

My library collection

In accordance with the APA style adopted by AGU

Denny Oliveira

March 16, 2024

My APA BIBTEX entries

- Aa, E., Ridley, A. J., Zhang, D., & Xiao, Z. (2012). Analyzing the hemispheric asymmetry in the thermospheric density response to geomagnetic storms. *Journal of Geophysical Research*, *117*(A8). <https://doi.org/10.1029/2011JA017259>
- Abbe, C. (1895). An aurora in South Carolina and Kentucky. *Monthly Weather Review*, *23*(8), 297-298. [https://doi.org/10.1175/1520-0493\(1895\)23\[297:AAISCA\]2.0.CO;2](https://doi.org/10.1175/1520-0493(1895)23[297:AAISCA]2.0.CO;2)
- Abbott, W. N. (1951). The aurora of August 19, 1950, photographed in Greece. *Journal of Atmospheric and Terrestrial Physics*, *1*(5-6), 343-344. [https://doi.org/10.1016/0021-9169\(51\)90007-4](https://doi.org/10.1016/0021-9169(51)90007-4)
- Abda, Z. M. K., Aziz, N. F. A., Kadir, M. Z. A. A., & Rhazali, Z. A. (2020). A Review of Geomagnetically Induced Current Effects on Electrical Power System: Principles and Theory. *IEEE Access*, *8*, 200237-200258. <https://doi.org/10.1109/ACCESS.2020.3034347>
- Abraham-Shrauner, B. (1972). Determination of magnetohydromagnetic shock normals. *Journal of Geophysical Research*, *77*(4), 736-739. <https://doi.org/10.1029/JA077i004p00736>
- Abraham-Shrauner, B., & Yun, S. H. (1976). Interplanetary shocks seen by Ames Plasma Probe on Pioneer 6 and 7. *Journal of Geophysical Research*, *81*(13), 2097-2102. <https://doi.org/10.1029/JA081i013p02097>
- Acuña, M. H., Curtis, D., Scheifele, J. L., Russell, C. T., Schroeder, P., Szabo, A., & Luhmann, J. G. (2008). The STEREO/IMPACT magnetic field experiment. *Space Science Reviews*, *136*(1), 203-226. <https://doi.org/10.1007/s11214-007-9259-2>
- Adebesin, B. O., Pulkkinen, A., & Ngwira, C. M. (2016). The interplanetary and magnetospheric causes of extreme dB/dt at equatorial locations. *Geophysical Research Letters*, *43*(22), 11,501-11,509. <https://doi.org/10.1002/2016GL071526>
- Adhikari, L., Zank, G. P., Hunana, P., & Hu, Q. (2016). The interaction of turbulence with parallel and perpendicular shocks. *Journal of Physics: Conference Series*, *767*(1), 1-13. <https://doi.org/10.1088/1742-6596/767/1/012001>
- Adrian, M. L. (2000). *Rocket measurements of the thermal and superthermal electron distributions in the prenoon topside auroral ionosphere and ionospheric cleft* (Ph.D thesis). University of Alabama in Huntsville, Huntsville, Alabama.

- Aguado, J., Cid, C., Saiz, E., & Cerrato, Y. (2010). Hyperbolic decay of the Dst index during the recovery phase of intense geomagnetic storms. *Journal of Geophysical Research*, *115*(A7). <https://doi.org/10.1029/2009JA014658>
- Aguilar-Rodriguez, E., Blanco-Cano, X., Russell, C. T., Jian, L. K., Luhmann, J. G., & Velez, J. C. R. (2010). Study of interplanetary shocks using multi-spacecraft observations. In M. Maksimovic, K. Issautier, N. Meyer-Vernet, M. Moncuquet, & F. Pantellini (Eds.), *Twelfth International Solar Wind Conference, AIP Conference Proceedings* (Vol. 1216, p. 467-470). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.3395904>
- Ahmadi, N., Germaschewski, K., & Raeder, J. (2016). Effects of electron temperature anisotropy on proton mirror instability evolution. *Journal of Geophysical Research: Space Physics*, *121*(6), 5350-5365. <https://doi.org/10.1002/2016JA022429>
- Ahn, B.-H., Kroehl, H. W., Kamide, Y., & Kihn, E. A. (2000). Universal time variations of the auroral electrojet indices. *Journal of Geophysical Research*, *105*(A1), 267-275. <https://doi.org/10.1029/1999JA900364>
- Ahn, B.-H., Moon, G.-H., Sun, W., Akasofu, S.-I., Chen, G. X., & Park, Y. D. (2002). Universal time variation of the Dst index and the relationship between the cumulative and Dst indices during geomagnetic storms. *Journal of Geophysical Research*, *107*(A11). <https://doi.org/10.1029/2002JA009257>
- Ahn, B.-H., Richmond, A. D., Kamide, Y., Kroehl, H. W., Emery, B. A., de la Beaujardière, O., & Akasofu, S.-I. (1998). An ionospheric conductance model based on ground magnetic disturbance data. *Journal of Geophysical Research*, *103*(A7), 14769-14780. <https://doi.org/10.1029/97JA03088>
- Airapetian, V. S. (2016). The environment of the young Earth in the perspective of an young Sun. *Proceedings of the International Astronomical Union*, *12*(S328), 315-328. <https://doi.org/10.1017/S1743921317004288>
- Airapetian, V. S., Glocer, A., Gronoff, G., Hébrard, E., & Danchi, W. (2016). Prebiotic chemistry and atmospheric warming of early Earth by an active young Sun. *Nature Geosciences*, *9*, 452-455. <https://doi.org/10.1038/ngeo2719>
- Airapetian, V. S., Glocer, A., Khazanov, G. V., Loyd, R. O. P., France, K., Sojka, J., Danchi, W. C., & Liemohn, M. W. (2017). How hospitable are space weather affected habitable zones? The role of ion escape. *The Astrophysical Journal*, *836*(1), 1-5. <https://doi.org/10.3847/2041-8213/836/1/L3>
- Airapetian, V. S., Jackman, C. H., Mlynczak, M., Danchi, W., & Hunt, L. (2017). Atmospheric beacons of life from exoplanets around G and K stars. *Nature Scientific Reports*, *7*(1), 14141. <https://doi.org/10.1038/s41598-017-14192-4>
- Akasofu, S.-I. (1964a). The development of geomagnetic storms after a negative sudden impulse. *Planetary and Space Science*, *12*(6), 573-578. [https://doi.org/10.1016/0032-0633\(64\)90004-2](https://doi.org/10.1016/0032-0633(64)90004-2)
- Akasofu, S.-I. (1964b). The development of the auroral substorm. *Planetary and Space Science*, *12*(4), 273-282. [https://doi.org/10.1016/0032-0633\(64\)90151-5](https://doi.org/10.1016/0032-0633(64)90151-5)
- Akasofu, S.-I. (1966). Electrodynamics of the magnetosphere: Geomagnetic storms. *Space Science Reviews*, *6*(1), 21-143. <https://doi.org/10.1007/BF00213406>

- Akasofu, S.-I. (1968). *Polar and magnetospheric substorms*. Hingham: D. Reidel.
- Akasofu, S.-I. (1977). *Physics of magnetospheric substorms*. Hingham: D. Reidel.
- Akasofu, S.-I. (1979). Interplanetary energy flux associated with magnetospheric substorms. *Planetary and Space Science*, *27*(4), 425-431. [https://doi.org/10.1016/0032-0633\(79\)90119-3](https://doi.org/10.1016/0032-0633(79)90119-3)
- Akasofu, S.-I. (1981a). Energy coupling between the solar wind and the magnetosphere. *Space Science Reviews*, *28*(2), 121-190. <https://doi.org/10.1007/BF00218810>
- Akasofu, S.-I. (1981b). Magnetospheric substorms: A newly emerging model. *Planetary and Space Science*, *29*(10), 1069-1078. [https://doi.org/10.1016/0032-0633\(81\)90004-0](https://doi.org/10.1016/0032-0633(81)90004-0)
- Akasofu, S.-I. (1983). Evolution of ideas in solar-terrestrial physics. *Geophysical Journal International*, *74*(1), 257-299. <https://doi.org/10.1111/j.1365-246X.1983.tb01880.x>
- Akasofu, S.-I. (2011). A historical review of the geomagnetic storm-producing plasma flows from the sun. *Space Science Reviews*, *164*(1-4), 85-132. <https://doi.org/10.1007/s11214-011-9856-y>
- Akasofu, S.-I. (2013a). The relationship between the magnetosphere and magnetospheric/auroral substorms. *Annales Geophysicae*, *31*, 387-394. <https://doi.org/10.5194/angeo-31-387-2013>
- Akasofu, S.-I. (2013b). Where is the magnetic energy for the expansion phase of auroral substorms accumulated? *Journal of Geophysical Research*, *118*(11), 7219-7225. <https://doi.org/10.1002/2013JA019042>
- Akasofu, S.-I., & Chao, J. (1980). Interplanetary shock waves and magnetospheric substorms. *Planetary and Space Science*, *28*(4), 381-385. [https://doi.org/10.1016/0032-0633\(80\)90042-2](https://doi.org/10.1016/0032-0633(80)90042-2)
- Akasofu, S.-I., & Chapman, S. (1963). The lower limit of latitude (U.S. sector) of northern quiet auroral arcs, and its relation to Dst(H). *Journal of Atmospheric and Solar-Terrestrial Physics*, *25*(9), 9-13. [https://doi.org/10.1016/0021-9169\(63\)90011-4](https://doi.org/10.1016/0021-9169(63)90011-4)
- Akay, I. G., Kaymaz, Z., & Sibeck, D. G. (2018). Magnetotail boundary crossings at lunar distances: ARTEMIS observations. *Journal of Atmospheric and Solar-Terrestrial Physics*. <https://doi.org/10.1016/j.jastp.2018.11.002>
- Akhiezer, A., Lubarski, G., & Polovin, R. (1959). The stability of shock waves in magneto-hydrodynamics. *Soviet Phys. JETP*, *8*, 507-511.
- Albert, J. M., & Shprits, Y. Y. (2009). Estimates of lifetimes against pitch angle diffusion. *Journal of Atmospheric and Solar-Terrestrial Physics*, *71*(16), 1647-1652. <https://doi.org/10.1016/j.jastp.2008.07.004>
- Albertson, V. D., Bozoki, B., Feero, W. E., Kappenman, J. G., Larsen, E. V., Nordell, D., Ponder, J., Prabhaskara, F. S., Thompson, K., & Walling, R. (1993). Geomagnetic disturbance effects on power systems. *IEEE Transactions on Power Delivery*, *8*(3), 1206-1216. <https://doi.org/10.1109/61.252646>
- Alex, S., Mukherjee, S., & Lakhina, G. S. (2006). Geomagnetic signatures during the intense geomagnetic storms of 29 October and 20 November 2003. *Journal of Atmospheric and Solar-Terrestrial Physics*, *68*(7), 769-780. <https://doi.org/10.1016/j.jastp.2006.01.003>

- Alfaro, J., Andrianov, A. A., Cambiaso, M., Giacconi, P., & Soldati, R. (2006). On the consistency of Lorentz invariance violation in QED induced by fermions in constant axial-vector background. *Phys. Lett. B*, *639*(5), 586-590. <https://doi.org/10.1016/j.physletb.2006.06.075>
- Alfvén, H. (1942). Existence of electromagnetic–hydrodynamic waves. *Nature*, *150*(3805), 405–406. <https://doi.org/10.1038/150405d0>
- Alfvén, H. (1956). The sun’s general magnetic field. *Tellus*, *8*(1), 1-12. <https://doi.org/10.1111/j.2153-3490.1956.tb01191.x>
- Alfvén, H. (1975). Electric Current Structure of the Magnetosphere. In B. Hultqvist & L. Stenflo (Eds.), *Physics of the Hot Plasma in the Magnetosphere* (p. 1-22). New York, NY: Plenum Press. https://doi.org/10.1007/978-1-4613-4437-7_1
- Alken, P., Thébault, E., Beggan, C. D., Amit, H., Aubert, J., Baerenzung, J., Bondar, T. N., Brown, W. J., Califf, S., Chambodut, A., Chulliat, A., Cox, G. A., Finlay, C. C., Fournier, A., Gillet, N., Grayver, A., Hammer, M. D., Holschneider, M., Huder, L., Hulot, G., Jager, T., Kloss, C., Korte, M., Kuang, W., Kuvshinov, A., Langlais, B., Léger, J.-M., Lesur, V., Livermore, P. W., Lowes, F. J., Macmillan, S., Magnes, W., Manda, M., Marsal, S., Matzka, J., Metman, M. C., Minami, T., Morschhauser, A., Mound, J. E., Nair, M., Nakano, S., Olsen, N., Pavón-Carrasco, F. J., Petrov, V. G., Ropp, G., Rother, M., Sabaka, T. J., Sanchez, S., Saturnino, D., Schnepf, N. R., Shen, X., Stolle, C., Tangborn, A., Tøffner-Clausen, L., Toh, H., Torta, J. M., Varner, J., Vervelidou, F., Vigneron, P., Wardinski, I., Wicht, J., Woods, A., Yang, Y., Zeren, Z., & Zhou, B. (2021). International geomagnetic reference field: the thirteenth generation. *Earth, Planets and Space*, *73*(49). <https://doi.org/10.1186/s40623-020-01288-x>
- Allan, R. R. (1972). Upper atmosphere heating near the auroral zones. *Nature*, *235*, 100–102. <https://doi.org/10.1038/235100a0>
- Allen, J. (2010). The Galaxy 15 Anomaly: Another Satellite in the Wrong Place at a Critical Time. *Space Weather*, *8*(6). <https://doi.org/10.1029/2010SW000588>
- Allen, J., Sauer, H., Frank, L., & Reiff, P. (1989). Effects of the March 1989 solar activity. *Eos Transactions AGU*, *70*(46), 1479–1488. <https://doi.org/10.1029/89EO00409>
- Altschul, B. (2004). Compton scattering in the presence of Lorentz and CPT violation. *Phys. Rev. D*, *70*, 056005. <https://doi.org/10.1103/PhysRevD.70.056005>
- Alves, L. R., Souza, V. M., Jauer, P. R., da Silva, L. A., Medeiros, C., Braga, C. R., Alves, M. V., Koga, D., Marchezi, J. P., de Mendonça, R. R. S., Dallaqua, R. S., Barbosa, M. V. G., Rockenbach, M., Dal Lago, A., Mendes, O., Vieira, L. E. A., Banik, M., Sibeck, D. G., Kanekal, S. G., Baker, D. N., Wygant, J. R., & Kletzing, C. A. (2017). The Role of Solar Wind Structures in the Generation of ULF Waves in the Inner Magnetosphere. *Solar Physics*, *292*(7). <https://doi.org/10.1007/s11207-017-1113-4>
- Alves, M. V., Echer, E., & Gonzalez, W. D. (2011). Geoeffectiveness of solar wind interplanetary magnetic structures. *Journal of Atmospheric and Solar-Terrestrial Physics*, *73*(11-12), 1380-1384. <https://doi.org/10.1016/j.jastp.2010.07.024>
- and A. M. Du, X. D. Z., & Xu, W. (n.d.). The magnetic local time distribution of ring current during the geomagnetic storm. *Planetary and Space Science*, *78*, 52-63.

<https://doi.org/10.1016/j.pss.2013.01.008>

- Amm, O., Engebretson, M. J., Hughes, T., Newitt, L., Viljanen, A., & Watermann, J. (2002). A traveling convection vortex event study: Instantaneous ionospheric equivalent currents, estimation of field-aligned currents, and the role of induced currents. *Journal of Geophysical Research*, *107*(A11), SIA 1-1-SIA 1-11. <https://doi.org/10.1029/2002JA009472>
- Amm, O., & Viljanen, A. (1999). Ionospheric disturbance magnetic field continuation from the ground to the ionosphere using spherical elementary current systems. *Earth, Planets and Space*, *51*, 431-440. <https://doi.org/10.1186/BF03352247>
- AN SSSR. (1954). *Astronomicheskii tsirkuliar*. Akademiia nauk SSSR. Biuro astronomicheskikh soobshchenii Vol. 2. (in Russian)
- Anderson, A. D. (1973). The relation between low-latitude neutral density variations near 400 km and magnetic activity indices. *Planetary and Space Science*, *21*(12), 2049–2060. [https://doi.org/10.1016/0032-0633\(73\)90182-7](https://doi.org/10.1016/0032-0633(73)90182-7)
- Anderson, B. J., Angappan, R., Barik, A., Vines, S. K., Stanley, S., Bernasconi, P. N., Korth, H., & Barnes, R. J. (2021). Iridium Communications Satellite Constellation Data for Study of Earth’s Magnetic Field. *Geochemistry, Geophysics, Geosystems*, *22*(8), e2020GC009515. <https://doi.org/10.1029/2020GC009515>
- Anderson, B. J., Korth, H., Waters, C. L., Green, D. L., & Stauning, P. (2008). Statistical Birkeland current distributions from magnetic field observations by the Iridium constellation. *Annales Geophysicae*, *26*, 671-687. <https://doi.org/10.5194/angeo-26-671-2008>
- Anderson, B. J., Takahashi, K., & Toth, B. A. (2000). Sensing global Birkeland currents with Iridium® engineering magnetometer data. *Geophysical Research Letters*, *27*(24), 4045-4048. <https://doi.org/10.1029/2000GL000094>
- Anderson, D., Anghel, A., Yumoto, K., Ishitsuka, M., & Kudeki, E. (2002). Estimating daytime vertical $\mathbf{E} \times \mathbf{B}$ drift velocities in the equatorial F-region using ground-based magnetometer observations. *Geophysical Research Letters*, *29*(12), 37-1–37-4. <https://doi.org/10.1029/2001GL014562>
- Anderson, P. C., Heelis, R. A., Jahn, J.-M., Chen, Y.-J., Ridley, A. J., Zou, S., Bristow, W. B., Purdue, M., & Freeman, M. A. (2023). The Thermal Plasma Sensor (TPS) for the Geospace Dynamics Constellation (GDC) mission. In *Final paper number: SA21D-2699*. Presented at 2023 AGU Fall Meeting, San Francisco, CA, 10-14 Dec..
- Andréová, K., Pulkkinen, T. I., Juusola, I., Palmeroth, M., & Santolik, O. (2011). Propagation of a shock-related disturbance in the Earth’s magnetosphere. *Journal of Geophysical Research*, *116*(A01213). <https://doi.org/10.1029/2010JA015908>
- Andréová, K., Pulkkinen, T. I., Laitinen, T. V., & Přech, L. (2008). Shock propagation in the magnetosphere: Observations and MHD simulations compared. *Journal of Geophysical Research*, *113*(A09224). <https://doi.org/10.1029/2008JA013350>
- Andréová, K., Pulkkinen, T. I., Palmroth, M., & McPherron, R. (2011). Geoefficiency of solar wind discontinuities. *Journal of Atmospheric and Solar-Terrestrial Physics*, *73*(1), 112-122. <https://doi.org/10.1016/j.jastp.2010.03.006>
- Andréová, K., & Přech, L. (2007a). Propagation of interplanetary shocks into

- the Earth's magnetosphere. *Advances in Space Research*, 40(12), 1871–1880.
<https://doi.org/10.1016/j.asr.2007.04.079>
- Andréová, K., & Přech, L. (2007b). Properties of fast forward shock caused waves in the magnetosphere. In J. Šafránková & J. Pavlů (Eds.), *WDS'07 Proceedings of Contributed Papers* (pp. 22–28). Prague, Czech Republic: WDS Proceedings.
- Andrianov, A. A., Giacconi, P., & Soldati, R. (2008). Lorentz and CPT violations from Chern-Simons modifications of QED. *Journal of High Energy Physics*, 2002(02), 030.
<https://doi.org/10.1088/1126-6708/2002/02/030>
- Andrioli, V. F., Echer, E., Savian, J. F., & Schuch, N. J. (2006). Positive and negative sudden impulses caused by fast forward and reverse interplanetary shocks. *Revista Brasileira de Geofísica*, 25(2), 175–179. <https://doi.org/10.1590/S0102-261X2007000600021>
- Andriyas, T. (2017). A comparative study of sawtooth events and substorm onsets triggered by interplanetary shocks. *Annals of Geophysics*, 60(6), GM672, 1–12.
<https://doi.org/10.4401/ag-7481>
- Angelopoulos, V. (2008). The THEMIS mission. *Space Science Reviews*, 141(1–4), 5–34.
<https://doi.org/10.1007/s11214-008-9336-1>
- Angelopoulos, V. (2011). The ARTEMIS mission. *Space Science Reviews*, 165, 3–25.
<https://doi.org/10.1007/s11214-010-9687-2>
- Angelopoulos, V., Artemyev, A., Phan, T. D., & Miyashita, Y. (2020). Near-Earth magnetotail reconnection powers space storms. *Nature Physics*.
<https://doi.org/10.1038/s41567-019-0749-4>
- Angelopoulos, V., Cruce, P., Drozdov, A., Grimes, E. W., Hatzigeorgiu, N., King, D. A., Larson, D., Lewis, J. W., McTiernan, J. M., Roberts, D. A., Russell, C. L., Hori, T., Kasahara, Y., Kumamoto, A., Matsuoka, A., Miyashita, Y., Miyoshi, Y., Shinohara, I., Teramoto, M., Faden, J. B., Halford, A. J., McCarthy, M., Millan, R. M., Sample, J. G., Smith, D. M., Woodger, L. A., Masson, A., Narock, A. A., Asamura, K., Chang, T. F., Chiang, C.-Y., Kazama, Y., Keika, K., Matsuda, S., Segawa, T., Seki, K., Shoji, M., Tam, S. W. Y., Umemura, N., Wang, B.-J., Wang, S.-Y., Redmon, R., Rodriguez, J. V., Singer, H. J., Vandegriff, J., Abe, S., Nose, M., Shinbori, A., Tanaka, Y.-M., UeNo, S., Andersson, L., Dunn, P., Fowler, C., Halekas, J. S., Hara, T., Harada, Y., Lee, C. O., Lillis, R., Mitchell, D. L., Argall, M. R., Bromund, K., Burch, J. L., Cohen, I. J., Galloy, M., Giles, B., Jaynes, A. N., Le Contel, O., Oka, M., Phan, T. D., Walsh, B. M., Westlake, J., Wilder, F. D., Bale, S. D., Livi, R., Pulupa, M., Whittlesey, P., DeWolfe, A., Harter, B., Lucas, E., Auster, U., Bonnell, J. W., Cully, C. M., Donovan, E., Ergun, R. E., Frey, H. U., Jackel, B., Keiling, A., Korth, H., McFadden, J. P., Nishimura, Y., Plaschke, F., Robert, P., Turner, D. L., Weygand, J. M., Candey, R. M., Johnson, R. C., Kovalick, T., Liu, M. H., McGuire, R. E., Breneman, A., Kersten, K., & Schroeder, P. (2019). The Space Physics Environment Data Analysis System (SPEDAS). *Space Science Reviews*, 215(9), 1–46.
<https://doi.org/10.1007/s11214-018-0576-4>
- Angelopoulos, V., McFadden, J. P., Larson, D., Carlson, C. W., Mende, S. B., Frey, H., Phan, T., Sibeck, D. G., Glassmeier, K.-H., Auster, U., Donovan, E., Mann, I. R., Rae, I. J., Russell, C. T., Runov, A., Zhou, X.-Z., & Kepko, L. (2008). Tail reconnection triggering substorm onset. *Science*, 321(5891), 931–935.

<https://doi.org/10.1126/science.1160495>

- Angelopoulos, V., Sibeck, D., Carlson, C. W., McFadden, J. P., Larson, D., Lin, R. P., Bonnell, J. W., Mozer, F. S., Ergun, R., Cully, C., Glassmeier, K. H., Auster, U., Roux, A., LeContel, O., Frey, S., Phan, T., Mende, S., Frey, H., Donovan, E., Russell, C. T., Strangeway, R., Liu, J., Mann, I., Rae, J., Raeder, J., Li, X., Liu, W., Singer, H. J., Sergeev, V., Apatenkov, S., Parks, G., Fillingim, M., & Sigwarth, J. (2008). First results from the THEMIS mission. *Space Science Reviews*, 141(1-4), 453-476. https://doi.org/10.1007/978-0-387-89820-9_19
- Ångström, J. A. (1869). On the Spectrum of the Aurora Borealis. *The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science.*, 38(244), 246-247. <https://doi.org/10.1080/14786446908640219>
- Aplin, K. L., & Harrison, R. G. (2013). Lord Kelvin's atmospheric electricity measurements. *History of Geo- and Space Sciences*, 4, 83-95. <https://doi.org/10.5194/hgss-4-83-2013>
- Appleton, E. V. (1946). Two anomalies in the ionosphere. *Nature*, 157, 691. <https://doi.org/10.1038/157691a0>
- Araki, T. (1977). Global structure of geomagnetic sudden commencements. *Planetary and Space Science*, 25(4), 373-384. [https://doi.org/10.1016/0032-0633\(77\)90053-8](https://doi.org/10.1016/0032-0633(77)90053-8)
- Araki, T. (1994). A physical model of the geomagnetic sudden commencement. In M. J. Engebretson, K. Takahashi, & M. Scholer (Eds.), *Solar Wind Sources of Magnetospheric Ultra-Low-Frequency Waves*, Geophysical Monograph Series (Vol. 81, p. 183-200). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM081p0183>
- Araki, T. (2014). Historically largest geomagnetic sudden commencement (SC) since 1868. *Earth, Planets and Space*, 66(164). <https://doi.org/10.1186/s40623-014-0164-0>
- Araki, T., Fujitani, S., Emoto, M., Yumoto, K., Shiokawa, K., Ichinose, T., Luehr, H., Orr, D., Milling, D. K., Singer, H., Rostoker, G., Tsunomura, S., Yamada, Y., & Liu, C. F. (1997). Anomalous sudden commencement on March 24, 1991. *Journal of Geophysical Research*, 102(A7), 14075-14086. <https://doi.org/10.1029/96JA03637>
- Araki, T., Keika, K., Kamei, T., Yang, H., & Alex, S. (2006). Nighttime enhancement of the amplitude of geomagnetic sudden commencements and its dependence on IMF-Bz. *Earth, Planets and Space*, 26, 45-50. <https://doi.org/10.1186/BF03351912>
- Araki, T., & Shinbori, A. (2016). Relationship between solar wind dynamic pressure and amplitude of geomagnetic sudden commencement (SC). *Earth, Planets and Space*, 68(9), 1-7. <https://doi.org/10.1186/s40623-016-0444-y>
- Araki, T., Takeuchi, T., & Araki, Y. (2004). Rise time of geomagnetic sudden commencements - Statistical analysis of ground geomagnetic data. *Earth, Planets and Space*, 56(2), 289-293. <https://doi.org/10.1186/BF03353411>
- Araki, T., Tsunomura, S., & Kikuchi, T. (2009). Local time variation of the amplitude of geomagnetic sudden commencements (SC) and SC-associated polar cap potential. *Earth, Planets and Space*, 61, e13-e16. <https://doi.org/10.1186/BF03353154>
- Archer, W. E., St.-Maurice, J.-P., Gallardo-Lacourt, B., Perry, G. W., Cully, C. M., Donovan, E., Gillies, D. M., Downie, R., Smith, J., & Eurich, D. (2019). The Vertical

- Distribution of the Optical Emissions of a Steve and Picket Fence Event. *Geophysical Research Letters*, 46(19), 10719-10725. <https://doi.org/10.1029/2019GL084473>
- Arcimis, A. (1903). Telegraphic Disturbances in Spain on October 31. *Nature*, 69(1776), 29. <https://doi.org/10.1038/069029b0>
- Arfken, G. B., & Weber, H. J. (2005). *Mathematical Methods for Physicists - International Edition*. Burlington: Elsevier Academic Press. (Sixth Edition)
- Arlinghaus, S. L. (1994). *Practical handbook of curve fitting*. Boca Raton, FL: CRC Press.
- Armstrong, E. B. (1982). The association of visible airglow features with a gravity wave. *Journal of Atmospheric and Terrestrial Physics*, 44(4), 325-336. [https://doi.org/10.1016/0021-9169\(82\)90077-0](https://doi.org/10.1016/0021-9169(82)90077-0)
- Armstrong, T. P., Pesses, M. E., & Decker, R. B. (1985). Shock drift acceleration. In B. T. Tsurutani & R. G. Stone (Eds.), *Collisionless Shocks in the Heliosphere: Reviews of Current Research*, Geophysical Monograph Series (Vol. 35, p. 271-285). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0271>
- Aryan, H., Balikhin, M. A., Taktakishvili, A., & Zhang, T. L. (2014). Observation of shocks associated with CMEs in 2007. *Annales Geophysicae*, 32(3), 223-230. <https://doi.org/10.5194/angeo-32-223-2014>
- Aryan, H., Sibeck, D. G., Kang, S.-B., Balikhin, M. A., Fok, M.-C., Agapitov, O., Komar, C. M., Kanekal, S. G., & Nagai, T. (2017). CIMI simulations with newly developed multiparameter chorus and plasmaspheric hiss wave models. *Journal of Geophysical Research: Space Physics*, 122(9), 9344-9357. <https://doi.org/10.1002/2017JA024159>
- Astafyeva, E., Yasyukevich, Y., Maksikov, A., & Zhivetiev, I. (2014). Geomagnetic storms, super-storms, and their impacts on GPS-based navigation systems. *Space Weather*, 12(7), 508-525. <https://doi.org/10.1002/2014SW001072>
- Aubin, D. (2016). Liais, Emmanuel-Benjamin. In T. Hockey et al. (Eds.), *Biographical Encyclopedia of Astronomers* (p. 1320-1321). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-1-4419-9917-7_847
- Auster, H. U., Glassmeier, K. H., Magnes, W., Aydogar, O., Baumjohann, W., Constantinescu, D., Fischer, D., Fornaçon, K. H., Georgescu, E., Harvey, P., Hillenmaier, O., Kroth, R., Ludlam, M., Narita, Y., Nakamura, R., Okrafka, K., Plaschke, F., Richter, I., Schwarzl, H., Stoll, B., Valavanoglou, A., & Wiedemann, M. (2008). The THEMIS Fluxgate Magnetometer. *Space Science Reviews*, 141, 235-264. <https://doi.org/10.1007/s11214-008-9365-9>
- Ausubel, D. P. (1963). *The psychology of meaningful learning*. New York, NY: Grune & Stratton.
- Axford, W. I. (1962). The interaction between the solar wind and the earth's magnetosphere. *Journal of Geophysical Research*, 67(10), 3791-3796. <https://doi.org/10.1029/JZ067i010p03791>
- Axford, W. I., Leer, E., & Skadron, G. (1977). The acceleration of cosmic rays by shock waves. In *International Cosmic Ray Conference* (Vol. 11, p. 132). Plovdiv, Bulgaria: Bulgarian Academy of Sciences.

- Badruddin, Kumar, A., & Derouich, M. (2019). Study of the travelling interplanetary shocks, their earth crossings and resulting geomagnetic disturbances. *Astrophysics and Space Science*, *364*(4), 1-8. <https://doi.org/10.1007/s10509-019-3560-x>
- Bag, T. (2018). Local Time Hemispheric Asymmetry in Nitric Oxide Radiative Emission During Geomagnetic Activity. *Journal of Geophysical Research: Space Physics*, *123*(11), 9669-9681. <https://doi.org/0.1029/2018JA025731>
- Bag, T., Rout, D., Ogawa, Y., & Singh, V. (2023). Distinctive response of thermospheric cooling to ICME and CIR-driven geomagnetic storms. *Frontiers in Astronomy and Space Science*, *10*. <https://doi.org/10.3389/fspas.2023.1107605>
- Bag, T., & Sivakumar, V. (2023). Diurnal Response of the Thermospheric radiative cooling to March 16–21, 2015 Geomagnetic Storm. *Advances in Space Research*, *71*(1), 144-159. <https://doi.org/10.1016/j.asr.2022.08.052>
- Bailey, D. K. (1964). Polar-cap absorption. *Planetary and Space Science*, *12*(5), 495-541. [https://doi.org/10.1016/0032-0633\(64\)90040-6](https://doi.org/10.1016/0032-0633(64)90040-6)
- Baker, A. B. (2019). *Effect of Interplanetary Shock Impact Angle on the Occurrence Rate and Properties of Pc5 Waves Observed by High-Latitude Ground Magnetometers* (Master's thesis). Virginia Tech, Blacksburg, Virginia.
- Baker, D. N. (2000). Effects of the sun on the Earth's environment. *Journal of Atmospheric and Solar-Terrestrial Physics*, *62*(17-18), 1669–1681. [https://doi.org/10.1016/S1364-6826\(00\)00119-X](https://doi.org/10.1016/S1364-6826(00)00119-X)
- Baker, D. N. (2002). How to cope with Space Weather. *Science*, *297*(5596), 1486-1487. <https://doi.org/10.1126/science.1074956>
- Baker, D. N. (2016). Becoming a Space Weather-Ready Nation. *Space Weather*, *14*(11), 935-936. <https://doi.org/10.1002/2016SW001555>
- Baker, D. N., Daly, E., Daglis, I., Kappenman, J. G., & Panasyuk, M. (2004). Effects of Space Weather on Technology Infrastructure. *Space Weather*, *2*(2). <https://doi.org/10.1029/2003SW000044>
- Baker, D. N., Erickson, P. J., Fennell, J. F., Foster, J. C., Jaynes, A. N., & Verronen, P. T. (2017). Space Weather Effects in the Earth's Radiation Belts. *Space Science Reviews*, *24*(17), 1-60. <https://doi.org/10.1007/s11214-017-0452-7>
- Baker, D. N., Erickson, P. J., Fennell, J. F., Foster, J. C., Jaynes, A. N., & Verronen, P. T. (2018). Space Weather Effects in the Earth's Radiation Belts. *Space Science Reviews*, *214*(17). <https://doi.org/10.1007/s11214-017-0452-7>
- Baker, D. N., Jaynes, A. N., Hoxie, V. C., Thorne, R. M., Foster, J. C., Li, X., Fennell, J. F., Wygant, J. R., Kanekal, S. G., Erickson, P. J., Kurth, W., Li, W., Ma, Q., Schiller, Q., Blum, L., Malaspina, D. M., Gerrard, A., & Lanzerotti, L. J. (2014). An impenetrable barrier to ultrarelativistic electrons in the Van Allen radiation belts. *Nature*, *515*, 531-534. <https://doi.org/10.1038/nature13956>
- Baker, D. N., Kanekal, S. G., Hoxie, V. C., Li, M. G. H. X., Spence, H. E., Elkington, S. R., Friedel, R. H. W., Goldstein, J., Hudson, M. K., Reeves, G. D., Thorne, R. M., Kletzing, C. A., & Claudepierre, S. G. (2013). A Long-Lived Relativistic Electron Storage Ring Embedded in Earth's Outer Van Allen Belt. *Science*, *340*(6129), 186-190. <https://doi.org/10.1126/science.1233518>

- Baker, D. N., & Lanzerotti, L. J. (2016). Resource Letter SW1: Space Weather. *American Journal of Physics*, *84*(3), 166-180. <https://doi.org/10.1119/1.4938403>
- Baker, D. N., Li, X., Pulkkinen, A., Ngwira, C. M., Mays, M. L., Galvin, A. B., & Simunac, K. D. C. (2013). A major solar eruptive event in July 2012: Defining extreme space weather scenarios. *Space Weather*, *11*(10), 585-591. <https://doi.org/10.1002/swe.20097>
- Baker, K. B., & Wing, S. (1989). A new magnetic coordinate system for conjugate studies at high latitudes. *Journal of Geophysical Research*, *94*(A7), 9139-9143. <https://doi.org/10.1029/JA094iA07p09139>
- Baker, W. G., & Martyn, D. F. (1953). Electric currents in the ionosphere. I. The conductivity. *Philosophical Transactions of the Royal Society of London*, *246*(913), 281-294. <https://doi.org/10.1098/rsta.1953.0016>
- Balan, N., Skoug, R., Tulasi Ram, S., Rajesh, P. K., Shiokawa, K., Otsuka, Y., Batista, I. S., Ebihara, Y., & Nakamura, T. (2014). CME front and severe space weather. *Journal of Geophysical Research: Space Physics*, *119*(12), 10,041-10,058. <https://doi.org/10.1002/2014JA020151>
- Balan, N., Tulasiram, S., Kamide, Y., Batista, I. S., Souza, J. R., Shiokawa, K., Rajesh, P. K., & Victor, N. J. (2017). Automatic selection of Dst storms and their seasonal variations in two versions of Dst in 50 years. *Earth, Planets and Space*, *69*(59). <https://doi.org/10.1186/s40623-017-0642-2>
- Balan, N., Zhang, Q.-H., Xing, Z., Skoug, R., Shiokawa, K., Lühr, H., Tulasi Ram, S., Otsuka, Y., & Zhao, L. (2019). Capability of Geomagnetic Storm Parameters to Identify Severe Space Weather. *The Astrophysical Journal*, *887*(1). <https://doi.org/10.3847/1538-4357/ab5113>
- Baldwin, M. (2017). Origins of the journal impact factor. *Physics Today*. <https://doi.org/10.1063/PT.5.9082>
- Balma, P. M. (1992). *Geomagnetic effects on a bank of single phase generator step-up transformers* (Tech. Rep. Nos. EPRI Report TR-100450, 20-1). Milbrae, CA: Proceedings of Geomagnetically Induced Currents Conference, November 8-10, 1989.
- Balogh, A., Bothmer, V., Crooker, N. U., Forsyth, R. J., Gloeckler, G., Hewish, A., Hilchenbach, M., Kallenbach, R., Klecker, B., Linker, J., Lucek, E., Mann, G., Marsch, E., Posner, A., Richardson, I., Schmidt, J., Wang, M. S. Y.-M., Aellig, R. W.-S. M. R., Bochsler, P., Hefti, S., & Mikić, Z. (1999). The solar origin of corotating interaction regions and their formation in the inner heliosphere. *Space Science Reviews*, *89*(1), 141-178. <https://doi.org/10.1023/A:1005245306874>
- Balogh, A., Gonzalez-Esparza, J. A., Forsyth, R. J., Burton, M. E., Goldstein, B. E., Smith, E. J., & Bame, S. J. (1995). Interplanetary shock waves: Ulysses observations in and out of the ecliptic plane. *Space Science Reviews*, *72*, 171-180. <https://doi.org/10.1007/BF00768774>
- Balogh, A., & Treumann, R. A. (2013). *Physics of collisionless shocks*. New York: Springer.
- Balthazor, R. L., & Moffett, R. J. (1999). Morphology of large-scale traveling atmospheric disturbances in the polar thermosphere. *Journal of Geophysical Research*, *104*(A1), 15-24. <https://doi.org/10.1029/1998JA900039>

- Bame, S. J., Asbridge, J. R., Feldman, W. C., Fenimore, E. E., & Gosling, J. T. (1979). Solar wind heavy ions from flare-heated coronal plasma. *Solar Physics*, *62*(1). <https://doi.org/10.1007/BF00150143>
- Banach, J. (1987). Pipeline coatings - evaluation, repair, and impact on corrosion protection design and cost. In (p. 10). National Assoc. of Corrosion Engineers, Houston, TX.
- Barbosa, C. S., Caraballo, R., Alves, L. R., Hartmann, G. A., Beggan, C. D., Viljanen, A., Ngwira, C. M., Papa, A. R. R., & Pirjola, R. J. (2017). The Tsallis statistical distribution applied to geomagnetically induced currents. *Space Weather*, *15*(9), 1094-1101. <https://doi.org/10.1002/2017SW001631>
- Barbosa, C. S., Hartmann, G. A., & Pinheiro, K. J. (2015). Numerical modeling of geomagnetically induced currents in a Brazilian transmission line. *Advances in Space Research*, *55*(4), 1168-1179. <https://doi.org/10.1016/j.asr.2014.11.008>
- Bargatze, L. F., Baker, D. N., McPherron, R. L., & Jr., E. W. H. (1985). Magnetospheric impulse response for many levels of geomagnetic activity. *Journal of Geophysical Research*, *90*(A7), 6387-6394. <https://doi.org/10.1029/JA090iA07p06387>
- Barlow, W. H. (1849). VI. On the spontaneous electrical currents observed in the wires of the electric telegraph. *Philosophical Transactions of the Royal Society of London*, 61-72. <https://doi.org/10.1098/rstl.1849.0006>
- Barnard, L., Scott, C. J., Owens, M., Lockwood, M., Crothers, S. R., Davies, J. A., & Harrison, R. A. (2015). Differences between the CME fronts tracked by an expert, an automated algorithm, and the Solar Stormwatch project. *Space Weather*, *13*(10), 709-725. <https://doi.org/10.1002/2015SW001280>
- Barnard, L. A., de Koning, C. A., Scott, C. J., Owens, M. J., Wilkinson, J., & Davies, J. A. (2017). Testing the current paradigm for space weather prediction with heliospheric imagers. *Space Weather*, *15*(6), 782-803. <https://doi.org/10.1002/2017SW001609>
- Barnett, R. J. (2016). *OneWeb Non-geostationary Satellite System: Technical Information to Supplement Schedule S* (Tech. Rep.). Washington, D.C.: Attachment to FCC Application SAT-LOI-20160428-00041. Retrieved from <https://fcc.report/IBFS/SAT-MPL-20200526-00062/2379706.pdf>
- Barrington-Leigh, C. P., Inan, U. S., & Stanley, M. (2001). Identification of sprites and elves with intensified video and broadband array photometry. *Journal of Geophysical Research*, *106*(A2), 1741-1750. <https://doi.org/10.1029/2000JA000073>
- Bartels, J. (1937). Solar eruptions and their ionospheric effects - A classical observation and its new interpretation. *Terrestrial Magnetism and Atmospheric Electricity*, *42*(3), 235-239. <https://doi.org/10.1029/TE042i003p00235>
- Bartels, J. (1949). The standardized index, Ks, and the planetary index, Kp. *Int. Union Geod. Geophys. IATME Bull.*, *97*(12b).
- Bartels, J., & Veldkam, J. (1954). International data on magnetic disturbances, fourth quarter, 1953. *Journal of Geophysical Research*, *59*(2), 295-302. <https://doi.org/10.1029/JZ059i002p00297>
- Barth, C. A., Lu, G., & Roble, R. G. (2009). Joule heating and nitric oxide in the thermosphere. *Journal of Geophysical Research*, *114*(A5). <https://doi.org/10.1029/2008JA013765>

- Barth, C. A., Mankoff, K. D., Bailey, S. M., & Solomon, S. C. (2003). Global observations of nitric oxide in the thermosphere. *Journal of Geophysical Research*, *108*(A1). <https://doi.org/10.1029/2002JA009458>
- Barth, C. A., Tobiska, W. K., Siskind, D. E., & Cleary, D. D. (1988). Solar-terrestrial coupling: Low-latitude thermospheric nitric oxide. *Geophysical Research Letters*, *15*(1), 92-94. <https://doi.org/10.1029/GL015i001p00092>
- Baruah, Y., Roy, S., Sinha, S., Palmerio, E., Pal, S., Oliveira, D. M., & Nandy, D. (2024). The loss of the Starlink satellites in February 2022: How moderate geomagnetic storms can adversely affect assets in Low-Earth orbit. *Space Weather*. (Under review)
- Bates, D. R. (1960). The airglow. In J. A. Ratcliffe (Ed.), *Physics of the Upper Atmosphere* (p. 219-268). New York, NY: Academic Press.
- Battin, R. H. (1999). *An introduction to the mathematics and methods of astrodynamics, revised edition*. Reston, VA: American Institute of Aeronautics and Astronautics.
- Bauer, S., & Lemmer, H. (2004). *Planetary aeronomy: Atmosphere environments in planetary systems*. Berlin, Germany: Springer-Verlag Berlin Heidelberg.
- Baumgärtel, K., Sauer, K., & Bogdanov, A. (1994). A magnetohydrodynamic model of solar wind interaction with asteroid Gaspra. *Science*, *263*(5147), 653-655. <https://doi.org/10.1126/science.263.5147.653>
- Baumjohann, W., Blanc, M., Fedorov, A., & Glassmeier, K.-H. (2010). Current Systems in Planetary Magnetospheres and Ionospheres. *Space Science Reviews*, *152*(1-4), 99-134. <https://doi.org/10.1007/s11214-010-9629-z>
- Baumjohann, W., & Glassmeier, K.-H. (1984). The transient response mechanism and Pi2 pulsations at substorm onset - Review and outlook. *Planetary and Space Science*, *32*(11), 1361-1370. [https://doi.org/10.1016/0032-0633\(84\)90079-5](https://doi.org/10.1016/0032-0633(84)90079-5)
- Baumjohann, W., & Treumann, R. (2009). *Basic Space Plasma Physics*. London, United Kingdom: Imperial College Press.
- Bavassano, B., Mariani, F., & Ness, N. F. (1973). Pioneer 8 observations and interpretations of sixteen interplanetary shock waves observed in 1968. *Journal of Geophysical Research*, *78*(22), 4535—4546. <https://doi.org/10.1029/JA078i022p04535>
- Bedrosian, P. A., & Love, J. J. (2015). Mapping geoelectric fields during magnetic storms: Synthetic analysis of empirical united states impedances. *Geophysical Research Letters*, *42*(23), 10,160-10,170. <https://doi.org/10.1002/2015GL066636>
- Beggan, C. D. (2015). Sensitivity of geomagnetically induced currents to varying auroral electrojet and conductivity models. *Earth, Planets and Space*, *67*(24). <https://doi.org/10.1186/s40623-014-0168-9>
- Belakhovsky, V., Pilipenko, V., Engebretson, M., Sakharov, Y., & Selivanov, V. (2019). Impulsive disturbances of the geomagnetic field as a cause of induced currents of electric power lines. *Journal of Space Weather and Space Climate*, *9*(A8). <https://doi.org/10.1051/swsc/2019015>
- Belakhovsky, V. B., Pilipenko, V., Ya. A. Sakharov, Lorentsen, D. L., & Samsonov, S. N. (2017). Geomagnetic and ionospheric response to the interplanetary shock on Jan. 24, 2012. *Earth, Planets and Space*, *69*(105), 1-25. <https://doi.org/10.1186/s40623-017->

- Béland, J., & Small, K. (2005). Space Weather Effects on Power Transmission Systems: The Cases of Hydro-Québec and Transpower New ZealandLtd. In I. A. Daglis (Ed.), *Effects of space weather on technology infrastructure* (p. 287-299). Dordrecht, The Netherlands: Springer. <https://doi.org/10.1007/1-4020-2754-015>
- Belcher, J. W., & Davis, L. (1971). Large-amplitude Alfvén waves in the interplanetary medium, 2. *Journal of Geophysical Research*, *76*(16), 3534-3563. <https://doi.org/10.1029/JA076i016p03534>
- Belian, R. D., Gisler, G. R., Cayton, T., & Christensen, R. (1992). High-Z energetic particles at geosynchronous orbit during the Great Solar Proton Event Series of October 1989. *Journal of Geophysical Research*, *97*(A11), 16897-16906. <https://doi.org/10.1029/92JA01139>
- Belich, H., Costa-Soares, T., Santos, M., & Orlando, M. (2007). Violação da simetria de Lorentz. *Revista Brasileira de Ensino de Física*, *29*(1). <https://doi.org/10.1590/S1806-11172007000100011>
- Belov, A., Papaioannou, A., Abunina, M., Dumbovic, M., Richardson, I. G., Heber, B., Kuhl, P., Herbst, K., Anastasiadis, A., Vourlidas, A., Eroshenko, E., & Abunin, A. (2021). On the Rigidity Spectrum of Cosmic-Ray Variations within Propagating Interplanetary Disturbances: Neutron Monitor and SOHO/EPHIN Observations at ~1–10 GV. *The Astrophysical Journal*, *908*(1). <https://doi.org/10.3847/1538-4357/abd724>
- Benacquista, R., Rochel, S., & Rolland, G. (2017). Understanding the variability of magnetic storms caused by ICMEs. *Annales Geophysicae*, *35*, 147-159. <https://doi.org/10.5194/angeo-35-147-2017>
- Benevides, J. M. A. (1979). *D. Pedro II, o patrono da astronomia brasileira*. Fortaleza, Brazil: Imprensa Oficial do Ceará.
- Benkevich, L., Lyatsky, W., & Cogger, L. L. (2000). Field-aligned currents between conjugate hemispheres. *Journal of Geophysical Research*, *105*(A12), 27727-27737. <https://doi.org/10.1029/2000JA900095>
- Benkevitch, L. (2006). *Effects of ionospheric conductance in high-latitude phenomena* (Ph.D thesis). University of Saskatchewan, Saskatoon, Canada.
- Bennet, J., Donahue, M., Schneider, N., & Voit, M. (2012). *The essential cosmic perspective* (6th ed.). New York, NY: Addison-Wesley.
- Benson, R. F. (1996). Ionospheric investigations using digital Alouette/ISIS topside ionograms. In J. M. Goodman (Ed.), *1996 Ionospheric Effects Symposium* (p. 202-209). Alexandria, VA.
- Benson, R. F., & Bilitza, D. (2009). New satellite mission with old data: Rescuing a unique data set. *Radio Science*, *44*(1). <https://doi.org/10.1029/2008RS004036>
- Benson, R. F., Fainberg, J., Osherovich, V. A., Truhlik, V., Wang, Y., Bilitza, D., & Fung, S. F. (2016). High-latitude topside ionospheric vertical electron density profile changes in response to large magnetic storms. *Radio Science*, *51*(5), 524-537. <https://doi.org/10.1002/2015RS005882>

- Benson, R. F., Truhlik, V., Huang, X., Wang, Y., & Bilitza, D. (2012). Improving the automatic inversion of digital Alouette/ISIS ionogram reflection traces into topside electron density profiles. *Radio Science*, *47*(4). <https://doi.org/10.1029/2011RS004963>
- Berdichevsky, D. B., Szabo, A., Lepping, R. P., Viñas, A. F., & Mariani, F. (2000). Interplanetary fast shocks and associated drivers observed through the 23rd solar minimum by Wind over its first 2.5 years. *Journal of Geophysical Research*, *105*(A12), 27,289–27,314. <https://doi.org/10.1029/1999JA000367>
- Berger, C., & Barlier, F. (1981a). Asymmetrical structure in the thermosphere during magnetic storms as deduced from the CACTUS accelerometer data. *Advances in Space Research*, *1*(12), 251–235. [https://doi.org/10.1016/0273-1177\(81\)90438-5](https://doi.org/10.1016/0273-1177(81)90438-5)
- Berger, C., & Barlier, F. (1981b). Response of the equatorial thermosphere to magnetic activity analysed with accelerometer total density data. Asymmetrical structure. *Journal of Atmospheric and Solar-Terrestrial Physics*, *43*(2), 121–133. [https://doi.org/10.1016/0021-9169\(81\)90070-2](https://doi.org/10.1016/0021-9169(81)90070-2)
- Berger, T., Holzinger, M., Sutton, E., & Thayer, J. (2020). Flying Through Uncertainty. *Space Weather*, *18*(1), e2019SW002373. <https://doi.org/10.1029/2019SW002373>
- Berger, T. E., Dominique, M., Lucas, G., Pilinski, M., Ray, V., Sewell, R., Sutton, E. K., Thayer, J. P., & Thiemann, E. (2023). The Thermosphere Is a Drag: The 2022 Starlink Incident and the Threat of Geomagnetic Storms to Low Earth Orbit Space Operations. *Space Weather*, *21*(3), e2022SW003330. <https://doi.org/10.1029/2022SW003330>
- Besprozvannaya, A. S. (1962). Abnormal Polar-Cap Absorption Associated with Strong Chromospheric Flares on the Sun for the Period 1938 to 1959. *Journal of the Physical Society of Japan*, *17*, 146-149.
- Bettadpur, S. (2007). *GRACE 327-720 (CSR-GR-03-02) Gravity Recovery and Climate Experiment* (Tech. Rep. Nos. Product Specification Document (Rev 4.6 – May 29, 2012)). Austin, Texas: The University of Texas at Austin, Center for Space Research.
- Bhaskar, A., Hayakawa, H., Oliveira, D. M., Blake, S., Silverman, S., & Ebihara, Y. (2020). An analysis of Trouvelot’s Auroral Drawing on 1/2 March 1872: Plausible Evidence for Recurrent Geomagnetic Storms. *Journal of Geophysical Research: Space Physics*, *125*(10), e2020JA028227. <https://doi.org/10.1029/2020JA028227>
- Bhaskar, A., Sibeck, D., Kanekal, S. G., Singer, H. J., Reeves, G., Oliveira, D. M., Kang, S.-B., & Komar, C. M. (2021). Radiation belt response to fast reverse shock at geosynchronous orbit. *The Astrophysical Journal*, *910*(2), 154. <https://doi.org/10.3847/1538-4357/abd702>
- Bhaskar, A., Sibeck, D. G., Kanekal, S. G., Singer, H. J., Reeves, G. D., Angelopoulos, V., & Oliveira, D. M. (2018). Radiation belt response to fast reverse shock at geosynchronous orbit. In *Final paper number sm31c-1792*. Presented at 2018 AGU Fall Meeting, Washington, D.C., 10-14 Dec..
- Bhowmik, P., & Nandy, D. (2018). Prediction of the strength and timing of sunspot cycle 25 reveal decadal-scale space environmental conditions. *Nature Communications*, *9*(5209). <https://doi.org/10.1038/s41467-018-07690-0>
- Biermann, L. (1957). Solar corpuscular radiation and the interplanetary gas. *Observatory*, *77*, 109-110.

- Bignami, G. F. (2016). *The mystery of the seven spheres – how homo sapiens will conquer space*. Cham, Switzerland: Springer International Publishing. <https://doi.org/10.1007/978-3-319-17004-6>
- Billett, D. D., Grocott, A., Wild, J. A., Walach, M.-T., & Kosch, M. J. (2018). Diurnal Variations in Global Joule Heating Morphology and Magnitude Due To Neutral Winds. *Journal of Geophysical Research: Space Physics*, *123*(3), 2398-2411. <https://doi.org/10.1002/2017JA025141>
- Billett, D. D., McWilliams, K. A., Pakhotin, I. P., Burchill, J. K., Knudsen, D. J., & Martin, C. J. (2022). High-Resolution Poynting Flux Statistics From the Swarm Mission: How Much Is Being Underestimated at Larger Scales? *Journal of Geophysical Research: Space Physics*, *127*(7), e2022JA030573. <https://doi.org/10.1029/2022JA030573>
- Billett, D. D., Perry, G. W., Clausen, L. B. N., Archer, W. E., McWilliams, K. A., Haaland, S., Reistad, J. P., Burchill, J. K., Patrick, M. R., Humberstet, B. K., & Anderson, B. J. (2021). The Relationship Between Large Scale Thermospheric Density Enhancements and the Spatial Distribution of Poynting Flux. *Journal of Geophysical Research: Space Physics*, *126*(n/a), e2021JA029205. <https://doi.org/10.1029/2021JA029205>
- Birkeland, K. (1908). *The Norwegian aurora polaris expedition, 1902-1903* (Vol. 1). Oslo, Norway: H. Aschehoug & Co. <https://doi.org/10.5962/bhl.title.17857>
- Biskamp, D. (1973). Collisionless shock waves in plasmas. *Nuclear Fusion*, *13*(5), 719. <https://doi.org/10.1088/0029-5515/13/5/010>
- Blake, J. B., Kolasinski, W. A., Fillius, R. W., & Mullen, E. G. (1992). Injection of electrons and protons with energies of tens of MeV into $L < 3$ on 24 March 1991. *Geophysical Research Letters*, *19*(8), 821-824. <https://doi.org/10.1029/92GL00624>
- Blake, S. P., Gallagher, P. T., McCauley, J., Jones, A. G., Hogg, C., Campanyà, J., Beggan, C. D., Thomson, A. W. P., Kelly, G. S., & Bell, D. (2016). Geomagnetically induced currents in the Irish power network during geomagnetic storms. *Space Weather*, *14*(12), 1136-1154. <https://doi.org/10.1002/2016SW001534>
- Blake, S. P., Pulkkinen, A., Schuck, P. W., Glocer, A., Oliveira, D. M., Welling, D., Weigel, R. S., & Quaresima, G. (2021). Recreating the Horizontal Magnetic Field at Colaba during the Carrington Event with Geospace Simulations. *Space Weather*, *19*, e2020SW002585. <https://doi.org/10.1029/2020SW002585>
- Blake, S. P., Pulkkinen, A., Schuck, P. W., Glocer, A., & Tóth, G. (2021). Estimating Maximum Extent of Auroral Equatorward Boundary using Historical and Simulated Surface Magnetic Field Data. *Journal of Geophysical Research: Space Physics*, e2020JA028284. <https://doi.org/10.1029/2020JA028284>
- Blake, S. P., Pulkkinen, A., Schuck, P. W., Nevanlinna, H., Reale, O., Veenadhari, B., & Mukherjee, S. (2020). Magnetic Field Measurements from Rome during the August-September 1859 Storms. *Journal of Geophysical Research: Space Physics*, *125*(6), e2019JA027336. <https://doi.org/10.1029/2019JA027336>
- Blake, S. P., Pulkkinen, A. A., & Schuck, P. W. (2019). Latitudinal Extent of the Auroral Oval during the Carrington Event. In *Final paper abstract number: IN41B-09*. Presented at 2019 AGU Fall Meeting, Washington, D.C., 10-14 Dec.
- Blake, S. P., Pulkkinen, A. A., Schuck, P. W., Glocer, A., Oliveira, D. M., & Welling,

- D. T. (2020). Recreating the Horizontal Magnetic Field at Colaba during the Carrington Event with Geospace Simulations. In *Final paper abstract number: SM011-10*. Presented at the 2020 AGU Fall Meeting (virtual), 1-17 Dec.
- Blanco-Cano, X., Omidi, N., & Russell, C. T. (2004). How to make a magnetosphere. *Astronomy & Geophysics*, *45*, 3.14-3.17. <https://doi.org/10.1046/j.1468-4004.2003.45314.x>
- Bleeker, J. A. M., Geiss, J., & Huber, M. C. E. (Eds.). (2002). *The century of space science*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Bluhm, R. (2001). Lorentz and CPT tests in QED. *AIP Conference Proceedings*, *564*(1), 101-108. <https://doi.org/10.1063/1.1374973>
- Bodanis, D. (2005). *Electric Universe - How Electricity Switched On the Modern World*. New York, NY: Three Rivers Press.
- Bolduc, L. (2002). GIC observations and studies in the Hydro-Québec power system. *Journal of Atmospheric and Solar-Terrestrial Physics*, *64*(16), 1793-1802. [https://doi.org/10.1016/S1364-6826\(02\)00128-1](https://doi.org/10.1016/S1364-6826(02)00128-1)
- Bolduc, L., & Aubin, J. (1978). Effects of direct currents in power transformers Part I. A general theoretical approach. *Electric Power Systems Research*, *1*(4), 291-298. [https://doi.org/10.1016/0378-7796\(78\)90015-9](https://doi.org/10.1016/0378-7796(78)90015-9)
- Bol'shakova, O., & Troitskaya, V. A. (1968). Relation of the interplanetary magnetic field direction to the system of stable oscillations. *Dokl. Akad. Nauk SSSR*, *180*(2), 343-346.
- Borodkova, N., Zastenkera, G., Riazantseva, M., & Richardson, J. (2005). Large and sharp solar wind dynamic pressure variations as a source of geomagnetic field disturbances at the geosynchronous orbit. *Planetary and Space Science*, *53*(-3), 25-32. <https://doi.org/10.1016/j.pss.2004.09.025>
- Borodkova, N. L., Liu, J. B., Huang, Z. H., Zastenker, G. N., Wang, C., & Eiges, P. E. (2006). Effect of change in large and fast solar wind dynamic pressure on geosynchronous magnetic field. *Chinese Physics*, *15*(10), 2458-2464. <https://doi.org/10.1088/1009-1963/15/10/045>
- Borovsky, J. E. (2020). What magnetospheric and ionospheric researchers should know about the solar wind. *Journal of Atmospheric and Solar-Terrestrial Physics*, *204*(105271), 1-16. <https://doi.org/10.1016/j.jastp.2020.105271>
- Borovsky, J. E., & Denton, M. H. (2006). Differences between CME-driven storms and CIR-driven storms. *Journal of Geophysical Research*, *111*(A7). <https://doi.org/10.1029/2005JA011447>
- Borovsky, J. F. (2016). Solar wind. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 47-74). Boca Raton, FL: CRC Press.
- Borrini, G., Gosling, J. T., Bame, S. J., & Feldman, W. C. (1982). An analysis of shock wave disturbances observed at 1 AU from 1971 through 1978. *Journal of Geophysical Research*, *87*(A6), 4365-4373. <https://doi.org/10.1029/JA087iA06p04365>
- Bortnik, J., & Camporeale, E. (2021). Ten Ways to Apply Machine Learning in Earth and Space Sciences. *Eos Transactions AGU*, *2021*. <https://doi.org/10.1029/2021EO160257>

- Boteler, D. (2014). Methodology for simulation of geomagnetically induced currents in power systems. *Journal of Space Weather and Space Climate*, 4(4), A21. <https://doi.org/10.1051/swsc/2014018>
- Boteler, D. H. (2001). Space weather effects on power systems. In P. Song, H. J. Singer, & G. L. Siscoe (Eds.), *Space Weather*, Geophysical Monograph Series (Vol. 125, pp. 347–352). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM125p0347>
- Boteler, D. H. (2003). Geomagnetic Hazards to Conducting Networks. *Natural Hazards*, 28, 537-561. <https://doi.org/10.1023/A:1022902713136>
- Boteler, D. H. (2019). A Twenty-First Century View of the March 1989 Magnetic Storm. *Space Weather*, 17(10), 1427-1441. <https://doi.org/10.1029/2019SW002278>
- Boteler, D. H., Chakraborty, S., Shi, X., Hartinger, M. D., & Wang, X. (2024). An Examination of Geomagnetic Induction in Submarine Cables. *Space Weather*, 22(2), e2023SW003687. <https://doi.org/10.1029/2023SW003687>
- Boteler, D. H., & Pirjola, R. J. (2014). Comparison of methods for modelling geomagnetically induced currents. *Annales Geophysicae*, 32(9), 1177-1187. <https://doi.org/10.5194/angeo-32-1177-2014>
- Boteler, D. H., & Pirjola, R. J. (2017). Modeling geomagnetically induced currents. *Space Weather*, 15(1), 258-276. <https://doi.org/10.1002/2016SW001499>
- Boteler, D. H., Pirjola, R. J., & Nevanlinna, H. (1998). The effects of geomagnetic disturbances on electrical systems at the Earth's surface. *Advances in Space Research*, 22(1), 17-27. [https://doi.org/10.1016/S0273-1177\(97\)01096-X](https://doi.org/10.1016/S0273-1177(97)01096-X)
- Boteler, D. H., & van Beek, G. J. (1999). August 4, 1972 revisited: A new look at the geomagnetic disturbance that caused the L4 cable system outage. *Geophysical Research Letters*, 26(5), 577-580. <https://doi.org/10.1029/1999GL900035>
- Bothmer, V., & Daglis, I. (2007). *Space weather: Physics and effects*. New York, NY: Springer.
- Botley, C. M. (1963). Sporadic aurora. *Planetary and Space Science*, 11(6), 723-724. [https://doi.org/10.1016/0032-0633\(63\)90176-4](https://doi.org/10.1016/0032-0633(63)90176-4)
- Boudouridis, A., Lyons, L. R., Zesta, E., & Ruohoniemi, J. M. (2007). Dayside reconnection enhancement resulting from a solar wind dynamic pressure increase. *Journal of Geophysical Research*, 112(A6), 1-12. <https://doi.org/10.1029/2006JA012141>
- Boudouridis, A., Lyons, L. R., Zesta, E., Weygand, J. M., Ribeiro, A. J., & Ruohoniemi, J. M. (2011). Statistical study of the effect of solar wind dynamic pressure fronts on the dayside and nightside ionospheric convection. *Journal of Geophysical Research*, 116(A10). <https://doi.org/10.1029/2011JA016582>
- Boudouridis, A., & Spence, H. E. (2007). Separation of spatial and temporal structure of auroral particle precipitation. *Journal of Geophysical Research*, 112(A12). <https://doi.org/10.1029/2007JA012591>
- Boudouridis, A., Zesta, E., Lyons, L. R., & Anderson, P. C. (2004). Evaluation of the Hill-Siscoe transpolar potential saturation model during a solar

- wind dynamic pressure pulse. *Geophysical Research Letters*, 31(23), 1–4. <https://doi.org/10.1029/2004GL021252>
- Boudouridis, A., Zesta, E., Lyons, L. R., Anderson, P. C., & Lummerzheim, D. (2004). Magnetospheric reconnection driven by solar wind pressure fronts. *Annales Geophysicae*, 22, 1367-1378. <https://doi.org/10.5194/angeo-22-1367-2004>
- Boudouridis, A., Zesta, E., Lyons, L. R., Anderson, P. C., & Lummerzheim, D. (2005). Enhanced solar wind geoeffectiveness after a sudden increase in dynamic pressure during southward IMF orientation. *Journal of Geophysical Research*, 110(A5), 1–15. <https://doi.org/10.1029/2004JA010704>
- Boudouridis, A., Zesta, E., Lyons, R., Anderson, P. C., & Lummerzheim, D. (2003). Effect of solar wind pressure pulses on the size and strength of the auroral oval. *Journal of Geophysical Research*, 108(A4), 1–16. <https://doi.org/10.1029/2002JA009373>
- Bowman, B. R., & Hrcir, S. (2007). Drag Coefficient Variability at 100-300 km from the Orbit Decay Analyses of Rocket Bodies. In *AIAA/AAS Astrodynamics Specialist Conference*. Mackinac Island, Michigan.
- Bowman, B. R., Tobiska, W. K., Marcos, F. A., Huang, C. Y., Lin, C. S., & Burke, W. J. (2008). A new empirical thermospheric density model JB2008 using new solar and geomagnetic indices. In *AIAA/AAS Astrodynamics Specialist Conference, AIAA 2008-6438* (p. 1-19). Honolulu, HI: American Institute of Aeronautics and Astronautics (AIAA) and American Astronautical Society (AAS). <https://doi.org/10.2514/6.2008-6438>
- Bowman, B. R., Tobiska, W. K., Marcos, F. A., & Valladares, C. (2006). The JB2006 empirical thermospheric density model. *Journal of Atmospheric and Solar-Terrestrial Physics*, 70(5), 774-793. <https://doi.org/10.1016/j.jastp.2007.10.002>
- Boyd, T. J. M., & Sanderson, J. J. (1969). *Plasma Dynamics*. New York, NY: Barnes & Noble.
- Boyd, T. J. M., & Sanderson, J. J. (2003). *The Physics of Plasmas*. Cambridge, United Kingdom: Cambridge University Press.
- Boyer, H. B. (1898). Anomalous and Sporadic Auroras. *Monthly Weather Review*, 26(5), 260-261. [https://doi.org/10.1175/1520-0493\(1898\)26\[260:AASA\]2.0.CO;2](https://doi.org/10.1175/1520-0493(1898)26[260:AASA]2.0.CO;2)
- Boyle, C. B., Reiff, P. H., & Hairston, M. R. (1997). Empirical polar cap potentials. *Journal of Geophysical Research*, 102(A1), 111-125. <https://doi.org/10.1029/96JA01742>
- Brady, B., Zesta, E., & Oliveira, D. M. (2021). High-latitude Nitric Oxide time response during CME-driven geomagnetic storms. In *Final paper abstract number: SA25B-1968*. Presented at the 2021 AGU Fall Meeting, 12-17 Dec, New Orleans, LA.
- Brandt, D. A., Bussy-Virat, C. D., & Ridley, A. J. (2020). A Simple Method for Correcting Empirical Model Densities During Geomagnetic Storms Using Satellite Orbit Data. *Space Weather*, 18(12), e2020SW002565. <https://doi.org/10.1029/2020SW002565>
- Brandt, P. C., Zheng, Y., Sotirelis, T. S., Oksavik, K., & Rich, F. J. (2008). The Linkage between the Ring Current and the Ionosphere System. In *Midlatitude Ionospheric Dynamics and Disturbances*, Geophysical Monograph Series (Vol. 181, p. 135-143). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/181GM13>

- Bravo, S., & Pérez-Enríquez, R. (1994). Coronal mass ejections associated with interplanetary shocks and their relation to coronal holes. *Revista Mexicana de Astronomía y Astrofísica*, *28*, 17-25.
- Brekke, A. (1997). *Physics of the upper polar atmosphere*. Norfolk, United Kingdom: Springer.
- Brinkman, D. G., Walterscheid, R. L., Clemmons, J. H., & Hecht, J. H. (2016). High-resolution modeling of the cusp density anomaly: Response to particle and Joule heating under typical conditions. *Journal of Geophysical Research: Space Physics*, *121*(3), 2645-2661. <https://doi.org/10.1002/2015JA021658>
- Brinton, H. C., Scott, L. R., Pharo III, M. W., & Coulson, J. T. (1973). The Bennett ion-mass spectrometer on Atmosphere Explorer-C and -E. *Radio Science*, *8*(4), 323-332. <https://doi.org/10.1029/RS008i004p00323>
- Brito, F. A., Grigorio, L. S., Guimaraes, M. S., Passos, E., & Wotzasek, C. (2008). Induced Chern-Simons-like action in Lorentz-violating massless QED. *Phys. Rev. D*, *78*, 125023. <https://doi.org/10.1103/PhysRevD.78.125023>
- Brody, J. (2002). *The enigma of sunspots: A story of discovery and scientific revolution*. Eddinburgh, United Kingdom: Floris Books.
- Brookfield, S. D. (2015). *The skillful teacher: On technique, trust, and responsiveness in the classroom* (3rd ed.). San Francisco, CA: Jossey-Bass.
- Brueckner, G. E., Howard, R. A., Koomen, M. J., Korendyke, C. M., Michels, D. J., Moses, J. D., Socker, D. G., Dere, K. P., Lamy, P. L., Llebaria, A., Bout, M. V., Schwenn, R., Simnett, G. M., Bedford, D. K., & Eyles, C. J. (1995). The Large Angle Spectroscopic Coronagraph (LASCO). *Solar Physics*, *162*(1), 357-402. <https://doi.org/10.1007/BF00733434>
- Bruinsma, S., & Biancale, R. (2003). Total Densities Derived from Accelerometer Data. *Journal of Spacecraft and Rockets*, *40*(2), 230-236. <https://doi.org/10.2514/2.3937>
- Bruinsma, S., Dudok de Wit, T., Fuller-Rowell, T., Garcia-Sage, K., Mehta, P., Schiemenz, F., Shprits, Y. Y., Vasile, R., Yue, J., & Elvidge, S. (2023). Thermosphere and satellite drag. *Advances in Space Research*. <https://doi.org/10.1016/j.asr.2023.05.011>
- Bruinsma, S., Fedrizzi, M., Yue, J., & Siemes, C. (2021). Charting Satellite Courses in a Crowded Thermosphere. *Eos Transactions AGU*, *102*. <https://doi.org/10.1029/2021EO153475>
- Bruinsma, S., Forbes, J. M., Nerem, R. S., & Zhang, X. (2006). Thermosphere density response to the 20-21 November 2003 solar and geomagnetic storm from CHAMP and GRACE accelerometer data. *Journal of Geophysical Research*, *111*(A6), 1-14. <https://doi.org/10.1029/2005JA011284>
- Bruinsma, S., Sutton, E., Solomon, S. C., Fuller-Rowell, T., & Fedrizzi, M. (2018). Space weather modeling capabilities assessment: Neutral density for orbit determination at low earth orbit. *Space Weather*, *16*(11), 1806-1816. <https://doi.org/10.1029/2018SW002027>
- Bruinsma, S. L. (2015). The DTM-2013 thermosphere model. *Journal of Space Weather and Space Climate*, *5*(A1). <https://doi.org/10.1051/swsc/2015001>

- Bruinsma, S. L., Doornbos, E., & Bowman, B. R. (2014). Validation of GOCE densities and evaluation of thermosphere models. *Advances in Space Research*, *54*(4), 576–585. <https://doi.org/10.1016/j.asr.2014.04.008>
- Bruinsma, S. L., & Forbes, J. M. (2007). Global observations of traveling atmospheric disturbances (TADs) in the thermosphere. *Geophysical Research Letters*, *34*(L14103). <https://doi.org/10.1029/2007GL030243>
- Bruinsma, S. L., & Forbes, J. M. (2008). Medium- to large-scale density variability as observed by CHAMP. *Space Weather*, *6*(8). <https://doi.org/10.1029/2008SW000411>
- Bruinsma, S. L., & Forbes, J. M. (2009). Properties of traveling atmospheric disturbances (TADs) inferred from CHAMP accelerometer observations. *Advances in Space Research*, *43*(3), 369–376. <https://doi.org/10.1016/j.asr.2008.10.031>
- Bruinsma, S. L., & Forbes, J. M. (2010). Large-scale traveling atmospheric disturbances (LSTADs) in the thermosphere inferred from CHAMP, GRACE, and SETA accelerometer data. *Journal of Atmospheric and Solar-Terrestrial Physics*, *72*(13), 1057–1066. <https://doi.org/10.1016/j.jastp.2010.06.010>
- Bruinsma, S. L., Tamagnan, D., & Biancale, R. (2004). Atmospheric densities derived from CHAMP/STAR accelerometer observations. *Planetary and Space Science*, *62*(4), 297–312. <https://doi.org/10.1016/j.pss.2003.11.004>
- Brun, A. S., Miesch, M. S., & Toomre, J. (2004). Global-scale turbulent convection and magnetic dynamo action in the solar envelope. *The Astrophysical Journal*, *614*(2). <https://doi.org/10.1086/423835>
- Bruno, A., Christian, E. R., de Nolfo, G. A., Richardson, I. G., & Ryan, J. M. (2019). Spectral Analysis of the September 2017 Solar Energetic Particle Events. *Space Weather*, *17*(3), 419–437. <https://doi.org/10.1029/2018SW002085>
- Buffett, B. A. (2000). Dynamics of the Earth’s core. In S. ichiro Karato, A. Forte, R. Liebermann, G. Masters, & L. Stixrude (Eds.), *Earth’s Deep Interior: Mineral Physics and Tomography From the Atomic to the Global Scale*, Geophysical Monograph Series (Vol. 117, p. 37–62). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM117p0037>
- Burch, J., & Drake, J. F. (2009). Reconnecting magnetic fields. *American Scientist*, *97*(5), 392–399. <https://doi.org/10.1511/2009.80.392>
- Burch, J. L. (1972). Preconditions for the triggering of polar magnetic substorms by storm sudden commencements. *Journal of Geophysical Research*, *77*(28), 5629–5632. <https://doi.org/10.1029/JA077i028p05629>
- Burch, J. L., Moore, T. E., Torbert, R. B., & Giles, B. L. (2016). Magnetospheric Multiscale overview and science objectives. *Space Science Reviews*, *199*(1), 5–21. <https://doi.org/10.1007/s11214-015-0164-9>
- Burch, J. L., & Torbert, R. B. (Eds.). (2017). *Magnetospheric Multiscale: A Mission to Investigate the Physics of Magnetic Reconnection*. Amsterdam, The Netherlands: Springer Netherlands.
- Burch, J. L., Torbert, R. B., Phan, T. D., Chen, L.-J., Moore, T. E., Ergun, R. E., Eastwood, J. P., Gershman, D. J., Cassak, P. A., Argall, M. R., Wang, S., Hesse, M.,

- Pollock, C. J., Giles, B. L., Nakamura, R., Mauk, B. H., Fuselier, S. A., Russell, C. T., Strangeway, R. J., Drake, J. F., Shay, M. A., Khotyaintsev, Y. V., Lindqvist, P.-A., Marklund, G., Wilder, F. D., Young, D. T., Torkar, K., Goldstein, J., Dorelli, J. C., Avakov, L. A., Oka, M., Baker, D. N., Jaynes, A. N., Goodrich, K. A., Cohen, I. J., Turner, D. L., Fennell, J. F., Blake, J. B., Clemmons, J., Goldman, M., Newman, D., Petrinec, S. M., Trattner, K. J., Lavraud, B., Reiff, P. H., Baumjohann, W., Magnes, W., Steller, M., Lewis, W., Saito, Y., Coffey, V., & Chandler, M. (2016). Electron-scale measurements of magnetic reconnection in space. *Science*, *352*(6290), 1189-1199. <https://doi.org/10.1126/science.aaf2939>
- Burgess, D. (1995). Collisionless shocks. In M. G. Kivelson & C. T. Russell (Eds.), *Introduction to space plasma physics* (chap. 5). Cambridge, United Kingdom: Cambridge University Press.
- Burgess, D., Lucek, E. A., Scholer, M., Bale, S. D., Balikhin, M. A., Balogh, A., Horbury, T. S., Kucharek, V. V. K. H., Lembège, B., Möbius, E., Schwartz, S. J., Thomsen, M. F., & Walker, S. N. (2005). Quasi-parallel shock structure and processes. In G. Paschmann, S. Schwartz, C. P. Escoubet, & S. Haaland (Eds.), *Outer Magnetospheric Boundaries: Cluster Results* (pp. 205–222). Dordrecht, The Netherlands: Springer Netherlands. <https://doi.org/10.1007/1-4020-4582-4-7>
- Burgess, D., & Scholer, M. (2015). *Collisionless Shocks in Space Plasmas – Structure and Accelerated Particles*. New York, NY: Cambridge University Press. <https://doi.org/10.1017/CBO9781139044097>
- Burke, W. J. (2018). Thermospheric Dynamics during the March 1989 Magnetic Storm. *Sun and Geosciences*, *13*(2), 163-168. <https://doi.org/10.31401/SunGeo.2018.02.07>
- Burke, W. J., Kilcommons, L. M., & Hairston, M. R. (2017). Storm time coupling between the magnetosheath and the polar ionosphere. *Journal of Geophysical Research: Space Physics*, *122*(7), 7541-7554. <https://doi.org/10.1002/2017JA024101>
- Burke, W. J., Lin, C. S., Hagan, M. P., Huang, C. Y., Weimer, D. R., Wise, J. O., Gentile, L. C., & Marcos, F. A. (2009). Storm time global thermosphere: A driven-dissipative thermodynamic system. *Journal of Geophysical Research*, *114*(A6). <https://doi.org/10.1029/2008JA013848>
- Burlaga, L., Lepping, R., Weber, R., Armstrong, T., Goodrich, C., Sullivan, J., Gurnett, D., Kellogg, P., Keppler, E., Mariani, F., Neubauer, F., Rosenbauer, H., & Schwenn, R. (1980). Interplanetary particles and fields, November 22 to December 6, 1977: Helios, Voyager, and IMP observations between 0.6 and 1.6 au. *Journal of Geophysical Research*, *85*(A5), 2227–2242. <https://doi.org/10.1029/JA085iA05p02227>
- Burlaga, L., Sittler, E., Mariani, F., & Schwenn, R. (1981). Magnetic loop behind an interplanetary shock: Voyager, Helios, and IMP 8 observations. *Journal of Geophysical Research*, *86*(A8), 6673–6684. <https://doi.org/10.1029/JA086iA08p06673>
- Burlaga, L. F. (1971). Hydromagnetic waves and discontinuities in the solar wind. *Space Science Reviews*, *12*(5), 600-657. <https://doi.org/10.1007/BF00173345>
- Burlaga, L. F. (1995). *Interplanetary magnetohydrodynamics*. New York, NY: Oxford University Press.
- Burlaga, L. F., & Chao, J. K. (1971). Reverse and forward slow shocks

- in the solar wind. *Journal of Geophysical Research*, 76(31), 7516-7521.
<https://doi.org/10.1029/JA076i031p07516>
- Burlaga, L. F., Ness, N. F., & Stone, E. C. (2013). Magnetic field observations as Voyager 1 entered the heliosheath depletion region. *Science*, 341(6142), 147–150.
<https://doi.org/10.1126/science.1235451>
- Burns, A. G., & Killeen, T. L. (1992). The equatorial neutral thermospheric response to geomagnetic forcing. *Geophysical Research Letters*, 19(10), 977–980.
<https://doi.org/10.1029/92GL00522>
- Burns, A. G., Killeen, T. L., Crowley, G., Emery, B. A., & Roble, R. G. (1989). On the mechanisms responsible for high-latitude thermospheric composition variations during the recovery phase of a geomagnetic storm. *Journal of Geophysical Research*, 94(A12), 16961–16968. <https://doi.org/10.1029/JA094iA12p16961>
- Burns, A. G., Killeen, T. L., Wang, W., & Roble, R. G. (2004). The solar-cycle-dependent response of the thermosphere to geomagnetic storms. *Journal of Atmospheric and Solar-Terrestrial Physics*, 66(1), 1–14. <https://doi.org/10.1016/j.jastp.2003.09.015>
- Burton, R. K., McPherron, R. L., & Russell, C. T. (1975). An empirical relationship between interplanetary conditions and Dst. *Journal of Geophysical Research*, 80(31), 4204–4214. <https://doi.org/10.1029/JA080i031p04204>
- Bussy-Virat, C. D., Ridley, A. J., & Getchius, J. W. (2018). Effects of uncertainties in the atmospheric density on the probability of collision between space objects. *Space Weather*, 16(5), 519-537. <https://doi.org/10.1029/2017SW001705>
- Butler, R. F. (1992). *Paleomagnetism: Magnetic Domains to Geologic Terranes*. Hoboken, New Jersey: Blackwell Scientific Publications.
- Bučík, R., Innes, D. E., Guo, L., Mason, G. M., & Wiedenbeck, M. E. (2015). Observations of EUV waves in ³He-rich solar energetic particles. *The Astrophysical Journal*, 12(53). <https://doi.org/10.1088/0004-637X/812/1/53>
- Buzulukova, N. (2018). *Extreme Events in Geospace - Origins, Predictability, and Consequences* (1st ed.). Amsterdam, The Netherlands: Elsevier.
- Buzulukova, N., & Tsurutani, B. (2022). Space Weather: From solar origins to risks and hazards evolving in time. *Frontiers in Astronomy and Space Science*, 9(1017103). <https://doi.org/10.3389/fspas.2022.1017103>
- Byron Jr., F. W., & Fuller, R. W. (1992). *Mathematics of classical and quantum physics*. New York, NY: Dover Publications.
- Cade III, W. B., & C.-P., C. (2015). The origin of “Space Weather”. *Space Weather*, 13(2), 99–103. <https://doi.org/10.1002/2014SW001141>
- Cagniard, L. (1953). Basic theory of the magneto-telluric method of geophysical prospecting. *Geophysics*, 18(3), 605–635. <https://doi.org/10.1190/1.1437915>
- Cahill, L. J., & Amazeen, P. (1963). The boundary of the geomagnetic field. *Journal of Geophysical Research*, 68(7), 1835—1843. <https://doi.org/10.1029/JZ068i007p01835>
- Cakaj, S. (2021). The Parameters Comparison of the “Starlink” LEO Satellites Constellation for Different Orbital Shells. *Frontiers in Astronomy and Space Science*, 2, 7.

<https://doi.org/10.3389/frcmn.2021.643095>

- Calabia, A., & Jin, S. (2016). Thermospheric mass density variations during the March 2015 geomagnetic storm from GRACE accelerometers. In *Progress In Electromagnetic Research Symposium (PIERS) Proceedings* (p. 476-4980). Shanghai, China: IEEE. <https://doi.org/10.1109/PIERS.2016.7735812>
- Calabia, A., & Jin, S. (2017). Thermospheric density estimation and responses to the March 2013 geomagnetic storm from GRACE GPS-determined precise orbits. *Journal of Atmospheric and Solar-Terrestrial Physics*, *154*, 167-179. <https://doi.org/10.1016/j.jastp.2016.12.011>
- Calabia, A., & Jin, S. (2021). Thermospheric Mass Density Disturbances Due to Magnetospheric Forcing From 2014–2020 CASSIOPE Precise Orbits. *Journal of Geophysical Research: Space Physics*, *126*(8), e2021JA029540. <https://doi.org/10.1029/2021JA029540>
- Callen, H. B. (1985). *Thermodynamics and an Introduction to Thermostatistics* (2nd ed.). New York, NY: John Wiley & Sons.
- Cameron, T., & Jackel, B. (2016). Quantitative evaluation of solar wind time-shifting methods. *Space Weather*, *14*(11), 973-981. <https://doi.org/10.1002/2016SW001451>
- Cameron, T. G. (2019). *Planar Structures in the Solar Wind and Their Effect on the Magnetosphere* (Ph.D. thesis). University of Calgary, Calgary, Canada.
- Cameron, T. G., Jackel, B. J., & Oliveira, D. M. (2019). Using mutual information to investigate geoeffectiveness of solar wind phase fronts with different front orientations. *Journal of Geophysical Research: Space Physics*, *124*(3), 1582-1592. <https://doi.org/10.1029/2018JA026080>
- Campbell, W. H. (1980). Observation of electric currents in the Alaska oil pipeline resulting from auroral electrojet current sources. *Geophysical Journal International*, *61*(2), 437-449. <https://doi.org/10.1111/j.1365-246X.1980.tb04325.x>
- Cane, H. V., & Richardson, I. G. (2003). Interplanetary coronal mass ejections in the near-Earth solar wind during 1996-2002. *Journal of Geophysical Research*, *108*(A4). <https://doi.org/10.1029/2002JA009817>
- Capron, J. R. (1879). *Aurorae: their characters and spectra*. London, United Kingdom: London, E. & F. N. Spon.
- Capron, J. R. (1883). XLVII. The auroral beam of November 17, 1882. *The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science.*, *15*(95), 318-339. <https://doi.org/10.1080/14786448308627358>
- Cárdenas, F. M., Sánchez, S. C., & Domínguez, S. V. (2016). The grand aurorae borealis seen in Colombia in 1859. *Advances in Space Research*, *57*(1), 257-267. <https://doi.org/10.1016/j.asr.2015.08.026>
- Carovillano, R. L., & Siscoe, G. L. (1973). Energy and momentum theorems in magnetospheric processes. *Reviews of Geophysics*, *11*(2), 289-353. <https://doi.org/10.1029/RG011i002p00289>
- Carpenter, D. L., & Anderson, R. R. (1992). An ISEEwhistler model of equatorial electron density in the magnetosphere. *Journal of Geophysical Research*, *97*(A2), 1097-1108.

<https://doi.org/10.1029/91JA01548>

- Carrasco, V. M. S., Trigo, M., R., & Vaquero, J. M. (2017). Unusual rainbows as auroral candidates: Another point of view. *Publications of the Astronomical Society of Japan*, *69*(L1). <https://doi.org/10.1093/pasj/psw127>
- Carrasco, V. M. S., & Vaquero, J. M. (2020). Portuguese eyewitness accounts of the great space weather event of 1582. *Journal of Space Weather and Space Climate*, *10*(3), 1-3. <https://doi.org/10.1051/swsc/2020005>
- Carrington, R. C. (1859). Description of a singular appearance seen in the Sun on September 1, 1859. *Monthly Notices of the Royal Astronomical Society*, *20*(1), 13-15. <https://doi.org/10.1093/mnras/20.1.13>
- Carrington, R. C. (1863). *Observations of the Spots on the Sun, from November 9th 1853 to March 24th 1861 made at Redhill*. London, United Kingdom: Williams and Norgate.
- Carroll, S. M., Field, G. B., & Jackiw, R. (1990). Limits on a Lorentz- and parity-violating modification of electrodynamics. *Phys. Rev. D*, *41*, 1231–1240. <https://doi.org/10.1103/PhysRevD.41.1231>
- Carter, B. A., Yizengaw, E., Pradipta, R., Halford, A. J., Norman, R., & Zhang, K. (2015). Interplanetary shocks and the resulting geomagnetically induced currents at the equator. *Geophysical Research Letters*, *42*(16), 6554–6559. <https://doi.org/10.1002/2015GL065060>
- Carter, B. A., Yizengaw, E., Pradipta, R., Weygand, J. M., Piersanti, M., Pulkkinen, A., Moldwin, M. B., Norman, R., & Zhang, K. (2016). Geomagnetically induced currents around the world during the March 17, 2015 storm. *Journal of Geophysical Research: Space Physics*, *121*(10), 10,496-10,507. <https://doi.org/10.1002/2016JA023344>
- Cash, M. D., Wrobel, J. S., Cosentino, K. C., & Reinard, A. A. (2014). Characterizing interplanetary shocks for development and optimization of an automated solar wind shock detection algorithm. *Journal of Geophysical Research*, *119*(6), 4210-4222. <https://doi.org/10.1002/2014JA019800>
- Cassak, P. A., Emslie, A. G., Halford, A. J., Baker, D. N., Spence, H. E., Avery, S. K., & Fisk, L. A. (2017). Space physics and policy for contemporary society. *Journal of Geophysical Research: Space Physics*, *122*(4), 4430-4435. <https://doi.org/10.1002/2017JA024219>
- Cattell, C., Breneman, A., Colpitts, C., Dombek, J., Thaller, S., Tian, S., Wygant, J., Fennell, J., Hudson, M. K., Ergun, R., Russell, C. T., Torbert, R., Lindqvist, P.-A., & Burch, J. (2017). Dayside response of the magnetosphere to a small shock compression: Van Allen Probes, Magnetospheric MultiScale, and GOES-13. *Geophysical Research Letters*, *44*(17), 8712-8720. <https://doi.org/10.1002/2017GL074895>
- Cavus, H., Araz, G., Caglar Coban, G., Rahee, A., & Karafistan, A. I. (2019). Correlation between Sunspots and Interplanetary Shocks Measured by ACE during 1998-2014 and Some Estimations for the 22nd Solar Cycle and the years between 2015 and 2018 with Artificial Neural Network using the Cavus 2013 model. *Advances in Space Research*, *63*. <https://doi.org/10.1016/j.asr.2019.09.056>
- Cavus, H., & Karafistan, A. I. (2018). Shock Wave Interactions with Viscosity Observed after the Coronal Mass Ejection Activities Occurred on December 18, 1999

- and April 4, 2001. *Asian Journal of Research and Review in Physics*, 1(4), 1-11.
<https://doi.org/10.9734/AJR2P/2018/45021>
- Cawood, J. (1979). The Magnetic Crusade: Science and Politics in Early Victorian Britain. *Isis*, 70(4), 492-518. <https://doi.org/https://www.jstor.org/stable/230719>
- Chakraborty, S., Boteler, D. H., and Benjamin S. Murphy, X. S., Hartinger, M. D., Wang, X., Lucas, G., & Bake, J. B. H. (2022). Modeling geomagnetic induction in submarine cables. *Frontiers in Astronomy and Space Science*, 10(1022475).
<https://doi.org/10.3389/fphy.2022.1022475>
- Chambat, F., & Valette, B. (2001). Mean radius, mass, and inertia for reference Earth models. *Physics of the Earth and Planetary Interiors*, 124(3-4), 237-253.
[https://doi.org/10.1016/S0031-9201\(01\)00200-X](https://doi.org/10.1016/S0031-9201(01)00200-X)
- Chamberlain, J. W. (Ed.). (1961). *Physics of the aurora and airglow*, Geophysical Monograph Series (Vol. 41). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1029/SP041>
- Chao, C. K., Su, S.-Y., & Yeh, H. C. (2003). Grid effects on the derived ion temperature and ram velocity from the simulated results of the retarding potential analyzer data. *Advances in Space Research*, 32(11), 2361-2366. [https://doi.org/10.1016/S0273-1177\(03\)90566-7](https://doi.org/10.1016/S0273-1177(03)90566-7)
- Chao, J. K., & Hsieh, K. C. (1984). On determining magnetohydrodynamic shock parameters θ_{B_n} and M_A . *Planetary and Space Science*, 32(5), 641-646.
[https://doi.org/10.1016/0032-0633\(84\)90115-6](https://doi.org/10.1016/0032-0633(84)90115-6)
- Chao, J. K., & Lepping, R. P. (1974). A correlative study of SSC's, interplanetary shocks, and solar activity. *Journal of Geophysical Research*, 79(13), 1799-1807.
<https://doi.org/10.1029/JA079i013p01799>
- Chao, J. K., Lyu, L. H., Wu, B. H., Lazarus, A. J., Chang, T. S., & Lepping, R. P. (1993). Observations of an intermediate shock in interplanetary space. *Journal of Geophysical Research*, 98(A10), 17443-17450. <https://doi.org/10.1029/93JA01609>
- Chao, J. K., & Olbert, S. (1970). Observation of slow shocks in interplanetary space. *Journal of Geophysical Research*, 75(31), 6394-6397.
<https://doi.org/10.1029/JA075i031p06394>
- Chao, J. K., Wu, D. J., Lin, C.-H., Yang, Y. H., Wang, X. Y., Kessel, M., Chen, S. H., & Lepping, R. P. (2002). Models for the size and shape of the Earth's magnetopause and bow shock. In L.-H. Lyu (Ed.), *Space Weather Study Using Multipoint Techniques, COSPAR Colloq. Ser.* (Vol. 12, p. 127-135). Oxford, United Kingdom: Pergamon.
[https://doi.org/10.1016/S0964-2749\(02\)80212-8](https://doi.org/10.1016/S0964-2749(02)80212-8)
- Chapman, S. (1919). An outline of a theory of magnetic storms. *Philosophical Transactions of the Royal Society of London. Series A*, 95(666), 61-83.
<https://doi.org/10.1098/rspa.1918.0049>
- Chapman, S. (1937a). Boltzmann's H-Theorem. *Nature*, 139, 931.
<https://doi.org/10.1038/139931a0>
- Chapman, S. (1937b). Radio fade-outs and the associated magnetic variations. *Terrestrial Magnetism and Atmospheric Electricity*, 42(4), 417-419.
<https://doi.org/10.1029/TE042i004p00417>

- Chapman, S. (1957). The Aurora in Middle and Low Latitudes. *Nature*, 179(4549), 7-11. <https://doi.org/10.1038/179007a0>
- Chapman, S., & Bartels, J. (1940). *Geomagnetism*. London, United Kingdom: Oxford Univ. Press.
- Chapman, S., & Ferraro, V. C. A. (1930). A new theory of magnetic storms. *Nature*, 126, 129-130. <https://doi.org/10.1038/126129a0>
- Chapman, S., & Ferraro, V. C. A. (1931a). A new theory of magnetic storms. *Terrestrial Magnetism and Atmospheric Electricity*, 36(2), 77-97. <https://doi.org/10.1029/TE036i002p00077>
- Chapman, S., & Ferraro, V. C. A. (1931b). A new theory of magnetic storms (continued). *Terrestrial Magnetism and Atmospheric Electricity*, 36(2), 171-186. <https://doi.org/10.1029/TE036i003p00171>
- Chapman, S., & Ferraro, V. C. A. (1932). A new theory of magnetic storms (continued). *Terrestrial Magnetism and Atmospheric Electricity*, 37(2), 147-156. <https://doi.org/10.1029/TE037i002p00147>
- Chapman, S. C., Horne, R. B., & Watkins, N. W. (2020). Using the aa index over the last 14 solar cycles to characterize extreme geomagnetic activity. *Geophysical Research Letters*, 47(3), e2019GL086524. <https://doi.org/10.1029/2019GL086524>
- Chappell, C. R., Schunk, R. W., Bankers, P. M., J, L. B., & Thorne, R. M. (Eds.). (2017). *Magnetosphere-Ionosphere Coupling in the Solar System*, Geophysical Monograph Series (Vol. 222). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119066880>
- Chaston, C. C., Bonnell, J. W., Carlson, C. W., Berthomier, M., Peticolas, L. M., Roth, I., McFadden, J. P., Ergun, R. E., & Strangeway, R. J. (2002). Electron acceleration in the ionospheric Alfvén resonator. *Journal of Geophysical Research*, 107(A11), SMP 41-1-SMP 41-16. <https://doi.org/10.1029/2002JA009272>
- Chaston, C. C., Bonnell, J. W., Carlson, C. W., McFadden, J. P., Ergun, R. E., & Strangeway, R. J. (2003). Properties of small-scale Alfvén waves and accelerated electrons from FAST. *Journal of Geophysical Research*, 108(A4). <https://doi.org/10.1029/2002JA009420>
- Chen, F. F. (1983). *Plasma Physics and Controlled Fusion*. London, United Kingdom: Plenum Press.
- Chen, G.-m., Xu, J., Wang, W., & Burns, A. G. (2014). A comparison of the effects of CIR- and CME-induced geomagnetic activity on thermospheric densities and spacecraft orbits: Statistical studies. *Journal of Geophysical Research: Space Physics*, 119(9), 7928-7939. <https://doi.org/10.1002/2014JA019831>
- Chen, G.-m., Xu, J., Wang, W., Lei, J., & Burns, A. G. (2012). A comparison of the effects of CIR- and CME-induced geomagnetic activity on thermospheric densities and spacecraft orbits: Case studies. *Journal of Geophysical Research*, 117(A8). <https://doi.org/10.1029/2012JA017782>
- Chen, H., Liu, H., & Hanada, T. (2014). Storm-time atmospheric density modeling using neural networks and its application in orbit propagation. *Advances in Space Research*, 53(3), 558-567. <https://doi.org/10.1016/j.asr.2013.11.052>

- Chen, J., Cargill, P. J., & Palmadesso, P. J. (1997). Predicting solar wind structures and their geoeffectiveness. *Journal of Geophysical Research*, *102*(A7), 14701–14720. <https://doi.org/10.1029/97JA00936>
- Chen, X., Zong, Q., Hao, Y., Li, Q., Zhang, D., & Zhang, H. (2023). Propagation of the Interplanetary Shock Induced Pulse: New Observations by the Global Navigation Satellite System. *Journal of Geophysical Research: Space Physics*, *128*(1), e2022JA030975. <https://doi.org/10.1029/2022JA030975>
- Cheng, Z. W., Shi, J. K., Dunlop, M., & Liu, Z. X. (2013). Influences of the interplanetary magnetic field clock angle and cone angle on the field-aligned currents in the magnetotail. *Geophysical Research Letters*, *40*(20), 5355–5359. <https://doi.org/10.1002/2013GL056737>
- Chopra, K. P. (1961). Interactions of rapidly moving bodies in terrestrial atmosphere. *Reviews of Modern Physics*, *33*(2), 153–189. <https://doi.org/10.1103/RevModPhys.33.153>
- Chree, C. (1909). The Magnetic Storms and Solar Eruptions. *Nature*, *81*(2085), 456. <https://doi.org/10.1038/081456b0>
- Chree, C. (1913). Some phenomena of sunspots and of terrestrial magnetism at Kew observatory. *Philosophical Transactions of the Royal Society of London*, *212*(484–496), 75–116. <https://doi.org/10.1098/rsta.1913.0003>
- Chree, C. (1921). The Magnetic Storm of 13–17 May. *Nature*, *107*(2690), 359. <https://doi.org/10.1038/107359a0>
- Christon, S. P., & Simpson, J. A. (1979). Separation of corotating nucleon fluxes from solar flare fluxes by radial gradients and nuclear composition. *The Astrophysical Journal*, *227*(2), L49–L53. <https://doi.org/10.1086/182865>
- Chua, D., Parks, G., Brittnacher, M., Peria, W., Germany, G., Spann, J., & Carlson, C. (2001). Energy characteristics of auroral electron precipitation: A comparison of substorms and pressure pulse related auroral activity. *Journal of Geophysical Research*, *106*(A4), 5945–5956. <https://doi.org/10.1029/2000JA003027>
- Cid, C., Palacios, J., Saiz, E., Cerrato, Y., Aguado, J., & Guerrero, A. (2013). Modeling the recovery phase of extreme geomagnetic storms. *Journal of Geophysical Research*, *118*(7), 4352–4359. <https://doi.org/10.1002/jgra.50409>
- Clark, S. (2007a). Astronomical fire: Richard Carrington and the solar flare of 1859. *Endeavor*, *31*(3), 104–109. <https://doi.org/10.1016/j.endeavour.2007.07.004>
- Clark, S. (2007b). *The Sun Kings – The Unexpected Tragedy of Richard Carrington and the Tale of How the Modern Astronomy Began*. Princeton, NJ: Princeton University Press.
- Claudepierre, S. G., Elkington, S. R., & Wiltberger, M. (2008). Solar wind driving of magnetospheric ULF waves: Pulsations driven by velocity shear at the magnetopause. *Journal of Geophysical Research*, *113*(A5). <https://doi.org/10.1029/2007JA012890>
- Claudepierre, S. G., Hudson, M. K., Lotko, W., Lyon, J. G., & Denton, R. E. (2010). Solar wind driving of magnetospheric ULF waves: Field line resonances driven by dynamic pressure fluctuations. *Journal of Geophysical Research*, *115*(A11). <https://doi.org/10.1029/2010JA015399>

- Claudepierre, S. G., Toffoletto, F. R., & Wiltberger, M. (2016). Global MHD modeling of resonant ULF waves: Simulations with and without a plasmasphere. *Journal of Geophysical Research: Space Physics*, *121*(1), 227-244. <https://doi.org/10.1002/2015JA022048>
- Clauer, C. R., Kim, H., Deshpande, K., Xu, Z., Weimer, D., Musko, S., Crowley, G., Fish, C., Nealy, R., Humphreys, T. E., Bhatti, J. A., & Ridley, A. J. (2014). An autonomous adaptive low-power instrument platform (AAL-PIP) for remote high-latitude geospace data collection. *Geoscientific Instrumentation, Methods and Data Systems*, *3*, 211-227. <https://doi.org/10.5194/gi-3-211-2014>
- Clausen, L. B. N., & Glassmeier, K.-H. (2014). Enhancement of ultralow frequency wave amplitudes at the plasmopause. *Journal of Geophysical Research: Space Physics*, *119*(11), 9113-9124. <https://doi.org/10.1002/2014JA020072>
- Clemmons, J. H., Hecht, J. H., Salem, D. R., & Strickland, D. J. (2008). Thermospheric density in the earth's magnetic cusp as observed by the Streak mission. *Geophysical Research Letters*, *35*(24). <https://doi.org/10.1029/2008GL035972>
- Clette, F., Cliver, E. W., Lefèvre, L., Svalgaard, L., & Vaquero, J. M. (2015). Revision of the sunspot number(s). *Space Weather*, *13*(9), 529-530. <https://doi.org/10.1002/2015SW001264>
- Clette, F., Cliver, E. W., Lefèvre, L., Svalgaard, L., Vaquero, J. M., & Leibacher, J. W. (2016). Preface to Topical Issue: Recalibration of the Sunspot Number. *Solar Physics*, *291*(9-10), 2479-2486. <https://doi.org/10.1007/s11207-016-1017-8>
- Clette, F., Jain, S., & Podladchikova, T. (2024). The McNish and Lincoln Solar-Activity Predictions: The Method and Its Performance. *Solar Physics*, *299*(22). <https://doi.org/10.1007/s11207-024-02266-2>
- Clette, F., & Lefèvre, L. (2016). The New Sunspot Number: Assembling All Corrections. *Solar Physics*, *291*(9-10), 2629-2651. <https://doi.org/10.1007/s11207-016-1014-y>
- Clette, F., Svalgaard, L., Vaquero, J. M., & Cliver, E. W. (2014). Revisiting the sunspot number. *Space Science Reviews*, *184*(1-4), 35-103. <https://doi.org/10.1007/s11214-014-0074-2>
- Cliver, E. W. (2006). The 1859 space weather event: Then and now. *Advances in Space Research*, *38*(2), 119-129. <https://doi.org/10.1016/j.asr.2005.07.077>
- Cliver, E. W., Balasubramaniam, K. S., Nitta, N. V., & Li, X. (2009). Great geomagnetic storm of 9 November 1991: Association with a disappearing solar filament. *Journal of Geophysical Research*, *114*(A3). <https://doi.org/10.1029/2008JA013232>
- Cliver, E. W., & Dietrich, W. F. (2013). The 1859 space weather event revisited: limits of extreme activity. *Journal of Space Weather and Space Climate*, *3*(A31). <https://doi.org/10.1051/swsc/2013053>
- Cliver, E. W., Feynman, J., & Garrett, H. B. (1990). An estimate of the maximum speed of the solar wind, 1938-1989. *Journal of Geophysical Research*, *95*(A10), 17103-17112. <https://doi.org/10.1029/JA095iA10p17103>
- Cliver, E. W., Hayakawa, H., Love, J. J., & Neidig, D. F. (2020). On the Size of the Flare Associated with the Solar Proton Event in 774 AD. *The Astrophysical Journal*, *903*(1). <https://doi.org/10.3847/1538-4357/abad93>

- Cliver, E. W., & Keer, N. C. (2012). Richard Christopher Carrington: Briefly among the great scientists of his time. *Solar Physics*, 280(1), 1–31. <https://doi.org/10.1007/s11207-012-0034-5>
- Cliver, E. W., & Svalgaard, L. (2004). The 1859 Solar–Terrestrial Disturbance And the Current Limits of Extreme Space Weather Activity. *Solar Physics*, 224(1-2), 407-422. <https://doi.org/10.1007/s11207-005-4980-z>
- Cnossen, I., & Förster, M. (2016). North-south asymmetries in the polar thermosphere-ionosphere system: Solar cycle and seasonal influences. *Journal of Geophysical Research: Space Physics*, 121(1), 612–627. <https://doi.org/10.1002/2015JA021750>
- Cocconia, G., & Morrison, P. (1959). Searching for interstellar communications. *Nature*, 184, 844-846. <https://doi.org/10.1038/184844a0>
- Codrescu, M. V., Negrea, C., Fedrizzi, M., Fuller-Rowell, T. J., Dobin, A., Jakowsky, N., Khalsa, H., Matsuo, T., & Maruyama, N. (2012). A real-time run of the Coupled Thermosphere Ionosphere Plasmasphere Electrodynamics (CTIPE) model. *Space Weather*, 10(2). <https://doi.org/10.1029/2011SW000736>
- Cohen, I. J., Schwartz, S. J., Goodrich, K. A., Ahmadi, N., Ergun, R. E., Fuselier, S. A., Desai, M. I., Christian, E. R., McComas, D. J., Zank, G. P., Shuster, J. R., Vines, S. K., Mauk, B. H., Decker, R. B., Anderson, B. J., Westlake, J. H., Le Contel, O., Breuillard, H., Giles, B. L., Torbert, R. B., & Burch, J. L. (2019). High-Resolution Measurements of the Cross-Shock Potential, Ion Reflection, and Electron Heating at an Interplanetary Shock by MMS. *Journal of Geophysical Research: Space Physics*, 124(6), 3961-3978. <https://doi.org/10.1029/2018JA026197>
- Colburn, D. S., & Sonett, C. P. (1966). Discontinuities in the solar wind. *Space Science Reviews*, 5(4), 439-506. <https://doi.org/10.1007/BF00240575>
- Cole, K. D. (1962). Joule heating of the upper atmosphere. *Australian Journal of Physics*, 15(2), 223–235. <https://doi.org/10.1071/PH620223>
- Coleman, P. J., Davis, L., & Sonett, C. P. (1960). Steady component of the interplanetary magnetic field: Pioneer V. *Phys. Rev. Lett.*, 5(2), 43-46. <https://doi.org/10.1103/PhysRevLett.5.43>
- Colladay, D., & Kostelecký, V. A. (1997). CPT violation and the Standard Model. *Phys. Rev. D*, 55(11), 6760–6774. <https://doi.org/10.1103/PhysRevD.55.6760>
- Colladay, D., & Kostelecký, V. A. (2001). Cross sections and Lorentz violation. *Phys. Lett. B*, 511(2–4), 209–217. [https://doi.org/10.1016/S0370-2693\(01\)00649-9](https://doi.org/10.1016/S0370-2693(01)00649-9)
- Collado-Vega, Y. M., Kessel, R. L., Sibeck, D. G., Kalb, V. L., Boller, R. A., & Rastaetter, L. (2013). Comparison between vortices created and evolving during fixed and dynamic solar wind conditions. *Annales Geophysicae*, 31(8), 1463-1483. <https://doi.org/10.5194/angeo-31-1463-2013>
- Collier, M. R., Lepping, R. P., & Berdichevsky, D. B. (2007). A statistical study of interplanetary shocks and pressure pulses internal to magnetic clouds. *Journal of Geophysical Research*, 112(A6). <https://doi.org/10.1029/2006JA011714>
- Comstock, G. M., Fan, C. Y., & Simpson, J. A. (1969). Energy Spectra and Abundances of the Cosmic-Ray Nuclei Helium to Iron from the Ogo-I Satellite Experiment. *The Astrophysical Journal*, 155(2), 609-617. <https://doi.org/10.1086/149895>

- Connor, H. K. (2012). *Cusp ion structures and their relation to magnetopause processes* (Ph.D thesis). University of New Hampshire, Durham, New Hampshire.
- Connor, H. K., Raeder, J., Sibeck, D. G., & Trattner, K. J. (2015). Relation between cusp ion structures and dayside reconnection for four IMF clock angles: OpenGGCM-LTPT results. *Journal of Geophysical Research: Space Physics*, *120*(6). <https://doi.org/10.1002/2015JA021156>
- Connor, H. K., Raeder, J., & Trattner, K. J. (2012). Dynamic modeling of cusp ion structures. *Journal of Geophysical Research*, *117*(A4). <https://doi.org/10.1029/2011JA017203>
- Connor, H. K., Zesta, E., Fedrizzi, M., Shi, Y., Raeder, J., Codrescu, M. V., & Fuller-Rowell, T. J. (2016). Modeling the ionosphere-thermosphere response to a geomagnetic storm using physics-based magnetospheric energy input: OpenGGCM-CTIM results. *Journal of Space Weather and Space Climate*, *6*(A25), 1–15. <https://doi.org/10.1051/swsc/2016019>
- Connor, H. K., Zesta, E., Ober, D. M., & Raeder, J. (2014). The relation between transpolar potential and reconnection rates during sudden enhancement of solar wind dynamic pressure: OpenGGCM-CTIM results. *Journal of Geophysical Research: Space Physics*, *119*(5), 3411–3429. <https://doi.org/10.1002/2013JA019728>
- Constable, C., Korte, M., & Panovska, S. (2016). Persistent high paleosecular variation activity in southern hemisphere for at least 10 000 years. *Earth and Planetary Science Letters*, *453*, 78–86. <https://doi.org/10.1016/j.epsl.2016.08.015>
- Cosgrove, R. B., Bahcivan, H., Chen, S., Sanchez, E., & Knipp, D. (2022). Violation of hemispheric symmetry in integrated poynting flux via an empirical model. *Geophysical Research Letters*, *49*(4), e2021GL097329. <https://doi.org/10.1029/2021GL097329>
- Costa Jr., E., & Alves, M. V. (2015). Auroral kilometric radiation. *Revista Brasileira de Ensino de Física*, *37*(4). <https://doi.org/10.1590/S1806-11173742016>
- Costa Jr., E., Alves, M. V., & Echer, E. (2013). Magnetic decreases in the interplanetary space. *Revista Brasileira de Ensino de Física*, *35*(3), 3309. <https://doi.org/10.1590/S1806-11172013000300009>
- Costa Jr., E., Simões, F. J. R., Cardoso, F. R., & Alves, M. V. (2011a). Ondas de Alfvén no meio interplanetário. *Revista Brasileira de Ensino de Física*, *33*(2), 2302. <https://doi.org/10.1590/S1806-11172011000200003>
- Costa Jr., E., Simões, F. J. R., Cardoso, F. R., & Alves, M. V. (2011b). O vento solar e a tempestade geomagnética. *Revista Brasileira de Ensino de Física*, *33*(4), 4301. <https://doi.org/10.1590/S1806-11172011000400001>
- Coster, A. J., Colerico, M. J., Foster, J. C., Rideout, W., & Rich, F. (2007). Longitude sector comparisons of storm enhanced density. *Geophysical Research Letters*, *34*(18). <https://doi.org/10.1029/2007GL030682>
- Cottam, S., Pearson, J., Orchiston, W., & Stephenson, R. (2010). The 1874 Transit of Venus and the Popularisation of Astronomy in the USA as Reflected in the New York Times. In *Highlighting the History of Astronomy in the Asia-Pacific Region* (p. 339–375). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-1-4419-8161-5_15

- Coumans, V., Gérard, J.-C., Hubert, B., Meurant, M., & Mende, S. B. (2004). Global auroral conductance distribution due to electron and proton precipitation from IMAGE-FUV observations. *Annales Geophysicae*, *22*, 1595–1611. <https://doi.org/10.5194/angeo-22-1595-2004>
- Cousins, E. D. P., Matsuo, T., & Richmond, A. D. (2015). Mapping high-latitude ionospheric electrodynamics with SuperDARN and AMPERE. *Journal of Geophysical Research: Space Physics*, *120*(7), 5854–5870. <https://doi.org/10.1002/2014JA020463>
- Cowley, S. W. H. (1981). Magnetospheric asymmetries associated with the y-component of the IMF. *Planetary and Space Science*, *29*(1), 79–96. [https://doi.org/10.1016/0032-0633\(81\)90141-0](https://doi.org/10.1016/0032-0633(81)90141-0)
- Cowley, S. W. H. (1995). Where the solar wind blows. *Physics World*, *8*(6), 46–51. <https://doi.org/10.1088/2058-7058/8/6/31>
- Cowley, S. W. H. (2000). Magnetosphere-ionosphere interactions: A tutorial review. In S. Ohtani, R. Fujii, M. Hesse, & R. L. Lysak (Eds.), *Magnetospheric current systems*, Geophysical Monograph Series (Vol. 118, p. 91–106). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM118p0091>
- Coxon, J. C., Chisham, G., Freeman, M. P., Anderson, B. J., & Fear, R. C. (2022). Distributions of Birkeland Current Density Observed by AMPERE are Heavy-Tailed or Long-Tailed. *Journal of Geophysical Research: Space Physics*, *127*(2), e2021JA029801. <https://doi.org/10.1029/2021JA029801>
- Coxon, J. C., Milan, S. E., & Anderson, B. J. (2018). A Review of Birkeland Current Research Using AMPERE. In A. Keiling, O. Marghitu, & M. Wheatland (Eds.), *Electric Current in Geospace and Beyond*, Geophysical Monograph Series (Vol. 235, p. 259–278). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119324522.ch16>
- Coxon, J. C., Milan, S. E., Carter, J. A., Clausen, L. B. N., Anderson, B. J., & Korth, H. (2016). Seasonal and diurnal variations in AMPERE observations of the Birkeland currents compared to modeled results. *Journal of Geophysical Research: Space Physics*, *121*(5), 4027–4040. <https://doi.org/10.1002/2015JA022050>
- Coxon, J. C., Rae, I. J., Forsyth, C., Jackman, C. M., Fear, R. C., & Anderson, B. J. (2017). Birkeland currents during substorms: Statistical evidence for intensification of Regions 1 and 2 currents after onset and a localized signature of auroral dimming. *Journal of Geophysical Research: Space Physics*, *122*(6), 6455–6468. <https://doi.org/10.1002/2017JA023967>
- Cramer, W. D., Raeder, J., Toffoletto, F. R., Gilson, M., & Hu, B. (2017). Plasma sheet injections into the inner magnetosphere: Two-way coupled OpenGGCM-RCM model results. *Journal of Geophysical Research: Space Physics*, *122*(5), 5077–5091. <https://doi.org/10.1002/2017JA024104>
- Cranmer, S. R. (2002). Coronal holes and the high-speed solar wind. *Space Science Reviews*, *101*(3–4), 229–294. <https://doi.org/10.1023/A:1020840004535>
- Craven, J. D., Frank, L. A., Russell, C. T., Smith, E. E., & Lepping, R. P. (1986). Global auroral responses to magnetospheric compressions by shocks in the solar wind: Two case studies. In Y. Kamide & J. A. Slavin (Eds.), *Solar Wind-Magnetosphere Coupling*

- (p. 367-380). Tokyo, Japan: Terra Scientific.
- Crooker, N., Joselyn, J., & Feynman, J. (Eds.). (1997). *Coronal mass ejections* (Vol. 99). American Geophysical Union: American Geophysical Union. <https://doi.org/10.1029/GM099>
- Crooker, N. U., Feynman, J., & Gosling, J. T. (1977). On the high correlation between long-term averages of solar wind speed and geomagnetic activity. *Journal of Geophysical Research*, *82*(13), 1933–1937. <https://doi.org/10.1029/JA082i013p01933>
- Crowley, G. (1991). Dynamics of the Earth's thermosphere: A review. *Reviews of Geophysics*, *29*, 1143-1165.
- Crowley, G., Immel, T. J., Hackert, C. L., Craven, J., & Roble, R. G. (2006). Effect of IMF BY on thermospheric composition at high and middle latitudes: 1. Numerical experiments. *Journal of Geophysical Research*, *111*(A10). <https://doi.org/10.1029/2005JA011371>
- Crowley, G., Knipp, D. J., Drake, K. A., Lei, J., Sutton, E., & Lühr, H. (2010). Thermospheric density enhancements in the dayside cusp region during strong BY conditions. *Geophysical Research Letters*, *37*(7), 1-5. <https://doi.org/10.1029/2009GL042143>
- Crowley, G., & Meier, R. R. (2008). Disturbed O/N₂ Ratios and their Transport to Middle and Low Latitudes. In *Midlatitude ionospheric dynamics and disturbances*, Geophysical Monograph Series (Vol. 181, p. 221-234). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/181GM20>
- Crowley, G., Reynolds, A., Thayer, J. P., Lei, J., Paxton, L. J., Christensen, A. B., Zhang, Y., Meier, R. R., & Strickland, D. J. (2008). Periodic modulations in thermospheric composition by solar wind high speed streams. *Geophysical Research Letters*, *35*(21). <https://doi.org/10.1029/2008GL035745>
- Crowther, R. (2002). Space Junk – Protecting Space for Future Generations. *Science*, *296*(5571), 1241-1242. <https://doi.org/10.1126/science.1069725>
- Crowther, R. (2003). Orbital debris: a growing threat to space operations. *Philosophical Transactions of the Royal Society of London. Series A*, *361*(1802), 157-168. <https://doi.org/10.1098/rsta.2002.1118>
- Cummings, W. D. (1966). Asymmetric ring currents and the low-latitude disturbance daily variation. *Journal of Geophysical Research*, *71*(19), 4495-4503. <https://doi.org/10.1029/JZ071i019p04495>
- Curto, J. J. (2020). Uncertainty in hourly mean data from classical magnetometers. *Earth, Planets and Space*, *71*(139), 1-14. <https://doi.org/10.1186/s40623-019-1119-2>
- Curto, J. J., Cardús, J. O., Alberca, L. F., & Blanch, E. (2007). Milestones of the IAGA International Service of Rapid Magnetic Variations and its contribution to geomagnetic field knowledge. *Earth, Planets and Space*, *59*, 463–471. <https://doi.org/10.1186/BF03352708>
- Curto, J. J., Castell, J., & Del Moral, F. (2016). Sfe: waiting for the big one. *Journal of Space Weather and Space Climate*, *6*(A23). <https://doi.org/10.1051/swsc/2016018>
- Da Gama, S. (1944). *Boletim Magnético do Observatório Nacional, Rio de Janeiro, 1940 e 1941*. Imprensa Nacional, Rio de Janeiro, Brasil.

- Daglis, I. A. (Ed.). (2001). *Space storms and space weather hazards*. Dordrecht, The Netherlands: Springer Netherlands. <https://doi.org/10.1007/978-94-010-0983-6>
- Daglis, I. A. (Ed.). (2005). *Effects of space weather on technology infrastructure*. Dordrecht, The Netherlands: Springer. <https://doi.org/10.1007/1-4020-2754-0>
- Daglis, I. A., Sarris, E. T., & Wilken, B. (1993). AMPTE/CCE CHEM observations of the ion population at geosynchronous altitudes. *Annales Geophysicae*, *11*, 685-696.
- Daglis, I. A., Thorne, R. M., Baumjohann, W., & Orsini, S. (1999). The terrestrial ring current: Origin, formation, and decay. *Reviews of Geophysics*, *37*(4), 407-438. <https://doi.org/10.1029/1999RG900009>
- Dahlgren, H., Lanchester, B. S., Ivchenko, N., & Whiter, D. K. (2016). Electrodynamics and energy characteristics of aurora at high resolution by optical methods. *Journal of Geophysical Research: Space Physics*, *121*(6), 5966-5974. <https://doi.org/10.1002/2016JA022446>
- Dal Lago, A., Antunes Vieira, L. E., Echer, E., Balmaceda, L. A., Rockenbach, M., & Gonzalez, W. D. (2016). Extreme solar-terrestrial events. *Proceedings of the International Astronomical Union*, *12*(S328), 233-236. <https://doi.org/10.1017/S1743921317004185>
- Dalgarno, A., Hanson, W. B., Spencer, N. W., & Schmerling, E. R. (1973). The Atmosphere Explorer mission. *Radio Science*, *8*(4), 263-266. <https://doi.org/10.1029/RS008i004p00263>
- Dang, T., Li, X., Luo, B., Li, R., Zhang, B., Pham, K., Ren, D., Chen, X., Lei, J., & Wang, Y. (2022). Unveiling the Space Weather During the Starlink Satellites Destruction Event on 4 February 2022. *Space Weather*, *20*(8), e2022SW003152. <https://doi.org/10.1029/2022SW003152>
- Davidson, R. L., & Earle, G. D. (2011). A design approach for improving the performance of single-grid planar retarding potential analyzers. *Physics of Plasmas*, *18*(1). <https://doi.org/10.1063/1.3533657>
- Davidson, W. F. (1940). *The magnetic storm of March 24, 1940 – Effects in the power system*. Edison Electric Institute Bulletin, 1940-07, 365–366 and 374.
- Davis, T. N., & Sugiura, M. (1966). Auroral electrojet activity index AE and its universal time variations. *Journal of Geophysical Research*, *71*(3), 785-801. <https://doi.org/10.1029/JZ071i003p00785>
- D’Azambuja, L. (1940). *Quarterly bulletin on solar activity*. Nos. 49, Zürich, Edigen. Sternwarte.
- de Hoffmann, F., & Teller, E. (1950). Magneto-hydrodynamic shocks. *Phys. Rev.*, *80*(4), 692-703. <https://doi.org/10.1103/PhysRev.80.692>
- De La Cruz Cueva, R. Y. (2008). *Efeitos de tempestades magnéticas em sinais de GPS em Natal, Brasil* (Master’s thesis). Universidade Federal do Rio Grande do Norte, Natal, Brazil.
- De Sterck, H., & Poedts, S. (2000). Intermediate shocks in three-dimensional magnetohydrodynamic bow-shock flows with multiple interacting shock fronts. *Phys. Rev. Lett.*, *84*(24), 5524–5527. <https://doi.org/10.1103/PhysRevLett.84.5524>

- de Toledo Piza, A. F. R. (2003). *Mecânica quântica*. São Paulo, Brazil: Edusp.
- de Villiers, J. S., Kosch, M., Yamazaki, Y., & Lotz, S. (2017). Influences of various magnetospheric and ionospheric current systems on geomagnetically induced currents around the world. *Space Weather*, *15*(2), 403-417. <https://doi.org/10.1002/2016SW001566>
- De Zeeuw, D., Gombosi, T., Groth, C., Powell, K., & Stout, Q. (2000). An adaptive MHD method for global space weather simulations. *IEEE Transactions on Plasma Science*, *28*(6), 1956-1965. <https://doi.org/10.1109/27.902224>
- De Zeeuw, D. L., Sazykin, S., Wolf, R. A., Gombosi, T. I., Ridley, A. J., & Tóth, G. (2004). Coupling of a global MHD code and an inner magnetospheric model: Initial results. *Journal of Geophysical Research*, *109*(A12). <https://doi.org/10.1029/2003JA010366>
- Decker, R. B. (1981). The modulation of low-energy proton distributions by propagating interplanetary shock waves: A numerical simulation. *Journal of Geophysical Research*, *86*(A6), 4537-4554. <https://doi.org/10.1029/JA086iA06p04537>
- Decker, R. B. (1993). The role of magnetic loops in particle acceleration at nearly perpendicular shocks. *Journal of Geophysical Research*, *98*(A1), 33-46. <https://doi.org/10.1029/92JA01841>
- Decker, R. B., & Vlahos, L. (1985). Shock drift acceleration in the presence of waves. *Journal of Geophysical Research*, *90*(A1), 47-56. <https://doi.org/10.1029/JA090iA01p00047>
- Del Corpo, A., Vellante, M., Heilig, B., Pietropaolo, E., Reda, J., & Lichtenberger, J. (2019). Observing the Cold Plasma in the Earth's Magnetosphere with the EMMA Network. *Annals of Geophysics*, *62*(4), 1-19. <https://doi.org/10.4401/ag-7751>
- Delano, K., Zesta, E., & Oliveira, D. M. (2024). Temporal and Spatial Dynamics of Nitric Oxide Production at High Latitudes During an ICME-driven Storm on Dec. 14, 2006. *Journal of Geophysical Research: Space Physics*. (Under review)
- Dellinger, J. H. (1936). Direct Effects of Particular Solar Eruptions on Terrestrial Phenomena. *Phys. Rev.*, *50*(12), 1189-1189. <https://doi.org/10.1103/PhysRev.50.1189>
- De Michelis, P., Daglis, I. A., & Consolini, G. (1997). Average terrestrial ring current derived from AMPTE/CCE-CHEM measurements. *Journal of Geophysical Research*, *102*(A7), 14103-14111. <https://doi.org/10.1029/96JA03743>
- Deng, Y. (2006). *Examining the high latitude thermosphere and ionosphere using a global model* (Ph.D thesis). University of Michigan, Ann Arbor, Michigan.
- Deng, Y., Fuller-Rowell, T. J., Akmaev, R. A., & Ridley, A. J. (2011). Impact of the altitudinal Joule heating distribution on the thermosphere. *Journal of Geophysical Research*, *116*(A5). <https://doi.org/10.1029/2010JA016019>
- Deng, Y., & Ridley, A. J. (2007). Possible reasons for underestimating Joule heating in global models: E field variability, spatial resolution, and vertical velocity. *Journal of Geophysical Research*, *112*(A9). <https://doi.org/10.1029/2006JA012006>
- Denton, M. H., Borovsky, J. E., Stepanova, M., & Valdivia, J. A. (2016). Preface: Unsolved problems of magnetospheric physics. *Journal of Geophysical Research: Space Physics*,

121(11), 1–8. <https://doi.org/10.1002/2016JA023362>

- Desai, M. V., & Shah, S. N. (2018). Impacts of Intense Geomagnetic Storms on NavIC / IRNSS System. *Annals of Geophysics*, 61(5), 1–15. <https://doi.org/10.4401/ag-7856>
- Descartes, R. (1637). *Discours de la méthode pour bien conduire sa raison, et chercher la vérité dans les sciences*. Leiden, The Netherlands: De l’Imprimerie de Ian Maire.
- Deser, S. (1982). Topologically massive gauge theories. *Annals of Physics*, 140(2), 372–411. [https://doi.org/10.1016/0003-4916\(82\)90164-6](https://doi.org/10.1016/0003-4916(82)90164-6)
- Dessler, A. J. (1959). Effect of magnetic anomaly on particle radiation trapped in geomagnetic field. *Journal of Geophysical Research*, 64(7), 713–715. <https://doi.org/10.1029/JZ064i007p00713>
- Dessler, A. J. (1967). Solar wind and interplanetary magnetic field. *Reviews of Geophysics*, 5(1), 1–41. <https://doi.org/10.1029/RG005i001p00001>
- Dessler, A. J. (1984). The evolution of arguments regarding the existence of field-aligned currents. In T. A. Potemra (Ed.), *Magnetospheric Currents*, Geophysical Monograph Series (Vol. 28, p. 22–28). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM028p0022>
- Dessler, A. J., Francis, W. E., & Parker, E. N. (1960). Geomagnetic storm sudden-commencement rise times. *Journal of Geophysical Research*, 65(9), 2715–2719. <https://doi.org/10.1029/JZ065i009p02715>
- Dessler, A. J., & Parker, E. N. (1959). Hydromagnetic theory of geomagnetic storms. *Journal of Geophysical Research*, 64(12), 2239–2252. <https://doi.org/10.1029/JZ064i012p02239>
- DeVries, L. L. (1972). Analysis and interpretation of density data from the low-g accelerometer calibration system (LOGACS). In S. A. Bowhill, L. D. Jaffe, & M. J. Rycroft (Eds.), *Space research* (Vol. 12, pp. 777–789). Berlin, Germany: Akademie-Verlag.
- Dimmock, A. P., Rosenqvist, L., Hall, J.-O., Viljanen, A., Yordanova, E., Honkonen, I., André, M., & Sjöberg, E. C. (2019). The GIC and Geomagnetic Response Over Fennoscandia to the 7–8 September 2017 Geomagnetic Storm. *Space Weather*, 17(7), 989–1010. <https://doi.org/10.1029/2018SW002132>
- Dimmock, A. P., Rosenqvist, L., Welling, D. T., Viljanen, A., Honkonen, I., Boynton, R. J., & Yordanova, E. (2020). On the Regional Variability of dB/dt and Its Significance to GIC. *Space Weather*, 18(8), e2020SW002497. <https://doi.org/10.1029/2020SW002497>
- Dombeck, J., Cattell, C., Prasad, N., Meeker, E., Hanson, E., & McFadden, J. (2018). Identification of Auroral Electron Precipitation Mechanism Combinations and Their Relationships to Net Downgoing Energy and Number Flux. *Journal of Geophysical Research: Space Physics*, 123(12), 10,064–10,089. <https://doi.org/10.1029/2018JA025749>
- Domínguez-Castro, F., Vaquero, J. M., Bertolin, C., Gallego, M. C., De la Guía, C., & Camuffo, D. (2016). Aurorae observed by Giuseppe Toaldo in Padua (1766–1797). *Journal of Space Weather and Space Climate*, 6(A21). <https://doi.org/10.1051/swsc/2016016>

- Dong, X.-C., Dunlop, M. W., Wang, T.-Y., Cao, J.-B., Trattner, K. J., Bamford, R., Russell, C. T., Bingham, R., Strangeway, R. J., Fear, R. C., Giles, B. L., & Torbert, R. B. (2018). Carriers and sources of magnetopause current: Mms case study. *Journal of Geophysical Research: Space Physics*, *123*(7), 5464-5475. <https://doi.org/10.1029/2018JA025292>
- Donovan, E. (2016). Coupling between the Geomagnetic Tail and the Inner Magnetosphere. In G. V. Khazanov (Ed.), *Space Weather Fundamentals* (p. 131-148). Boca Raton, FL: CRC Press.
- Donovan, E., Stephen, Mende, Jackel, B., Frey, H., Syrjäsuo, M., Voronkov, I., Trondsen, T., Peticolas, L., Angelopoulos, V., Harris, S., Greffen, M., & Connors, M. (2006). The THEMIS all-sky imaging array—system design and initial results from the prototype imager. *Journal of Atmospheric and Solar-Terrestrial Physics*, *68*(13), 1472-1487. <https://doi.org/10.1016/j.jastp.2005.03.027>
- Donovan, E. F. (1993). Modeling the magnetic effects of field-aligned currents. *Journal of Geophysical Research*, *98*(A8), 13529-13543. <https://doi.org/10.1029/93JA00603>
- Doornbos, E. (2012). *Thermospheric density and wind determination from satellite dynamics*. New York, NY: Springer. <https://doi.org/10.1007/978-3-642-25129-0>
- Doornbos, E., & Klinkrad, H. (2006). Modelling of space weather effects on satellite drag. *Advances in Space Research*, *37*(6), 1229–1239. <https://doi.org/10.1016/j.asr.2005.04.097>
- Doornbos, E., Ussel, J., Lühr, H., Förster, M., & Koppenwallner, G. (2010). Neutral density and crosswind determination from arbitrarily oriented multiaxis accelerometers on satellites. *Journal of Spacecraft and Rockets*, *47*(4), 580-589. <https://doi.org/10.2514/1.48114>
- Drayton, R. A., Koustov, A. V., Hairston, M. R., & Villain, J.-P. (2005). Comparison of DMSP cross-track ion drifts and SuperDARN line-of-sight velocities. *Annales Geophysicae*, *23*, 2479-2486. <https://doi.org/10.5194/angeo-23-2479-2005>
- Drinkwater, M. R., Floberghagen, R., Haagmans, R., Muzi, D., & Popescu, A. (2003). GOCE: ESA's First Earth Explorer Core Mission. In G. Beutler, M. R. Drinkwater, R. Rummel, & R. Von Steiger (Eds.), *Earth Gravity Field from Space – From Sensors to Earth Sciences* (Vol. 17, pp. 419–432). Dordrecht, The Netherlands: Springer Netherlands. https://doi.org/10.1007/978-94-017-1333-7_36
- Dryer, M. (1973). Bow shock and its interaction with interplanetary shocks. *Radio Science*, *8*(11), 893-901. <https://doi.org/10.1029/RS008i011p00893>
- Dryer, M., Merritt, D. L., & Aronson, P. M. (1967). Interaction of a plasma cloud with the earth's magnetosphere. *Journal of Geophysical Research*, *72*(11), 2955-2962. <https://doi.org/10.1029/JZ072i011p02955>
- Dungey, J. W. (1954). *Electrodynamics of the outer atmosphere*. University Park, PA: State College, Pa.: Pennsylvania State University, Ionosphere Research Laboratory.
- Dungey, J. W. (1961). Interplanetary magnetic field and the auroral zones. *Phys. Rev. Lett.*, *6*(2), 47-48. <https://doi.org/10.1103/PhysRevLett.6.47>
- Dungey, J. W. (1963). The structure of the exosphere or adventures in velocity space. In C. Dewitt, J. Hieblot, & A. Lebeau (Eds.), *Geophysics: The Earth's Environment*

- (p. 505-550). New York, NY: Gordon and Breach.
- Dunne, G. V. (2009). Aspects of Chern-Simons theory. In A. Comtet, T. Jolicoeur, S. Ouvry, & F. David (Eds.), *Topological aspects of low dimensional systems* (pp. 177–263). Berlin, Germany: Springer. https://doi.org/10.1007/3-540-46637-1_3
- Dunster, T. M. (2021). Legendre and related functions. In F. W. J. Olver et al. (Eds.), *NIST Digital Library of Mathematical Functions*. Gaithersburg, MD: National Institute of Standards and Technology. Retrieved from <https://dlmf.nist.gov/14.10>
- Dutra, R. S., Ferreira, D. S. R., Gonçalves, A. S. M., & Carvalho, G. M. (2020). Efeitos do vento solar na magnetosfera terrestre: uma abordagem didática dos cinturões de Van Allen. *Revista Brasileira de Ensino de Física*, *42*(1), e20190164. <https://doi.org/10.1590/1806-9126-rbef-2019-0164>
- Earle, G. D., & Kelley, M. C. (1993). Spectral evidence for stirring scales and two-dimensional turbulence in the auroral ionosphere. *Journal of Geophysical Research: Space Physics*, *98*(A7), 11543-11548. <https://doi.org/10.1029/93JA00632>
- Eastman, T. E., Hones, E. W., Bame, S. J., & Asbridge, J. R. (1976). The magnetospheric boundary layer: Site of plasma, momentum and energy transfer from the magnetosheath into the magnetosphere. *Geophysical Research Letters*, *3*(11), 685–688. <https://doi.org/10.1029/GL003i011p00685>
- Eastwood, J. P., Biffis, E., Hapgood, M. A., Green, L., Bisi, M. M., Bentley, R. D., Wicks, R., McKinnell, L.-A., Gibbs, M., & Burnett, C. (2017). The economic impact of space weather: Where do we stand? *Risk Analysis*, *37*(2), 206-218. <https://doi.org/10.1111/risa.12765>
- Eastwood, J. P., Hietala, H., Tóth, G., Phan, T. D., & Fujimoto, M. (2014). What controls the structure and dynamics of Earth’s magnetosphere? *Space Science Reviews*, *188*(1-4), 251-286. <https://doi.org/10.1007/s11214-014-0050-x>
- Eather, R. H. (1980). *Majestic Lights: The Aurora in Science, History, and the Arts*. Washington, D.C.: American Geophysical Union.
- Ebert, D., Zhukovsky, V. C., & Razumovsky, A. S. (2004). Chern-Simons-like term generation in an extended model of QED under external conditions. *Phys. Rev. D*, *70*, 025003. <https://doi.org/10.1103/PhysRevD.70.025003>
- Ebihara, Y. (2016). Ring Current. In G. V. Khazanov (Ed.), *Space Weather Fundamentals* (p. 149-172). Boca Raton, FL: CRC Press.
- Ebihara, Y., & Ejiri, M. (2000). Simulation study on fundamental properties of the storm-time ring current. *Journal of Geophysical Research*, *105*(A7), 15843-15859. <https://doi.org/10.1029/1999JA900493>
- Ebihara, Y., Ejiri, M., Nilsson, H., Sandahl, I., Milillo, A., Grande, M., Fennell, J. F., & Roeder, J. L. (2002). Statistical distribution of the storm-time proton ring current: POLAR measurements. *Geophysical Research Letters*, *29*(20), 30-1-30-4. <https://doi.org/10.1029/2002GL015430>
- Ebihara, Y., Fok, M.-C., Immel, T. J., & Brandt, P. C. (2011). Rapid decay of storm time ring current due to pitch angle scattering in curved field line. *Journal of Geophysical Research*, *116*(A3). <https://doi.org/10.1029/2010JA016000>

- Ebihara, Y., Fok, M.-C., Sazykin, S., Thomsen, M. F., Hairston, M. R., Evans, D. S., Rich, F. J., & Ejiri, M. (2005). Ring current and the magnetosphere-ionosphere coupling during the superstorm of 20 November 2003. *Journal of Geophysical Research*, *110*(A9). <https://doi.org/10.1029/2004JA010924>
- Ebihara, Y., Hayakawa, H., Iwahashi, K., Tamazawa, H., Kawamura, A. D., & Isobe, H. (2017). Possible Cause of Extremely Bright Aurora Witnessed in East Asia on 17 September 1770. *Space Weather*, *15*(10), 1373-1382. <https://doi.org/10.1002/2017SW001693>
- Echer, E. (2003). *A study of single and compound interplanetary magnetic structure characteristics and their geoeffectiveness* (Ph.D thesis). Instituto Nacional de Pesquisas Espaciais, São José dos Campos, Brazil.
- Echer, E. (2010). Magnetosferas planetárias. *Revista Brasileira de Ensino de Física*, *32*(2), 2301. <https://doi.org/10.1590/S1806-11172010000200001>
- Echer, E. (2019a). Interplanetary Shock Parameters Near Jupiter's Orbit. *Geophysical Research Letters*, *46*(11), 5681-5688. <https://doi.org/10.1029/2019GL082126>
- Echer, E. (2019b). Solar wind and interplanetary shock parameters near Saturn's orbit (~ 10 AU). *Planetary and Space Science*, *165*, 210-220. <https://doi.org/10.1016/j.pss.2018.10.006>
- Echer, E., Alves, M., & Gonzalez, W. (2006). Collisionless shock waves in the interplanetary space. *Revista Brasileira de Ensino de Física*, *28*(1), 51-66. <https://doi.org/10.1590/S0102-47442006000100008>
- Echer, E., Alves, M. V., & Gonzalez, W. D. (2004). Geoeffectiveness of interplanetary shocks during solar minimum (1995) and solar maximum (2000). *Solar Physics*, *221*(2), 361-380. <https://doi.org/10.1023/B:SOLA.0000035045.65224.f3>
- Echer, E., de Lucas, A., Hajra, R., de Souza Franco, A. M., Bolzan, M. J. A., & do Nascimento, L. E. S. (2023). Geomagnetic Activity Following Interplanetary Shocks in Solar Cycles 23 and 24. *Brazilian Journal of Physics*, *53*(79), 1-13. <https://doi.org/10.1007/s13538-023-01294-w>
- Echer, E., & Gonzalez, W. D. (2004). Geoeffectiveness of interplanetary shocks, magnetic clouds, sector boundary crossings and their combined occurrence. *Geophysical Research Letters*, *31*(9), 1-4. <https://doi.org/10.1029/2003GL019199>
- Echer, E., Gonzalez, W. D., & Alves, M. V. (2006). On the geomagnetic effects of solar wind interplanetary magnetic structures. *Space Weather*, *4*(S06001). <https://doi.org/10.1029/2005SW000200>
- Echer, E., Gonzalez, W. D., Dal Lago, A., Vieira, L. E. A., Guarnieri, F. L., Gonzalez, A. L. C., & Schuch, N. J. (2005). Interplanetary shocks and sudden impulses during solar maximum (2000) and solar minimum (1995-1996). *Advances in Space Research*, *36*(12), 2313-2317. <https://doi.org/10.1016/j.asr.2005.04.030>
- Echer, E., Gonzalez, W. D., Guarnieri, F. L., Dal Lago, A., & Vieira, L. E. A. (2005). Introduction to space weather. *Advances in Space Research*, *35*(5), 855-865. <https://doi.org/10.1016/j.asr.2005.02.098>
- Echer, E., Gonzalez, W. D., & Tsurutani, B. T. (2008). Interplanetary conditions leading to superintense geomagnetic storms ($Dst < -250$ nT) during solar cycle 23. *Geophysical Research Letters*, *35*(12), L12102. <https://doi.org/10.1029/2007GL032001>

Research Letters, 35(L06S03). <https://doi.org/10.1029/2007GL031755>

- Echer, E., Gonzalez, W. D., Tsurutani, B. T., & Gonzalez, A. L. C. (2008). Interplanetary conditions causing intense geomagnetic storms ($Dst \leq -100$ nt) during solar cycle 23 (1996–2006). *Journal of Geophysical Research*, 113(A5). <https://doi.org/10.1029/2007JA012744>
- Echer, E., Gonzalez, W. D., Tsurutani, B. T., Vieira, L. E. A., Alves, M. V., & Gonzalez, A. L. C. (2005). On the preferential occurrence of interplanetary shocks in July and November: Causes (solar wind annual dependence) and consequences (intense magnetic storms). *Journal of Geophysical Research*, 110(A2). <https://doi.org/10.1029/2004JA010527>
- Echer, E., Gonzalez, W. D., Vieira, L. E. A., Dal Lago, A., Guarnieri, F. L., Prestes, A., Gonzalez, A. L. C., & Schuch, N. J. (2003). Interplanetary shock parameters during solar activity maximum (2000) and minimum (1995–1996). *Brazilian Journal of Physics*, 33(1), 115–122. <https://doi.org/10.1590/S0103-97332003000100010>
- Echer, E., Rigozo, N. R., Nordemann, D. J. R., Vieira, L. E. A., Prestes, A., & De Faria, H. H. (2003). O número de manchas solares, índice da atividade do sol. *Revista Brasileira de Ensino de Física*, 25(2), 157–163. <https://doi.org/10.1590/S0102-47442003000200004>
- Echer, E., Tsurutani, B., Guarnieri, F., & Kozyra, J. (2011). Interplanetary fast forward shocks and their geomagnetic effects: CAWSES events. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(11–12), 1330–1338. <https://doi.org/10.1016/j.jastp.2010.09.020>
- Echer, E., Tsurutani, B. T., & Guarnieri, F. L. (2009). Solar and interplanetary origins of the November 2004 superstorms. *Advances in Space Research*, 44(5), 615–620. <https://doi.org/10.1016/j.asr.2009.05.003>
- Echer, E., Tsurutani, B. T., & Guarnieri, F. L. (2010). Forward and reverse CIR shocks at 4–5 AU: Ulysses. *Advances in Space Research*, 45(6), 798–803. <https://doi.org/10.1016/j.asr.2009.11.011>
- Eddie, L. A. (1894). Note on an auroral display. *Journal of the British Astronomical Association*, 4, 381.
- Eddy, J. A. (1976). The Maunder Minimum. *Science*, 192(4245), 1189–1202. <https://doi.org/10.1126/science.192.4245.1189>
- Edmiston, J. P., & Kennel, C. F. (1984). A parametric survey of the first critical Mach number for a fast MHD shock. *Journal of Plasma Physics*, 32(3), 429–441. <https://doi.org/10.1017/S002237780000218X>
- Egedal, J. (1947). The magnetic diurnal variation of the horizontal force near the magnetic equator. *Terrestrial Magnetism and Atmospheric Electricity*, 52(4), 449–451. <https://doi.org/10.1029/TE052i004p00449>
- Eggington, J. W. B., Coxon, J. C., Shore, R. M., Desai, R. T., Mejnertsen, L., Chittenden, J. P., & Eastwood, J. P. (2022). Response timescales of the magnetotail current sheet during a geomagnetic storm: Global MHD simulations. *Frontiers in Astronomy and Space Science*, 9(966164). <https://doi.org/10.3389/fspas.2022.966164>
- Einstein, A. (1905). Zur elektrodynamik bewegter körper. *Annalen der Physik*, 322(10),

891-921. <https://doi.org/10.1002/andp.19053221004>

- Einstein, A. (1916). *Relativity: The Special and General Theory*. Overland Park, KS: Digireads.com.
- Einstein, A. (1935). *The World As I See It*. San Diego, CA: The Book Tree.
- Einstein, A., & Infeld, L. (1938). *The evolution of physics – from early concepts to relativity and quanta*. New York, NY: Touchstone.
- Elkington, S. R. (2006). A Review of ULF Interactions with Radiation Belt Electrons. In *Magnetospheric ULF Waves: Synthesis and New Directions*, Geophysical Monograph Series (Vol. 169, p. 177-193). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/169GM12>
- Ellison, M. A. (1940). Solar and Terrestrial Relationships of March 23–29, 1940. *Nature*, *145*, 898. <https://doi.org/10.1038/145898b0>
- Elphinstone, R. D., Murphree, J. S., & Cogger, L. L. (1996). What is a global auroral sub-storm? *Reviews of Geophysics*, *34*(2), 169-232. <https://doi.org/10.1029/96RG00483>
- Emmert, J. T. (2015). Thermospheric mass density: A review. *Advances in Space Research*, *56*(5), 773–824. <https://doi.org/10.1016/j.asr.2015.05.038>
- Emmert, J. T., Richmond, A. D., & Drob, D. P. (2010). A computationally compact representation of Magnetic-Apex and Quasi-Dipole coordinates with smooth base vectors. *Journal of Geophysical Research: Space Physics*, *115*(A8). <https://doi.org/10.1029/2010JA015326>
- Engebretson, M., & Zesta, E. (2017). The future of ground magnetometer arrays in support of Space Weather monitoring and research. *Space Weather*, *15*(11), 1433-1441. <https://doi.org/10.1002/2017SW001718>
- Engebretson, M. J., Simms, L. E., Pilipenko, V. A., Bouayed, L., Moldwin, M. B., Weygand, J. M., Hartinger, M. D., Xu, Z., Clauer, C. R., Coyle, S., Willer, A. N., Freeman, M. P., & Gerrard, A. J. (2022). Geomagnetic Disturbances That Cause GICs: Investigating Their Interhemispheric Conjugacy and Control by IMF Orientation. *Journal of Geophysical Research: Space Physics*, *127*(10), e2022JA030580. <https://doi.org/10.1029/2022JA030580>
- Engebretson, M. J., Takahashi, K., & Scholer, M. (Eds.). (1994). *Solar Wind Sources of Magnetospheric Ultra-Low-Frequency*, Geophysical Monograph Series (Vol. 81). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM081>
- Erinmez, I. A., Kappenman, J. G., & Radasky, W. A. (2002). Management of the geomagnetically induced current risks on the national grid company's electric power transmission system. *Journal of Atmospheric and Solar-Terrestrial Physics*, *63*(5–6), 743–756. [https://doi.org/10.1016/S1364-6826\(02\)00036-6](https://doi.org/10.1016/S1364-6826(02)00036-6)
- Espinosa, K. V., Padilha, A. L., & Alves, L. R. (2019). Effects of Ionospheric Conductivity and Ground Conductance on Geomagnetically Induced Currents During Geomagnetic Storms: Case Studies at Low-Latitude and Equatorial Regions. *Space Weather*, *17*(2), 252-268. <https://doi.org/10.1029/2018SW002094>
- Esplin, R., Mlynczak, M. G., Russell, J., Gordley, L., & The SABER Team. (2023). Sounding

- of the Atmosphere Using Broadband Emission Radiometry (SABER): Instrument and Science Measurement Description. *Earth and Space Science*, 10(9), e2023EA002999. <https://doi.org/10.1029/2023EA002999>
- Evangelista, E. F. D., Domingues, M. O., Mendes, O., & Miranda, O. D. (2016). A brief study of instabilities in the context of space magnetohydrodynamic simulations. *Revista Brasileira de Ensino de Física*, 38(1). <https://doi.org/10.1590/S1806-11173812098>
- Facsó, G., Honkonen, I., Živković, T., Palin, L., Kallio, E., Ågren, K., Opgenoorth, H., & Tanskanen, S., E. I. and Milan. (2016). One year in the Earth's magnetosphere: A global MHD simulation and spacecraft measurements. *Space Weather*, 14(5), 351-367. <https://doi.org/10.1002/2015SW001355>
- Fang, T.-W., Kubaryk, A., Goldstein, D., Li, Z., Fuller-Rowell, T., Millward, G., Singer, H. J., Steenburgh, R., Westerman, S., & Babcock, E. (2022). Space Weather Environment During the SpaceX Starlink Satellite Loss in February 2022. *Space Weather*, 20(11), e2022SW003193. <https://doi.org/10.1029/2022SW003193>
- Fang, X., Lummerzheim, D., & Jackman, C. H. (2013). Proton impact ionization and a fast calculation method. *Journal of Geophysical Research: Space Physics*, 118(8), 5369-5378. <https://doi.org/10.1002/jgra.50484>
- Fang, X., Randall, C. E., Lummerzheim, D., Wang, W., Lu, G., Solomon, S. C., & Frahm, R. A. (2010). Parameterization of monoenergetic electron impact ionization. *Geophysical Research Letters*, 37(22). <https://doi.org/10.1029/2010GL045406>
- Farrona, A. M. M., Gallego, M. C., Vaquero, J. M., & Domínguez-Castro, F. (2011). Spanish eyewitness accounts of the great space weather event of 1859. *Acta Geodaetica et Geophysica Hungarica*, 46(3), 370-377. <https://doi.org/10.1556/AGeod.46.2011.3.7>
- Farrugia, C. J., Matsui, H., Kucharek, H., Jordanova, V. K., Torbert, R. B., Ogilvie, K. W., Berdichevsky, D. B., Smith, C. W., & Skouge, R. (2006). Survey of intense Sun-Earth connection events (1995-2003). *Advances in Space Research*, 38(2), 198-502. <https://doi.org/10.1016/j.asr.2005.05.051>
- Fausto, B. (1994). *História do Brasil*. São Paulo, Brazil: Edusp.
- Federal Communications Commission. (2019). *Request for Modification of Authorization for the SpaceX NGSO Satellite System* (Tech. Rep.). Washington, D.C.: DA 19-342, IBFS File No. SAT-MOD-20181108-00083. Retrieved from <https://docs.fcc.gov/public/attachments/DA-19-342A1.pdf>
- Federal Energy Regulatory Commission. (2015). *Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events* (Tech. Rep.). Washington, D.C.: 18 CFR Part 40, Docket No. RM15-11-000. Retrieved from <https://www.federalregister.gov/documents/2016/09/30/2016-23441/reliability-standard-for-transmission-system-planned-performance-for-geomagnetic-disturbance-events>
- Fedrizzi, M., Fuller-Rowell, T. J., & Codrescu, M. V. (2012). Global Joule heating index derived from thermospheric density physics-based modeling and observations. *Space Weather*, 10(3). <https://doi.org/10.1029/2011SW000724>
- Feibelman, P. J. (2011). *A PhD is not enough! - A Guide to Survival in Science*. New

York, NY: Addison-Wesley.

- Fejer, B. G., Jensen, J. W., Kikuchi, T., Abdu, M. A., & Chau, J. L. (2007). Equatorial ionospheric electric fields during the November 2004 magnetic storm. *Journal of Geophysical Research*, *112*(A10). <https://doi.org/10.1029/2007JA012376>
- Fejer, J. A. (1963). Theory of auroral electrojets. *Journal of Geophysical Research*, *68*(8), 2147-2157. <https://doi.org/10.1029/JZ068i008p02147>
- Feng, H., & Wang, J. M. (2008). Observations of a 2→3 type interplanetary intermediate shock. *Solar Physics*, *247*(1), 195-201. <https://doi.org/10.1007/s11207-007-9087-2>
- Feng, H. Q., Li, Q. H., Wang, J. M., & Zhao, G. Q. (2016). Observations of an interplanetary intermediate shock associated with a magnetic reconnection exhaust. *The Astrophysical Journal*, *826*(1), 1-5. <https://doi.org/10.3847/0004-637X/826/1/15>
- Ferdousi, B. (2017). *The study of magnetotail dynamics and their ionospheric signatures using magnetohydrodynamic simulation model: OpenGGCM* (Ph.D thesis). University of New Hampshire, Durham, New Hampshire.
- Ferdousi, B., & Raeder, J. (2016). Signal propagation time from the magnetotail to the ionosphere: OpenGGCM simulation. *Journal of Geophysical Research: Space Physics*, *121*(7), 6549-6561. <https://doi.org/10.1002/2016JA022445>
- Ferguson, K. (2002). *Tycho & Kepler - The Unlikely Partnership That Forever Changed Our Understanding of the Universe*. New York, NY: Walker & Company.
- Fermi, E. (1949). On the origin of the cosmic radiation. *Phys. Rev.*, *75*(8), 1169–1174. <https://doi.org/10.1103/PhysRev.75.1169>
- Ferreira, P. P., Silveira, M. V. D., Cardoso, F. R., Koga, D., Souza, V. M. C. S., Vieira, L. E. A., Pérez, G. F., Cuadros-Melgar, B. M., Gonzalez, W. D., & Santos, E. F. (2017). Conceitos básicos sobre a física da formação de tubos de fluxo magnético nas proximidades da terra. *Revista Brasileira de Ensino de Física*, *39*(2), e2307. <https://doi.org/10.1590/1806-9126-rbef-2016-0190>
- Fetter, A. L., & Walecka, J. D. (2003). *Theoretical Mechanics of Particles and Continua*. New York, NY: Dover Publications.
- Feynman, J., & Ruzmaikin, A. (2014). The Centennial Gleissberg Cycle and its association with extended minima. *Journal of Geophysical Research: Space Physics*, *119*(8), 6027-6041. <https://doi.org/10.1002/2013JA019478>
- Feynman, R. P. (1985). *Surely you're joking, Mr. feynman! - adventures of a curious character*. New York, NY: W. W. Norton.
- Feynman, R. P., Leighton, R. B., & Sands, M. L. (1964a). *The feynman lectures on physics* (Vols. 1: Mainly Mechanics, Radiation and Heat). Reading, MA: Addison-Wesley.
- Feynman, R. P., Leighton, R. B., & Sands, M. L. (1964b). *The feynman lectures on physics* (Vol. 2: Mainly Electromagnetism and Matter). Reading, MA: Addison-Wesley.
- Feynman, R. P., Leighton, R. B., & Sands, M. L. (1964c). *The feynman lectures on physics* (Vol. 3: Quantum Mechanics). Reading, MA: Addison-Wesley.
- Feynman, R. P., & Styer, D. F. (1965). *Quantum mechanics and path integrals*. Mineola, NY: Dover Publications.

- Fillington, M. O., Parks, G. K., Frey, H. U., Immel, T. J., & Mende, S. B. (2005). Hemispheric asymmetry of the afternoon electron aurora. *Geophysical Research Letters*, *32*(3). <https://doi.org/10.1029/2004GL021635>
- Fiori, R. A. D., Boteler, D. H., & Gillies, D. M. (2014). Assessment of GIC risk due to geomagnetic sudden commencements and identification of the current systems responsible. *Space Weather*, *12*(1), 76-91. <https://doi.org/10.1002/2013SW000967>
- Fisk, L. A., & Lee, M. A. (1980). Shock acceleration of energetic particles in corotating interaction regions in the solar wind. *The Astrophysical Journal*, *237*(1), 620-626. <https://doi.org/10.1086/157907>
- Flammarion, G. C., & Quenisset, F. (1940). *Eruption solaire perturbation magnetique et aurore boreale*. *L'Astronomie*, *54*, 88-89.
- Flury, J., Bettadpur, S., & Tapley, B. D. (2008). Precise accelerometry onboard the GRACE gravity field satellite mission. *Advances in Space Research*, *42*(8), 1414-1423. <https://doi.org/10.1016/j.asr.2008.05.004>
- Fok, M., Ebihara, Y., Moore, T. E., Ober, D. M., & Keller, K. A. (2005). Geospace Storm Processes Coupling the Ring Current, Radiation Belt and Plasmasphere. In *Inner Magnetosphere Interactions: New Perspectives from Imaging*, Geophysical Monograph Series (Vol. 159, p. 207-225). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/159GM16>
- Fok, M.-C., Buzulukova, N. Y., Chen, S.-H., Glocer, A., Nagai, T., Valek, P., & Perez, J. D. (2014). The comprehensive inner magnetosphere-ionosphere model. *Journal of Geophysical Research: Space Physics*, *119*(9), 7522-7540. <https://doi.org/10.1002/2014JA020239>
- Fok, M.-C., Glocer, A., Zheng, Q., Horne, R. B., P.Meredith, N., Albert, J. M., & Nagaie, T. (2011). Recent developments in the radiation belt environment model. *Journal of Atmospheric and Solar-Terrestrial Physics*, *73*(11-12), 1435-1443. <https://doi.org/10.1016/j.jastp.2010.09.033>
- Fok, M.-C., Horne, R. B., Meredith, N. P., & Glauert, S. A. (2008). Radiation Belt Environment model: Application to space weather nowcasting. *Journal of Geophysical Research*, *113*(A3). <https://doi.org/10.1029/2007JA012558>
- Fok, M.-C., & Moore, T. E. (1997). Ring current modeling in a realistic magnetic field configuration. *Geophysical Research Letters*, *24*(14), 1775-1778. <https://doi.org/10.1029/97GL01255>
- Fok, M.-C., Moore, T. E., Slinker, S. P., Fedder, J. A., Delcourt, D. C., Nosé, M., & Chen, S.-H. (2011). Modeling the superstorm in november 2003. *Journal of Geophysical Research*, *116*(A1). <https://doi.org/10.1029/2010JA015720>
- Fok, M.-C., Wolf, R. A., Spiro, R. W., & Moore, T. E. (2001). Comprehensive computational model of earth's ring current. *Journal of Geophysical Research*, *106*(A5), 8417-8424. <https://doi.org/10.1029/2000JA000235>
- Forbes, J. M. (1981). The equatorial electrojet. *Reviews of Geophysics*, *19*(3), 469-504. <https://doi.org/10.1029/RG019i003p00469>
- Forbes, J. M. (2007). Dynamics of the thermosphere. *Journal of the Meteorological Society of Japan*, *85B*, 193-213. <https://doi.org/10.2151/jmsj.85B.193>

- Forbes, J. M., Bruinsma, S. L., Zhang, X., & Oberheide, J. (2009). Surface-exosphere coupling due to thermal tides. *Geophysical Research Letters*, *36*(15). <https://doi.org/10.1029/2009GL038748>
- Forbes, J. M., Lu, G., Bruinsma, S., Nerem, S., & Zhang, X. (2005). Thermosphere density variations due to the 15-24 April 2002 solar events from CHAMP/STAR accelerometer measurements. *Journal of Geophysical Research*, *110*(A12), 1–9. <https://doi.org/10.1029/2004JA010856>
- Forbes, J. M., Zhang, X., Bruinsma, S., & Oberheide, J. (2011). Sun-synchronous thermal tides in exosphere temperature from CHAMP and GRACE accelerometer measurements. *Journal of Geophysical Research*, *116*(A11). <https://doi.org/10.1029/2011JA016855>
- Forbes, K. F., & St. Cyr, O. C. (2004). Space weather and the electricity market: An initial assessment. *Space Weather*, *2*(10). <https://doi.org/10.1029/2003SW000005>
- Forbes, K. F., & St. Cyr, O. C. (2008). Solar activity and economic fundamentals: Evidence from 12 geographically disparate power grids. *Space Weather*, *6*(10). <https://doi.org/10.1029/2007SW000350>
- Ford, H. L., Brick, C., Blaufuss, K., & Dekens, P. S. (2018). Gender inequity in speaking opportunities at the American Geophysical Union Fall Meeting. *Nature Communications*, *9*(1358). <https://doi.org/10.1038/s41467-018-03809-5>
- Forman, M. A., & Webb, G. M. (1985). Acceleration of energetic particles. In B. T. Tsurutani & R. G. Stone (Eds.), *Collisionless Shocks in the Heliosphere: A Tutorial Review*, Geophysical Monograph Series (Vol. 34, p. 91-114). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM034p0091>
- Förster, M., & Cnossen, I. (2013). Upper atmosphere differences between northern and southern high latitudes: The role of magnetic field asymmetry. *Journal of Geophysical Research*, *118*(9), 5951–5966. <https://doi.org/10.1002/jgra.50554>
- Forster, M., Doornbos, E., & Haaland, S. E. (2017). The Role of the Upper Atmosphere for Dawn-Dusk Differences in the Coupled Magnetosphere-Ionosphere-Thermosphere System. In S. Haaland, A. Runov, & C. Forsyth (Eds.), *Dawn-dusk asymmetries in planetary plasma environments* (pp. 125–141). Hoboken, NJ: Wiley. <https://doi.org/10.1002/9781119216346.ch10>
- Foster, J. C., Holt, J. M., Musgrove, R. G., & Evans, D. S. (1986). Ionospheric convection associated with discrete levels of particle precipitation. *Geophysical Research Letters*, *13*(7), 656–659. <https://doi.org/10.1029/GL013i007p00656>
- Fowler, G. J. (2005). *The compression of the geo-magnetosphere: A physical model and the effects of compression* (Ph.D thesis). University of California, Los Angeles, Los Angeles, California.
- Frank, L. A., Craven, J. D., Burch, J. L., & Winningham, J. D. (1982). Polar views of the Earth's aurora with Dynamics Explorer. *Geophysical Research Letters*, *9*(9), 1001-1004. <https://doi.org/10.1029/GL009i009p01001>
- Freed, A. J., & Russell, C. T. (2014). Travel time classification of extreme solar events: Two families and an outlier. *Geophysical Research Letters*, *41*(19), 6590-6594. <https://doi.org/10.1002/2014GL061353>

- Freeman, M. P., Forsyth, C., & Rae, I. J. (2019). The Influence of Substorms on Extreme Rates of Change of the Surface Horizontal Magnetic Field in the United Kingdom. *Space Weather*, *17*(6), 827-844. <https://doi.org/10.1029/2018SW002148>
- Freeman, M. P., & Morley, S. K. (2004). A minimal substorm model that explains the observed statistical distribution of times between substorms. *Geophysical Research Letters*, *31*(12). <https://doi.org/10.1029/2004GL019989>
- Frenkel, J. (1996). *Princípios de eletrodinâmica clássica*. São Paulo, Brazil: Edusp.
- Frey, H. U., & Mende, S. B. (2006). Substorm onsets as observed by IMAGE-FUV. In *Int. conf. Substorms-8* (p. 71-75). ICS-8 Canada.
- Frey, H. U., Mende, S. B., Angelopoulos, V., & Donovan, E. F. (2004). Substorm onset observations by IMAGE-FUV. *Journal of Geophysical Research*, *109*(A10). <https://doi.org/10.1029/2004JA010607>
- Frey, H. U., Phan, T. D., Fuselier, S. A., & Mende, S. B. (2003). Continuous magnetic reconnection at Earth's magnetopause. *Nature*, *426*, 533-537. <https://doi.org/10.1038/nature02084>
- Friedman, J. F., & Herrero, F. A. (1982). Fabry-Perot interferometer measurements of thermospheric neutral wind gradients and reversals at Arecibo. *Geophysical Research Letters*, *9*(7), 785-788. <https://doi.org/10.1029/GL009i007p00785>
- Frigo, M., & Johnson, S. G. (1998). FFTW: an adaptive software architecture for the FFT. In *Proceedings of the 1998 IEEE International Conference on Acoustics, Speech and Signal Processing* (Vols. 3, ICASSP '98 (Cat. No.98CH36181), p. 1381-1384). Washington, D.C.: IEEE. <https://doi.org/10.1109/ICASSP.1998.681704>.
- Fritz, H. (1881). *Das polarlicht*. Leipzig, Germany: F. A. Brockhaus AG.
- Fu, H., Yue, C., Zong, Q.-G., Zhou, X.-Z., & Fu, S. (2021). Statistical Characteristics of Substorms With Different Intensity. *Journal of Geophysical Research: Space Physics*, *126*(8), e2021JA029318. <https://doi.org/https://doi.org/10.1029/2021JA029318>
- Fujii, R., Fukunishi, H., Kokubun, S., Sugiura, M., Tohyama, F., Hayakawa, H., Tsuruda, K., & Okada, T. (1992). Field-aligned current signatures during the March 13-14, 1989, Great Magnetic Storm. *Journal of Geophysical Research*, *97*(A7), 10703-10715. <https://doi.org/10.1029/92JA00171>
- Fujita, S., Tanaka, T., Kikuchi, T., Fujimoto, K., Hosokawa, K., & Itonaga, M. (2003). A numerical simulation of the geomagnetic sudden commencement: 1. Generation of the field-aligned current associated with the preliminary impulse. *Journal of Geophysical Research*, *108*(A12). <https://doi.org/10.1029/2002JA009407>
- Fujita, S., Tanaka, T., Kikuchi, T., Fujimoto, K., & Itonaga, M. (2003). A numerical simulation of the geomagnetic sudden commencement: 2. Plasma processes in the main impulse. *Journal of Geophysical Research*, *108*(A12). <https://doi.org/10.1029/2002JA009763>
- Fujiwara, H., & Miyoshi, Y. (2006). Characteristics of the large-scale traveling atmospheric disturbances during geomagnetically quiet and disturbed periods simulated by a whole atmosphere general circulation model. *Geophysical Research Letters*, *33*(20). <https://doi.org/10.1029/2006GL027103>

- Fujiwara, H., Miyoshi, Y., Jin, H., Shinagawa, H., Otsuka, Y., Saito, A., & Ishii, M. (2009). Thermospheric temperature and density variations. In *Solar and stellar variability: Impact on earth and planets* (Vol. 5, pp. 310–319). <https://doi.org/10.1017/S1743921309992857>
- Fukunishi, H., & Lanzerotti, L. J. (1974). ULF pulsation evidence of the plasmopause: 1. Spectral studies of Pc 3 and Pc 4 pulsations near L = 4. *Journal of Geophysical Research*, *79*(1), 142-158. <https://doi.org/10.1029/JA079i001p00142>
- Fukushima, N. (1976). Generalized theorem for no ground magnetic effect of vertical currents connected with Pedersen currents in the uniform-conductivity ionosphere. *Report of Ionosphere and Space Research in Japan*, *30*, 35–40.
- Fukushima, N. (1994). Some topics and historical episodes in geomagnetism and aeronomy. *Journal of Geophysical Research*, *99*(A10). <https://doi.org/10.1029/94JA00102>
- Fukushima, N., & Kamide, Y. (1973). Partial ring current models for world-wide geomagnetic disturbances. *Reviews of Geophysics*, *11*(4), 795-853. <https://doi.org/10.1029/RG011i004p00795>
- Fuller-Rowell, T. J., Codrescu, M. V., Rishbeth, H., Moffett, R. J., & Quegan, S. (1996). On the seasonal response of the thermosphere and ionosphere to geomagnetic storms. *Journal of Geophysical Research*, *101*(A2), 2343–2353. <https://doi.org/10.1029/95JA01614>
- Fuller-Rowell, T. J., Rees, D., Quegan, S., Moffett, R. J., Codrescu, M. V., & Millward, G. H. (1996). A coupled thermosphere-ionosphere model (CTIM). In R. W. Schunk (Ed.), *STEP report* (p. 217-238). Boulder, CO: Scientific Committee on Solar Terrestrial Physics (SCOSTEP), NOAA/NGDC.
- Fuller-Rowell, T. J., Rees, D., Quegan, S., Moffett, R. J., & Bailey, G. J. (1988). Simulations of the seasonal and universal time variations of the high-latitude thermosphere and ionosphere using a coupled, three-dimensional, model. *Pure Appl. Geophys.*, *127*(2), 189–217. <https://doi.org/10.1007/BF00879811>
- Fuller-Rowell, T. J. (2011). Storm-time response of the thermosphere-ionosphere system. In M. A. Abdu & D. Pancheva (Eds.), *Aeronomy of the earth's atmosphere and ionosphere* (pp. 419–435). Amsterdam, The Netherlands: Springer Netherlands. <https://doi.org/10.1007/978-94-007-0326-1-32>
- Fuller-Rowell, T. J., Codrescu, M. V., Moffett, R. J., & Quegan, S. (1994). Response of the thermosphere and ionosphere to geomagnetic storms. *Journal of Geophysical Research*, *99*(A3), 3893–3914. <https://doi.org/10.1029/93JA02015>
- Fuller-Rowell, T. J., Codrescu, M. V., Roble, R. G., & Richmond, A. D. (1997). How does the thermosphere and ionosphere react to a geomagnetic storm? In B. T. Tsurutani, W. D. Gonzalez, Y. Kamide, & J. K. Arballo (Eds.), *Magnetic storms*, Geophysical Monograph Series (Vol. 98, pp. 203–225). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM098p0203>
- Fuller-Rowell, T. J., & Evans, D. S. (1987). Height-integrated Pedersen and Hall conductivity patterns inferred from the TIROS-NOAA satellite data. *Journal of Geophysical Research*, *92*(A7), 7606-7618. <https://doi.org/10.1029/JA092iA07p07606>
- Fung, S. F. (1996). Recent Development in the NASA Trapped Radiation Models. In

- J. F. Lemaire, D. Heynderickx, & D. N. Baker (Eds.), *Radiation Belts: Models and Standards*, Geophysical Monograph Series (Vol. 97, p. 79-91). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM097p0079>
- Fuselier, S. A. (1994). Suprathermal Ions Upstream and Downstream from the Earth's Bow Shock. In M. J. Engebretson & M. S. K. Takahashi (Eds.), *Solar Wind Sources of Magnetospheric Ultra-Low-Frequency Waves*, Geophysical Monograph Series (Vol. 81, p. 107-119). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM081p0107>
- Fuselier, S. A., Lewis, W. S., Schiff, C., Ergun, R., Burch, J. L., Petrinec, S. M., & Trattner, K. J. (2016). Magnetospheric Multiscale Science Mission Profile and Operations. *Space Science Reviews*, 199(1-4), 77-103. <https://doi.org/10.1007/s11214-014-0087-x>
- Gade, K. (2010). A Non-singular Horizontal Position Representation. *The Journal of Navigation*, 63(3), 295-417. <https://doi.org/10.1017/S0373463309990415>
- Galand, M., & Richmond, A. D. (2001). Ionospheric electrical conductances produced by auroral proton precipitation. *Journal of Geophysical Research*, 106(A1), 117-125. <https://doi.org/10.1029/1999JA002001>
- Galilei, G. (1610). *Sidereus nuncius*. Venezia, Italia: Thomas Baglioni.
- Galilei, G. (1613). *Istoria e dimostrazioni intorno alle macchie solari*. Roma, Italia: Accademia dei Lincei.
- Galvin, A. B., Kistler, L. M., Popecki, M. A., Farrugia, C. J., Simunac, K. D. C., Ellis, L., Möbius, E., Lee, M. A., Boehm, M., Carroll, J., Crawshaw, A., Conti, M., Demaine, P., Ellis, S., Gaidos, J. A., Googins, J., Granoff, M., Gustafson, A., Heirtzler, D., King, B., Knauss, U., Levasseur, J., Longworth, S., Singer, K., Turco, S., Vachon, P., Vosbury, M., Widholm, M., Blush, L. M., Karrer, R., Bochsler, P., Daoudi, H., Etter, A., Fischer, J., Jost, J., Opitz, A., Sigrist, M., Wurz, P., Klecker, B., Seidenschwang, M. E. E., Wimmer-Schweingruber, R. F., Koeten, M., Thompson, B., & Steinfeld, D. (2008). The Plasma and Suprathermal Ion Composition (PLASTIC) investigation on the STEREO Observatories. *Space Science Reviews*, 136(1), 437-486. <https://doi.org/10.1007/s11214-007-9296-x>
- Gannon, J. L., Birchfield, A. B., Shetye, K. S., & Overbye, T. J. (2017). A Comparison of Peak Electric Fields and GICs in the Pacific Northwest Using 1-D and 3-D Conductivity. *Space Weather*, 15(11), 1535-1547. <https://doi.org/10.1002/2017SW001677>
- Gannon, J. L., Morley, S., Lugaz, N., Liu, H., Carter, B., & Zou, S. (2023). Long-Term Support Is Needed for Crucial Ground-Based Sensor Networks. *Space Weather*, 21(5), e2023SW003529. <https://doi.org/10.1029/2023SW003529>
- Ganushkina, N. Y., Liemohn, M. W., Dubyagin, S., Daglis, I. A., Dandouras, I., Zeeuw, D. L. D., Ebihara, Y., Ilie, R., Katus, R., Kubyshkina, M., Milan, S. E., Ohtani, S., Østgaard, N., Reistad, J. P., Tenfjord, P., Toffoletto, F., Zaharia, S., & Amariute, O. (2015). Defining and resolving current systems in geospace. *Annales Geophysicae*, 33, 1369-1402. <https://doi.org/10.5194/angeo-33-1369-2015>
- Gao, Y. (2012). Comparing the cross polar cap potentials measured by SuperDARN and AMIE during saturation intervals. *Journal of Geophysical Research*, 117(A8).

<https://doi.org/10.1029/2012JA017690>

- Garfield, E. (1955). Citation indexes for science: A new dimension in documentation through association of ideas. *Science*, *122*(3159), 108–111. <https://doi.org/10.1126/science.122.3159.108>
- Garret, H. B. (2016a). Spacecraft Charging. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 311-328). Boca Raton, FL: CRC Press.
- Garret, H. B. (2016b). Space Weather and Extraterrestrial Planets. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 291-310). Boca Raton, FL: CRC Press.
- Gary, J. B., Heelis, R. A., Hanson, W. B., & Slavin, J. A. (1994). Field-aligned Poynting flux observations in the high-latitude ionosphere. *Journal of Geophysical Research*, *99*(A6), 11417–11427. <https://doi.org/10.1029/93JA03167>
- Gary, J. B., Heelis, R. A., & Thayer, J. P. (1995). Summary of field-aligned Poynting flux observations from DE 2. *Geophysical Research Letters*, *22*(14), 1861–1864. <https://doi.org/10.1029/95GL00570>
- Gault, W. A., Koehler, R. A., Link, R., & Shepherd, G. G. (1981). Observations of the optical spectrum of the dayside magnetospheric cleft aurora. *Planetary and Space Science*, *29*(3), 321-333. [https://doi.org/10.1016/0032-0633\(81\)90020-9](https://doi.org/10.1016/0032-0633(81)90020-9)
- Gaunt, C., & Coetzee, G. (2007). Transformer failures in regions incorrectly considered to have low GIC-risk. In *Power Tech, 2007 IEEE Lausanne* (pp. 807–812). Lausanne, Switzerland: IEEE. <https://doi.org/10.1109/PCT.2007.4538419>
- Gaunt, C. T. (2016). Why space weather is relevant to electrical power systems. *Space Weather*, *14*(1), 2–9. <https://doi.org/10.1002/2015SW001306>
- Gawali, P., Bhaskar, A., Dhar, A., & Ramesh, D. S. (2016). Science outreach and capacity building in geomagnetism and space sciences – An Indian Institute of Geomagnetism endeavor. *Space Weather*, *14*(5), 324-329. <https://doi.org/10.1002/2015SW001326>
- Gawali, P. B., Doiphode, M. G., & Nimje, R. N. (2015). Colaba–Alibag magnetic observatory and Nanabhoy Moos: the influence of one over the other. *History of Geo- and Space Sciences*, *6*, 107-131. <https://doi.org/10.5194/hgss-6-107-2015>
- Ge, Y. S., Raeder, J., Angelopoulos, V., Gilson, M. L., & Runov, A. (2011). Interaction of dipolarization fronts within multiple bursty bulk flows in global MHD simulations of a substorm on 27 February 2009. *Journal of Geophysical Research*, *116*(A5), A00I23. <https://doi.org/10.1029/2010JA015758>
- Gérard, J. C., & Barth, C. A. (1977). High-latitude nitric oxide in the lower thermosphere. *Journal of Geophysical Research*, *82*(4), 674-680. <https://doi.org/10.1029/JA082i004p00674>
- Germaine, L. W. (1940). *The magnetic storm of March 24, 1940 – Effects in the power system*. Edison Electric Institute Bulletin, 11940-07, 367.
- Gershman, D. J., Samara, M., Zesta, E., Sotirelis, T., Jahn, J.-M., Michell, R., Khazanov, G. V., Glocer, A., Oliveira, D., Ridley, A. J., Solomon, S. C., Knudsen, D. J., Avakov, L. A., Chartier, A., Burch, J. L., Ogasawara, K., Genestreti, K. J., & Frederic Allegrini, N. P. (2022). The Comprehensive Auroral Precipitation Experiment for NASA’s Geospace Dynamics Constellation. In *Final paper number sa25c-1931*. Presented at

2022 AGU Fall Meeting, Chicago, IL, 10-14 Dec..

- Gershman, D. J., Samara, M., Zesta, E., Sotirelis, T., Jahn, J.-M., Michell, R., Khazanov, G. V., Glocer, A., Oliveira, D., Ridley, A. J., Solomon, S. C., Knudsen, D. J., Avananov, L. A., Chartier, A., Burch, J. L., Ogasawara, K., Genestreti, K. J., Allegrini, F., & Paschalidis, N. (2023). The Comprehensive Auroral Precipitation Experiment (CAPE) for GDC. In *Final paper number sa25c-1931*. Presented at 2023 AGU Fall Meeting, San Francisco, CA, 10-14 Dec..
- Gideon, D. N., Hopper, A. T., & Thompson, R. E. (1970). *Earth current effects on buried pipelines: Analysis of observations of telluric gradients and their effects*. Washington, D.C.: American Gas Association.
- Gilbert, W. (1600). *De Magnete, Magneticisque Corpori bus, et de Magno Magnete Teilure (English: On the Magnet and Magnetic Bodies, and on that Great Magnet the Earth)*. New York, NY: Dover Publications.
- Gillmor, C. S., & Spreiter, J. R. (Eds.). (1997). *Discovery of the magnetosphere* (Vol. 7). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/HG007>
- Gilson, M. L. (2011). *Global structure of the nightside proton precipitation during substorms using simulations and observations* (Ph.D thesis). University of New Hampshire, Durham, New Hampshire.
- Gilson, M. L., Raeder, J., Donovan, E., Ge, Y. S., & Kepko, L. (2012). Global simulation of proton precipitation due to field line curvature during substorms. *Journal of Geophysical Research*, 117(A5). <https://doi.org/10.1029/2012JA017562>
- Gini, F. (2014). *GOCE Precise Non-Gravitational Force Modeling for POD Applications* (Ph.D Thesis). University of Padova, Padova, Italy.
- Gjerloev, J. W. (2009). A global ground-based magnetometer initiative. *Eos Transactions AGU*, 90(27), 230–231. <https://doi.org/10.1029/2009EO270002>
- Gjerloev, J. W. (2012). The SuperMAG data processing technique. *Journal of Geophysical Research*, 117(A09213), 1–19. <https://doi.org/10.1029/2012JA017683>
- Gjerloev, J. W., Hoffman, R. A., Friel, M. M., Frank, L. A., & Sigwarth, J. B. (2004). Substorm behavior of the auroral electrojet indices. *Annales Geophysicae*, 22(6), 2135–2149. <https://doi.org/10.5194/angeo-22-2135-2004>
- Gledhill, J. A. (1976). Aeronomic effects of the South Atlantic Anomaly. *Reviews of Geophysics*, 14(2), 173-187. <https://doi.org/10.1029/RG014i002p00173>
- Gleiser, M. (2006). *A Harmonia do Mundo*. São Paulo, Brazil: Companhia das Letras.
- Gleissberg, W. (1967). Secularly smoothed data on the minima and maxima of sunspot frequency. *Solar Physics*, 2(2), 231-233. <https://doi.org/10.1007/BF00155925>
- Gleria, I. (2017). Rendezvous de espaçonaves em órbitas próximas à Terra. *Revista Brasileira de Ensino de Física*, 39(2). <https://doi.org/10.1590/1806-9126-RBEF-2016-0238>
- Gloag, J. M., & Balogh, A. (2005). Shock parameter calculations at weak interplanetary shock waves. *Annales Geophysicae*, 23(2), 545–552. <https://doi.org/10.5194/angeo-23-545-2005>
- Glocer, A., Dorelli, J., Tóth, G., Komar, C. M., & Cassak, P. A. (2016). Separator

- reconnection at the magnetopause for predominantly northward and southward IMF: Techniques and results. *Journal of Geophysical Research: Space Physics*, *121*(1), 140-156. <https://doi.org/10.1002/2015JA021417>
- Glocer, A., Fok, M., Meng, X., Toth, G., Buzulukova, N., Chen, S., & Lin, K. (2013). Crcm+bats-r-us two-way coupling. *Journal of Geophysical Research*, *118*(4), 1635-1650. <https://doi.org/10.1002/jgra.50221>
- Glocer, A., Fok, M.-C., Nagai, T., Tóth, G., Guild, T., & Blake, J. (2011). Rapid rebuilding of the outer radiation belt. *Journal of Geophysical Research*, *116*(A9). <https://doi.org/10.1029/2011JA016516>
- Glocer, A., Khazanov, G., & Liemohn, M. (2017). Photoelectrons in the quiet polar wind. *Journal of Geophysical Research: Space Physics*, *122*(6), 6708-6726. <https://doi.org/10.1002/2017JA024177>
- Glocer, A., Kitamura, N., Tóth, G., & Gombosi, T. (2012). Modeling solar zenith angle effects on the polar wind. *Journal of Geophysical Research*, *117*(A4). <https://doi.org/10.1029/2011JA017136>
- Glocer, A., Tóth, G., Fok, M., Gombosi, T., & Liemohn, M. (2009). Integration of the radiation belt environment model into the space weather modeling framework. *Journal of Atmospheric and Solar-Terrestrial Physics*, *71*(16), 1653-1663. <https://doi.org/doi.org/10.1016/j.jastp.2009.01.003>
- Glocer, A., Tóth, G., & Fok, M.-C. (2018). Including Kinetic Ion Effects in the Coupled Global Ionospheric Outflow Solution. *Journal of Geophysical Research: Space Physics*, *123*(4), 2851-2871. <https://doi.org/10.1002/2018JA025241>
- Glocer, A., Tóth, G., Gombosi, T., & Welling, D. (2009). Modeling ionospheric outflows and their impact on the magnetosphere, initial results. *Journal of Geophysical Research*, *114*(A5). <https://doi.org/10.1029/2009JA014053>
- Glocer, A., Tóth, G., Ma, Y., Gombosi, J.-C., T. a nd Zhang, & Kistler, L. M. (2009). Multifluid Block-Adaptive-Tree Solar wind Roe-type Upwind Scheme: Magnetospheric composition and dynamics during geomagnetic storms—Initial results. *Journal of Geophysical Research*, *114*(A12). <https://doi.org/10.1029/2009JA014418>
- Glocer, A., Tóth, G., Ma, Y., Gombosi, T., Zhang, J.-C., & Kistler, L. M. (2009). Multifluid Block-Adaptive-Tree Solar wind Roe-type Upwind Scheme: Magnetospheric composition and dynamics during geomagnetic storms - Initial results. *Journal of Geophysical Research*, *114*(A12). <https://doi.org/10.1029/2009JA014418>
- Glocer, A., Welling, D., Chappell, C. R., Tóth, G., Fok, M.-C., Komar, C., Kang, S.-B., Buzulukova, N., Ferradas, C., Bingham, S., & Mouikis, C. (2020). A case study on the origin of near-earth plasma. *Journal of Geophysical Research: Space Physics*, *125*(11), e2020JA028205. <https://doi.org/10.1029/2020JA028205>
- Gloecker, G., & Fisk, L. A. (2014). A test for whether or not Voyager 1 has crossed the heliopause. *Geophysical Research Letters*, *41*(15), 5325—5330. <https://doi.org/10.1002/2014GL060781>
- Gold, T. (1955). Discussion on shock waves and rarefied gases. In *Gas dynamics of cosmic clouds*. Amsterdam, The Netherlands: North Holland Publ. Co.
- Gold, T. (1959a). Motions in the magnetosphere of the Earth. *Journal of Geophysical*

- Research*, 64(9), 1219-1224. <https://doi.org/10.1029/JZ064i009p01219>
- Gold, T. (1959b). Plasma and magnetic field in the solar system. *Journal of Geophysical Research*, 64(11), 1665–1674. <https://doi.org/10.1029/JZ064i011p01665>
- Goldstein, H., Poole, C. P., & Safko, J. (2001). *Classical mechanics*. London, United Kingdom: Pearson Education.
- Goldstein, M. L. (2016). Solar wind. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 21-34). Boca Raton, FL: CRC Press.
- Gombosi, T. I. (1998). *Physics of space environment*. Cambridge, United Kingdom: Cambridge University Press.
- Gombosi, T. I. (2016). Simulating Space Weather. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 261-290). Boca Raton, FL: CRC Press.
- Gombosi, T. I., De Zeeuw, D. L., Groth, C. P. T., Powell, K. G., & Stout, Q. F. (2000). Multiscale MHD simulation of a coronal mass ejection and its interaction with the magnetosphere-ionosphere system. *Journal of Atmospheric and Solar-Terrestrial Physics*, 62(16), 1515-1525. [https://doi.org/10.1016/S1364-6826\(00\)00091-2](https://doi.org/10.1016/S1364-6826(00)00091-2)
- Gomes, M., Mariz, T., Nascimento, J. R., & da Silva, A. J. (2008). Dynamical Lorentz and CPT symmetry breaking in a 4D four-fermion model. *Phys. Rev. D*, 77, 105002. <https://doi.org/10.1103/PhysRevD.77.105002>
- Gomes, M., Mariz, T., Nascimento, J. R., Passos, E., Petrov, A. Y., & da Silva, A. J. (2008). Ambiguities in the effective action in Lorentz-violating gravity. *Phys. Rev. D*, 78, 025029. <https://doi.org/10.1103/PhysRevD.78.025029>
- Gomes, M. O. C. (2002). *Teoria quântica de campos*. São Paulo, Brazil: Edusp.
- Gómez, J. M. R. (2021). La influencia del Sol en la Tierra y otros planetas: Clima espacial. *Revista Brasileira de Ensino de Física*, 43, e20200495. <https://doi.org/10.1590/1806-9126-RBEF-2020-0495>
- Goncharov, O., Šafránková, J., & Němeček, Z. (2015). Interplanetary shock–bow shock interaction: Comparison of a global MHD model and observation. *Planetary and Space Science*, 2015, 4–11. <https://doi.org/10.1016/j.pss.2014.12.001>
- Goncharov, O., Šafránková, J., Němeček, Z., Přeč, L., Pitňa, A., & Zastenker, G. N. (2014). Upstream and downstream wave packets associated with low-Mach number interplanetary shocks. *Geophysical Research Letters*, 41(11), 8100-8106. <https://doi.org/10.1002/2014GL062149>
- Gonzalez, W. D., Clúa de Gonzalez, A. L., Mendes, O., & Tsurutani, B. T. (1992). Difficulties defining storm sudden commencements. *Eos Transactions AGU*, 73(16), 180–181. <https://doi.org/10.1029/91EO00148>
- Gonzalez, W. D., Echer, E., Clúa de Gonzalez, A. L., Tsurutani, B. T., & Lakhina, G. S. (2011). Extreme geomagnetic storms, recent gleissberg cycles and space era-superintense storms. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(11-12), 1447-1453. <https://doi.org/10.1016/j.jastp.2010.07.023>
- Gonzalez, W. D., Echer, E., Clua-Gonzalez, A. L., & Tsurutani, B. T. (2007). Interplanetary origin of intense geomagnetic storms ($Dst < -100$ nT) during solar cycle 23. *Geophysical Research Letters*, 34(6). <https://doi.org/10.1029/2006GL028879>

- Gonzalez, W. D., Echer, E., Tsurutani, B. T., Clúa de Gonzalez, A. L., & Lago, A. D. (2011). Interplanetary Origin of Intense, Superintense and Extreme Geomagnetic Storms. *Space Science Reviews*, *55*(1), 69-89. <https://doi.org/10.1007/s11214-010-9715-2>
- Gonzalez, W. D., Joselyn, J. A., Kamide, Y., Kroehl, H. W., Rostoker, G., Tsurutani, B. T., & Vasyliūnas, V. M. (1994). What is a geomagnetic storm? *Journal of Geophysical Research*, *99*(A4), 5771–5792. <https://doi.org/10.1029/93JA02867>
- Gonzalez, W. D., Parker, E. N., Mozer, F. S., Vasyliūnas, V. M., Pritchett, P. L., Karimabadi, H., Cassak, P. A., Scudder, J. D., Yamada, M., Kulsrud, R. M., & less, D. K. (2016). Fundamental concepts associated with magnetic reconnection. In W. D. Gonzalez & E. N. Parker (Eds.), *Magnetic reconnection* (Vol. 427, pp. 1–32). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-26432-5_1
- Gonzalez, W. D., & Tsurutani, B. T. (1987). Criteria of interplanetary parameters causing intense magnetic storms ($Dst < -100$ nT). *Planetary and Space Science*, *35*(9), 1101-1109. [https://doi.org/10.1016/0032-0633\(87\)90015-8](https://doi.org/10.1016/0032-0633(87)90015-8)
- Gonzalez, W. D., Tsurutani, B. T., & Clúa de Gonzalez, A. L. (1999). Interplanetary origin of geomagnetic storms. *Space Science Reviews*, *88*(3-4), 529-562. <https://doi.org/10.1023/A:1005160129098>
- Gonzalez, W. D., Tsurutani, B. T., Gonzalez, A. L. C., Smith, E. J., Tang, F., & Akasofu, S.-I. (1989). Solar wind-magnetosphere coupling during intense magnetic storms (1978-1979). *Journal of Geophysical Research*, *94*(A7), 8835–8851. <https://doi.org/10.1029/JA094iA07p08835>
- González-Esparza, J. A., & Cuevas-Cardona, M. C. (2018). Observations of Low-Latitude Red Aurora in Mexico During the 1859 Carrington Geomagnetic Storm. *Space Weather*, *16*(6), 593-600. <https://doi.org/10.1029/2017SW001789>
- Goodrich, C. C. (1985). Numerical simulations of Quasi-Perpendicular collisionless shocks. In B. T. Tsurutani & R. G. Stone (Eds.), *Collisionless Shocks in the Heliosphere: Reviews of Current Research*, Geophysical Monograph Series (Vol. 35, p. 153-168). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0153>
- Gopalswamy, N. (2002). Relation Between Coronal Mass Ejections and their Interplanetary Counterparts. In H. Wang & R. Xu (Eds.), *Solar-terrestrial Magnetic Activity and Space Environment Proceedings of the COSPAR Colloquium on Solar-Terrestrial Magnetic Activity and Space Environment (STMASE)* (Vol. 14, p. 157-164). Baijing, China. [https://doi.org/S0964-2749\(02\)80148-2](https://doi.org/S0964-2749(02)80148-2)
- Gopalswamy, N. (2008). Solar connections of geoeffective magnetic structures. *Journal of Atmospheric and Solar-Terrestrial Physics*, *70*(17), 2078–2100. <https://doi.org/10.1016/j.jastp.2008.06.010>
- Gopalswamy, N. (2009). CME link to the geomagnetic storms. In A. H. Andrei, A. Kosovichev, & J.-P. Rozelot (Eds.), *Solar and stellar variability: Impact on earth and planets* (p. 326-335). New York, NY: Cambridge University Press. <https://doi.org/10.1017/S1743921309992870>
- Gopalswamy, N. (2010). Coronal mass ejections: A summary of recent results. In I. Doro-

- tovič (Ed.), *Proceedings of the 20th national solar physics meeting* (pp. 108–130). Papradno, Slovakia.
- Gopalswamy, N. (2011). Coronal mass ejections and their heliospheric consequences. In A. Choudhuri & A. D. Banerjee (Eds.), *First asia-pacific solar physics meeting* (p. 241-258). 21024 Mrach, Bengaluru, India: Astron. Soc. India.
- Gopalswamy, N. (2016). History and development of coronal mass ejections as a key player in solar terrestrial relationship. *Geoscience Letters*, 3(8). <https://doi.org/10.1186/s40562-016-0039-2>
- Gopalswamy, N., Barbieri, L., Cliver, E. W., Lu, G., Plunkett, S. P., & Skoug, R. M. (2005). Introduction to violent Sun–Earth connection events of October–November 2003. *Journal of Geophysical Research*, 110(A9). <https://doi.org/10.1029/2005JA011268>
- Gopalswamy, N., Barbieri, L., Lu, G., Plunkett, S. P., & Skoug, R. M. (2005). Introduction to the special section: Violent Sun–Earth connection events of October–November 2003. *Geophysical Research Letters*, 32(3). <https://doi.org/10.1029/2005GL022348>
- Gopalswamy, N., Michalek, G., Yashiro, S., Mäkelä, P., Akiyama, S., & Xie, H. (2023). What Do Halo CMEs Tell Us about Solar Cycle 25? *The Astrophysical Journal Letters*, 952(L13). <https://doi.org/10.3847/2041-8213/acdde2>
- Gopalswamy, N., Xie, H., Mäkelä, P., Akiyama, S., Yashiro, S., Kaiser, M. L., Howard, R. A., & Bougeret, J.-L. (2010). Interplanetary shocks lacking type II radio bursts. *The Astrophysical Journal*, 710(2), 1111–1126. <https://doi.org/10.1088/0004-637X/710/2/1111>
- Gopalswamy, N., Yashiro, S., Liu, Y., Michalek, G., Vourlidas, A., Kaiser, M. L., & Howard, R. A. (2005). Coronal mass ejections and other extreme characteristics of the 2003 October–November solar eruptions. *Journal of Geophysical Research*, 110(A9). <https://doi.org/10.1029/2004JA010958>
- Gopalswamy, N., Yashiro, S., Xie, H., Akiyama, S., & Mäkelä, P. (2015). Properties and geoeffectiveness of magnetic clouds during solar cycles 23 and 24. *Journal of Geophysical Research: Space Physics*, 120(11), 9221–9245. <https://doi.org/10.1002/2015JA021446>
- Gosling, J. T. (1993). The solar flare myth. *Journal of Geophysical Research*, 105(A11), 18,937–18,949. <https://doi.org/10.1029/93JA01896>
- Gosling, J. T. (1997). Coronal mass ejections: An overview. In N. Crooker, J. A. Jocelyn, & J. Feynman (Eds.), *Coronal Mass Ejections*, Geophysical Monograph Series (Vol. 99, p. 9-16). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM099p0009>
- Gosling, J. T., McComas, D. J., Phillips, J. L., & Bame, S. J. (1991). Geomagnetic activity associated with earth passage of interplanetary shock disturbances and coronal mass ejections. *Journal of Geophysical Research*, 96(A5), 7831–7839. <https://doi.org/10.1029/91JA00316>
- Gosling, J. T., McComas, D. J., Phillips, J. L., Weiss, L. A., Pizzo, V. J., Goldstein, B. E., & Forsyth, R. J. (1994). A new class of forward–reverse shock pairs in the solar wind. *Geophysical Research Letters*, 21(21), 2271–2274. <https://doi.org/10.1029/94GL02245>
- Goyal, S. K., Kumar, P., aand S. V. Vadawale, P. J., Sarkar, A., Shanmugam, M., Subra-

- manian, K. P., Bapat, B., Chakrabarty, D., Adhyaru, P. R., Patel, A. R., Banerjee, S. B., Shah, M. S., Tiwari, N. K., Adalja, H. L., Ladiya, T., Dadhania, M. B., Sarda, A., Hait, A. K., Chauhan, M., & Bhavsar, R. R. (2018). Aditya Solarwind Particle EXperiment (ASPEX) onboard the Aditya-L1 mission. *Planetary and Space Science*, *163*, 42-55. <https://doi.org/10.1016/j.pss.2018.04.008>
- Green, J. C., Likar, J., & Shprits, Y. (2017). Impact of space weather on the satellite industry. *Space Weather*, *15*(6), 804-818. <https://doi.org/10.1002/2017SW001646>
- Green, J. L., & Boardsen, S. (2006). Duration and extent of the great auroral storm of 1859. *Advances in Space Research*, *38*(2), 130-135. <https://doi.org/10.1016/j.asr.2005.08.054>
- Greenberg, O. W. (2002). CPT violation implies violation of Lorentz invariance. *Phys. Rev. Lett.*, *89*, 231602. <https://doi.org/10.1103/PhysRevLett.89.231602>
- Greenspan, M. E., & Hamilton, D. C. (2000). A test of the Dessler-Parker-Sckopke relation during magnetic storms. *Journal of Geophysical Research*, *105*(A3), 5419-5430. <https://doi.org/10.1029/1999JA000284>
- Greenstadt, E. (1971). Conditions for magnetic interaction of asteroids with the solar wind. *Icarus*, *14*(3), 374-381. [https://doi.org/10.1016/0019-1035\(71\)90008-X](https://doi.org/10.1016/0019-1035(71)90008-X)
- Greenstadt, E. W., Singer, H. J., Russell, C. T., & Olson, J. V. (1979). IMF orientation, solar wind velocity, and Pc 3-4 signals: A joint distribution. *Journal of Geophysical Research*, *84*(A2), 527-532. <https://doi.org/10.1029/JA084iA02p00527>
- Grib, S., Brunelli, B., Dryer, M., & Shen, W.-W. (1979). Interaction of interplanetary shock waves with the bow shock-magnetopause system. *Journal of Geophysical Research*, *84*(A10), 5907-5921. <https://doi.org/10.1029/JA084iA10p05907>
- Grib, S. A. (1982). Interaction of non-perpendicular/parallel solar wind waves with the Earth's magnetosphere. *Space Science Reviews*, *32*(1-2), 43-48. <https://doi.org/10.1007/BF00225175>
- Grib, S. A., & Pushkar, E. A. (2006). Asymetry of nonlinear interactions of solar MHD discontinuities with the bow shock. *Geomagnetism and Aeronomy*, *46*(4), 417-423. <https://doi.org/10.1134/S0016793206040025>
- Grib, S. A., Pushkar, E. A., & Leora, S. N. (2016). Some sources of plasma inhomogeneties in the solar wind in front of the earth's magnetosphere. *Geomagnetism and Aeronomy*, *56*(7), 892-896. <https://doi.org/10.1134/S0016793216070070>
- Griffiths, J. D. (1999). *Introduction to Electrodynamics* (3rd ed.). Upper Saddle River, NJ: Pearson Addison Wesley.
- Gringauz, K. I., Troitskaya, V. A., Solomatina, E. K., & Shchepetnov, R. V. (1970). The relationship of solar wind variables to periods of continuous micropulsations of electromagnetic field of the earth. *Dokl. Akad. Nauk. SSSR*, *5*.
- Gross, S. H., & Eun, H. (1976). Traveling neutral disturbances. *Geophysical Research Letters*, *3*(5), 257-260. <https://doi.org/10.1029/GL003i005p00257>
- Groves, K. M., & Carrano, C. S. (2016). Space Weather Effects on Communication and Navigation. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 353-388). Boca Raton, FL: CRC Press.

- Grubbs, G. (2016). *Magnetosphere-ionosphere coupling during active aurora* (Ph.D thesis). The University of Texas at San Antonio, San Antonio, Texas.
- Grygorov, K., Přeč, L., Šafránková, J., Němeček, Z., & Goncharov, O. (2014). The far magnetotail response to an interplanetary shock arrival. *Planetary and Space Science*, *103*, 228-237. <https://doi.org/10.1016/j.pss.2014.07.016>
- Gulisano, A. M., Démoulin, P., Dasso, S., Ruiz, M. E., & Marsch, E. (2010). Global and local expansion of magnetic clouds in the inner heliosphere. *Astronomy & Astrophysics*, *509*(A39). <https://doi.org/10.1051/0004-6361/200912375>
- Gummow, R. A., & Eng, P. (2002). GIC effects on pipeline corrosion and corrosion control systems. *Journal of Atmospheric and Solar-Terrestrial Physics*, *64*(16), 1755-1764. [https://doi.org/10.1016/S1364-6826\(02\)00125-6](https://doi.org/10.1016/S1364-6826(02)00125-6)
- Guo, J., Feng, X., Forbes, J. M., Lei, J., Zhang, J., & Tan, C. (2010). On the relationship between thermosphere density and solar wind parameters during intense geomagnetic storms. *Journal of Geophysical Research*, *115*(A12), 1–9. <https://doi.org/10.1029/2010JA015971>
- Guo, X.-C., & Hu, Y.-Q. (2007). Response of Earth's ionosphere to interplanetary shocks. *Chinese Journal of Geophysics*, *50*(4), 817-823. <https://doi.org/10.1002/cjg2.1099>
- Guo, X.-C., Hu, Y.-Q., & Wang, C. (2005). Earth's magnetosphere impinged by interplanetary shocks of different orientations. *Chinese Physics Letters*, *22*(12), 3221-3224. <https://doi.org/10.1088/0256-307X/22/12/067>
- Gurnett, D. A., & Bhattacharjee, A. (2005). *Introduction to Plasma Physics With space and laboratory applications*. Cambridge, United Kingdom: Cambridge University Press.
- Gvishiani, A. D., Sidorov, R. V., Lukianova, R. Y., & Soloviev, A. A. (2016). Geomagnetic activity during St. Patrick's Day storm inferred from global and local indicators. *Russ. J. Earth Sci.*, *16*(ES6007). <https://doi.org/10.2205/2016ES000593>
- Haaland, S., Runov, A., & Forsyth, C. (Eds.). (2017). *Dawn-Dusk Asymmetries in Planetary Plasma Environments*, Geophysical Monograph Series (Vol. 230). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119216346>
- Haaser, R. A., Davidson, R., Heelis, R. A., Earle, G. D., Venkatraman, S., & Klenzing, J. (2013). Storm time meridional wind perturbations in the equatorial upper thermosphere. *Journal of Geophysical Research*, *118*(5), 2756–2764. <https://doi.org/10.1002/jgra.50299>
- Hada, T. (1994). Evolutionary conditions in the dissipative MHD system: Stability of intermediate MHD shock waves. *Geophysical Research Letters*, *21*(21), 2275-2278. <https://doi.org/10.1029/94GL02239>
- Hada, T., & Kennel, C. F. (1985). Nonlinear evolution of slow waves in the solar wind. *Journal of Geophysical Research*, *90*(A1), 531–535. <https://doi.org/10.1029/JA090iA01p00531>
- Haines, C., Owens, M. J., Barnard, L., Lockwood, M., & Ruffenach, A. (2019). The Variation of Geomagnetic Storm Duration with Intensity. *Solar Physics*, *294*(154). <https://doi.org/10.1007/s11207-019-1546-z>
- Haines, C., Owens, M. J., Barnard, L., Lockwood, M., Ruffenach, A., Boykin, K., & Mc-

- Granaghan, R. (2021). Forecasting Occurrence and Intensity of Geomagnetic Activity With Pattern-Matching Approaches. *Space Weather*, *19*(6), e2020SW002624. <https://doi.org/10.1029/2020SW002624>
- Hajra, R. (2021). Variation of the Interplanetary Shocks in the Inner Heliosphere. *The Astrophysical Journal*, *917*(2). <https://doi.org/10.3847/1538-4357/ac0897>
- Hajra, R. (2022a). Intense Geomagnetically Induced Currents (GICs): Association with Solar and Geomagnetic Activities. *Solar Physics*, *297*(14). <https://doi.org/10.1007/s11207-021-01945-8>
- Hajra, R. (2022b). Intense, Long-Duration Geomagnetically Induced Currents (GICs) Caused by Intense Substorm Clusters. *Space Weather*, *20*(3), e2021SW002937. <https://doi.org/10.1029/2021SW002937>
- Hajra, R., & Tsurutani, B. T. (2018a). Interplanetary Shocks Inducing Magnetospheric Supersubstorms (SML < -2500 nT): Unusual Auroral Morphologies and Energy Flow. *The Astrophysical Journal*, *858*(123). <https://doi.org/10.3847/1538-4357/aabaed>
- Hajra, R., & Tsurutani, B. T. (2018b). Magnetospheric “Killer” Relativistic Electron Dropouts (REDs) and Repopulation: A Cyclical Process. In N. Buzulukova (Ed.), *Extreme Events in Geospace: Origins, Predictability and Consequences* (p. 373-400). Cambridge, MA: Elsevier. <https://doi.org/10.1016/B978-0-12-812700-1.00014-5>
- Hajra, R., Tsurutani, B. T., & Lakhina, G. S. (2020). The Complex Space Weather Events of September 2017. *The Astrophysical Journal*, *899*(1). <https://doi.org/10.3847/1538-4357/aba2c5>
- Halekas, J. S., Poppe, A. R., McFadden, J. P., Angelopoulos, V., Glassmeier, K.-H., & Brain, D. A. (2014). Evidence for small-scale collisionless shocks at the Moon from ARTEMIS. *Geophysical Research Letters*, *41*(21), 7436-7443. <https://doi.org/10.1002/2014GL061973>
- Halford, A. J., McGregor, S. L., Murphy, K. R., Millan, R. M., Hudson, M. K., Woodger, L. A., Cattel, C. A., Breneman, A. W., Mann, I. R., Kurth, W. S., Hospodarsky, G. B., Gkioulidou, M., & Fennell, J. F. (2015). BARREL observations of an ICME-shock impact with the magnetosphere and the resultant radiation belt electron loss. *Journal of Geophysical Research: Space Physics*, *120*(4), 2557–2570. <https://doi.org/10.1002/2014JA020873>
- Halliday, D., Resnick, R., & Walker, J. (2011a). *Fundamentals of physics* (Vol. 1). Hoboken, NJ: Wiley.
- Halliday, D., Resnick, R., & Walker, J. (2011b). *Fundamentals of physics* (Vol. 2). Hoboken, NJ: Wiley.
- Halliday, D., Resnick, R., & Walker, J. (2011c). *Fundamentals of physics* (Vol. 3). Hoboken, NJ: Wiley.
- Halliday, D., Resnick, R., & Walker, J. (2011d). *Fundamentals of physics* (Vol. 4). Hoboken, NJ: Wiley.
- Hamilton, D. C., Gloeckler, G., Ipavich, F. M., Stüdemann, W., Wilken, B., & Kremser, G. (1988). Ring current development during the great geomagnetic storm of February 1986. *Journal of Geophysical Research*, *93*(A12), 14343-14355. <https://doi.org/10.1029/JA093iA12p14343>

- Hansen, R. T., Garcia, C. J., Grogard, R. J.-M., & Sheridan, K. V. (1971). A coronal disturbance observed simultaneously with a white-light coronameter and the 80 Mhz Culgoora radioheliograph. *Publications of the Astronomical Society of Australia*, 2(1), 57–60. <https://doi.org/10.1017/S1323358000012856>
- Hanson, E. L. M., Agapitov, O. V., Mozer, F. S., Krasnoselskikh, V., Bale, S. D., Avakov, L., Khotyaintsev, Y., & Giles, B. (2019). Cross-Shock Potential in Rippled Versus Planar Quasi-Perpendicular Shocks Observed by MMS. *Geophysical Research Letters*, 46(5), 2381–2389. <https://doi.org/10.1029/2018GL080240>
- Hao, Y. X., Zong, Q.-G., Zhou, X.-Z., Fu, S. Y., Rankin, R., Yuan, C.-J., Lui, A. T. Y., Spence, H. E., Blake, J. B., Baker, D. N., & Reeves, G. D. (2016). Electron dropout echoes induced by interplanetary shock: Van Allen Probes observations. *Geophysical Research Letters*, 43(11), 5597–5605. <https://doi.org/10.1002/2016GL069140>
- Hapgood, M. (2018). Linking Space Weather Science to Impacts—The View From the Earth. In N. Buzulukova (Ed.), *Extreme Events in Geospace - Origins, Predictability, and Consequences* (1st ed., p. 3-34). Amsterdam, The Netherlands: Elsevier. <https://doi.org/10.1016/B978-0-12-812700-1.00001-7>
- Hapgood, M. (2019). The Great Storm of May 1921: An Exemplar of a Dangerous Space Weather Event. *Space Weather*, 17(7), 950-975. <https://doi.org/10.1029/2019SW002195>
- Hapgood, M., Liu, H., & Lugaz, N. (2022). SpaceX – Sailing close to the space weather? *Space Weather*, 20, e2022SW003074. <https://doi.org/10.1029/2022SW003074>
- Hapgood, M., & Thomson, A. (2010). *Space weather: its impact on Earth and implications for business*. London, United Kingdom: Lloyd's 360 Risk Insight.
- Hapgood, M. A. (1992). Space physics coordinate transformations: A user guide. *Advances in Space Research*, 40(5), 711–717. [https://doi.org/10.1016/0032-0633\(92\)90012-D](https://doi.org/10.1016/0032-0633(92)90012-D)
- Harada, Y., Gurnett, D. A., Kopf, A. J., Halekas, J. S., Ruhunusiri, S., Lee, C. O., Hara, T., Espley, J., DiBraccio, G. A., Mitchell, D. L., Mazelle, C., Larson, D. E., & Jakosky, B. M. (2017). Dynamic response of the Martian ionosphere to an interplanetary shock: Mars Express and MAVEN observations. *Geophysical Research Letters*, 44(18), 9116-9123. <https://doi.org/10.1002/2017GL074897>
- Harang, L. (1946). The mean field of disturbance of polar geomagnetic storms. *Terrestrial Magnetism and Atmospheric Electricity*, 51(3), 353-380. <https://doi.org/10.1029/TE051i003p00353>
- Harari, Y. N. (2014). *Sapiens: A Brief History of Humankind*. Toronto, Canada: Signal Books, McClelland & Stewart.
- Harari, Y. N. (2016). *Homo Deus: A Brief History of Tomorrow*. London, United Kingdom: Harvill Secker.
- Hardy, D. A., Gussenhoven, M. S., & Brautigam, D. (1989). A statistical model of auroral ion precipitation. *Journal of Geophysical Research*, 94(A1), 370-392. <https://doi.org/10.1029/JA094iA01p00370>
- Hardy, D. A., Gussenhoven, M. S., & Holeman, E. (1985). A statistical model of auroral electron precipitation. *Journal of Geophysical Research*, 90(A5), 4229–4248. <https://doi.org/10.1029/JA090iA05p04229>

- Hardy, D. A., Gussenhoven, M. S., & Huber, A. (1979). *The precipitating electron detectors (SSJ/3) for the block 5D/flights 2-5 DMSP satellites: Calibration and data presentation* (Tech. Rep.). AFGL-TR-79-0216, Hanscom Air Force Base, MA: Air Force Phillips Laboratory.
- Hardy, D. A., Gussenhoven, M. S., Raistrick, R., & McNeil, W. J. (1987). Statistical and functional representations of the pattern of auroral energy flux, number flux, and conductivity. *Journal of Geophysical Research*, *92*(A11), 12275–12294. <https://doi.org/10.1029/JA092iA11p12275>
- Hargreaves, J. K. (1992). *The Solar-Terrestrial Environment*. New York, NY: Cambridge University Press.
- Hartinger, M., Engebretson, M., Lu, G., Connors, M., McGranaghan, R., Rigler, J., Shi, X., Weygand, J., Schultz, A., Kim, H., Salzano, M., Ngwira, C., Smith, A., Derr, J., Öztürk, D., Coyle, S., Dimmock, A., Turner, D., & Chi, P. (2023). Global Networks of Ground-Based Magnetometers Enable Cutting-Edge Heliophysics Research, Education, and Space Weather Operations. *Bulletin of the AAS*, *55*(3). <https://doi.org/10.3847/25c2cfab.2023.030001>
- Hartinger, M. D., Clauer, C. R., & Xu, Z. (2016). Space weather from a southern point of view. *Eos Transactions AGU*, *97*. <https://doi.org/10.1029/2016EO061791>
- Hartinger, M. D., Shi, X., Rodger, C. J., Fujii, I., Rigler, E. J., Kappler, J., Karl and Matzka, Love, J. J., Baker, J. B. H., Mac Manus, D. H., Dalzell, M., & Petersen, T. (2023). Determining ULF Wave Contributions to Geomagnetically Induced Currents: The Important Role of Sampling Rate. *Space Weather*, *21*(5), e2022SW003340. <https://doi.org/10.1029/2022SW003340>
- Hartinger, M. D., Takahashi, K., Drozdov, A. Y., Shi, X., Usanova, M. E., & Kress, B. (2022). ULF Wave Modeling, Effects, and Applications: Accomplishments, Recent Advances, and Future. *Frontiers in Astronomy and Space Science*, *9*(867394). <https://doi.org/10.3389/fspas.2022.867394>
- Hartinger, M. D., Xu, Z., Clauer, C. R., Yu, Y., Weimer, D. R., Kim, H., Pilipenko, V., Welling, D. T., Behlke, R., & Willer, A. N. (2017). Associating ground magnetometer observations with current or voltage generators. *Journal of Geophysical Research: Space Physics*, *122*(7), 7130–7141. <https://doi.org/10.1029/2017JA024140>
- Harvey, C. C. (1998). Spatial Gradients and the Volumetric Tensor. In G. Paschmann & P. W. Daly (Eds.), *Analysis Methods for Multi-Spacecraft Data* (p. 308–322). Noordwijk, The Netherlands: ESA Publications Division.
- Hasegawa, H., Retinò, A., Vaivads, A., Khotyaintsev, Y., André, M., Nakamura, T. K. M., Teh, W.-L., Sonnerup, B. U. Ö., Schwartz, S. J., Seki, Y., Fujimoto, M., Saito, Y., Rème, H., & Canu, P. (2009). Kelvin-Helmholtz waves at the Earth’s magnetopause: Multiscale development and associated reconnection. *Journal of Geophysical Research*, *114*(A12). <https://doi.org/10.1029/2009JA014042>
- Hatch, S. M., Laundal, K. M., & Reistad, J. P. (2022). Testing the mirror symmetry of Birkeland and ionospheric currents with respect to magnetic latitude, dipole tilt angle, and IMF B_y . *Frontiers in Astronomy and Space Science*, *9*(958977). <https://doi.org/10.3389/fspas.2022.958977>

- Hathaway, D. H. (2015). The Solar Cycle. *Living Reviews in Solar Physics*, 12(4).
<https://doi.org/10.1007/lrsp-2015-4>
- Hayakawa, H., Blake, S. P., Bhaskar, A., Hattori, K., Oliveira, D. M., & Ebihara, Y. (2021). The Extreme Space Weather Event in 1941 February/March. *The Astrophysical Journal*, 908(2). <https://doi.org/10.3847/1538-4357/abb772>
- Hayakawa, H., Ebihara, Y., Cliver, E. W., Hattori, K., Toriumi, S., Love, J. J., Umemura, N., Namekata, K., Sakaue, T., Takahashi, T., & Shibata, K. (2019). The extreme space weather event in September 1909. *Monthly Notices of the Royal Astronomical Society*, 484(3), 4083-4099. <https://doi.org/10.1093/mnras/sty3196>
- Hayakawa, H., Ebihara, Y., Hand, D. P., Hayakawa, S., Kumar, S., Mukherjee, S., & Veenadhari, B. (2018). Low-latitude aurorae during the extreme space weather events in 1859. *The Astrophysical Journal*, 869(57), 1-17. <https://doi.org/10.3847/1538-4357/aae47c>
- Hayakawa, H., Ebihara, Y., Pevtsov, A., Bhaskar, A., Karachik, N., & Oliveira, D. M. (2020). Intensity and Time Series of Extreme Solar-Terrestrial Storm in March 1946. *Monthly Notices of the Royal Astronomical Society*, 497(4), 5507-5517. <https://doi.org/10.1093/mnras/staa1508>
- Hayakawa, H., Ebihara, Y., Willis, D. M., Hattori, K., Giunta, A. S., Wild, M. N., Hayakawa, S., Toriumi, S., Mitsuma, Y., Macdonald, L. T., Shibata, K., & Silverman, S. M. (2018). The Great Space Weather Event during 1872 February Recorded in East Asia. *The Astrophysical Journal*, 862(15), 1-10. <https://doi.org/10.3847/1538-4357/aaca40>
- Hayakawa, H., Ebihara, Y., Willis, D. M., Toriumi, S., Iju, T., Hattori, K., Wild, M. N., Oliveira, D. M., Ermolli, I., Ribeiro, J. R., Correia, A. P., Ribeiro, A. I., & Knipp, D. J. (2019). Temporal and Spatial Evolutions of a Large Sunspot Group and Great Auroral Storms around the Carrington Event in 1859. *Space Weather*, 17(11), 1553-1569. <https://doi.org/10.1029/2019SW002269>
- Hayakawa, H., Hattori, K., Pevtsov, A. A., Ebihara, Y., Shea, M. A., McCracken, K. G., Daglis, I. A., Bhaskar, A. T., Ribeiro, P., & Knipp, D. J. (2021). The Intensity and Evolution of the Extreme Solar and Geomagnetic Storms in 1938 January. *The Astrophysical Journal*, 909(1). <https://doi.org/10.3847/1538-4357/abc427>
- Hayakawa, H., Iwahashi, K., Tamazawa, H., Isobe, H., Kataoka, R., Ebihara, Y., Miyahara, H., Kawamura, A. D., & Shibata, K. (2016). East Asian observations of low-latitude aurora during the Carrington magnetic storm. *Publications of the Astronomical Society of Japan*, 68(6), 1-13. <https://doi.org/10.1093/pasj/psw097>
- Hayakawa, H., Mitsuma, Y., Ebihara, Y., & Miyake, F. (2019). The Earliest Candidates of Auroral Observations in Assyrian Astrological Reports: Insights on Solar Activity around 660 BCE. *The Astrophysical Journal Letters*, 884(L18). <https://doi.org/10.3847/2041-8213/ab42e4>
- Hayakawa, H., Nevanlinna, H., Blake, S. P., Ebihara, Y., Bhaskar, A. T., & Miyoshi, Y. (2022). Temporal Variations of the Three Geomagnetic Field Components at Colaba Observatory around the Carrington Storm in 1859. *The Astrophysical Journal*, 928(1). <https://doi.org/10.3847/1538-4357/ac2601>

- Hayakawa, H., Oliveira, D. M., Shea, M. A., Smart, D. F., Blake, S. P., Hattori, K., Bhaskar, A. T., Curto, J. J., Franco, D. R., & Ebihara, Y. (2021). The Extreme Solar and Geomagnetic Storms on 21-27 March 1940. *Monthly Notices of the Royal Astronomical Society*. <https://doi.org/10.1093/mnras/stab3615>
- Hayakawa, H., Ribeiro, J. R., Ebihara, Y., Correia, A. P., & Sôma, M. (2020). South American auroral reports during the Carrington storm. *Earth, Planets and Space*, *72*(122). <https://doi.org/10.1186/s40623-020-01249-4>
- Hayakawa, H., Ribeiro, P., Vaquero, J. M., Gallego, M. C., Knipp, D. J., Mekhaldi, F., Bhaskar, A., Oliveira, D. M., Notsu, Y., Carrasco, V. M. S., Caccavari, A., Veenadhari, B., Mukherjee, S., & Ebihara, Y. (2020). The Extreme Space Weather Event in 1903 October/November: An Outburst from the Quiet Sun. *The Astrophysical Journal Letters*, *897*(1), L10. <https://doi.org/10.3847/2041-8213/ab6a18>
- Hayakawa, H., Vaquero, J. M., & Ebihara, Y. (2018). Sporadic auroras near the geomagnetic equator: in the Philippines, on 27 October 1856. *Annales Geophysicae*, *36*, 1153-1160. <https://doi.org/10.5194/angeo-36-1153-2018>
- Hays, P. B., Carignan, G., Kennedy, B. C., Shepherd, G. G., & Walker, J. C. G. (1973). The visible-airglow experiment on Atmosphere Explorer. *Radio Science*, *8*(4), 369-377. <https://doi.org/10.1029/RS008i004p00369>
- He, C., Yang, Y., Carter, B., Kerr, E., Wu, S., Deleflie, F., Cai, H., Zhang, K., Sagnières, L., & Norman, R. (2018). Review and comparison of empirical thermospheric mass density models. *Progress in Aerospace Sciences*, *103*, 31-51. <https://doi.org/10.1016/j.paerosci.2018.10.003>
- Hedin, A. E. (1987). MSIS-86 Thermospheric Model. *Journal of Geophysical Research*, *92*(A5), 4649-4662. <https://doi.org/10.1029/JA092iA05p04649>
- Hedin, A. E., Fleming, E. L., Manson, A. H., Schmidlin, F. J., Avery, S. K., Clark, R. R., Franke, S. J., Fraser, G. J., Tsuda, T., Vial, F., & Vincent, R. A. (1996). Empirical wind model for the upper, middle and lower atmosphere. *Journal of Atmospheric and Solar-Terrestrial Physics*, *58*(13), 1421-1447. [https://doi.org/10.1016/0021-9169\(95\)00122-0](https://doi.org/10.1016/0021-9169(95)00122-0)
- Hedin, A. E., Mayr, H. G., Reber, C. A., Spencer, N. W., & Carignan, G. R. (1974). Empirical model of global thermospheric temperature and composition based on data from the Ogo 6 quadrupole mass spectrometer. *Journal of Geophysical Research*, *79*(1), 215-225. <https://doi.org/10.1029/JA079i001p00215>
- Heinemann, M. A., & Siscoe, G. L. (1974). Shapes of strong shock fronts in an inhomogeneous solar wind. *Journal of Geophysical Research*, *79*(10), 1349-1355. <https://doi.org/10.1029/JA079i010p01349>
- Heppner, J. P. (1955). Note on the occurrence of world-wide S.S.C.'s during the onset of negative bays at College, Alaska. *Journal of Geophysical Research*, *60*(1), 29-31. <https://doi.org/10.1029/JZ060i001p00029>
- Heppner, J. P. (1972). Electric field variations during substorms: OGO-6 measurements. *Planetary and Space Science*, *20*(9), 475-1498. [https://doi.org/10.1016/0032-0633\(72\)90052-9](https://doi.org/10.1016/0032-0633(72)90052-9)
- Heppner, J. P., Ness, N. F., Scarce, C. S., & Skillman, T. L. (1963). Explorer 10

- magnetic field measurements. *Journal of Geophysical Research*, 68(1), 1–46.
<https://doi.org/10.1029/JZ068i001p00001>
- Hersé, M. (1988). Bright nights: past, present, and future trends. In W. Schröder (Ed.), *Geophysical research* (p. 41-64). Potsdam, Germany: IUGG.
- Hershberger, J. (1940). Tucson magnetic observatory january to march, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, 45(2), 228-228.
<https://doi.org/10.1029/TE045i002p00228>
- Hestenes, D., Wells, M., & Swackhamer, G. (1992). Force concept inventory. *The Physics Teacher*, 30(3), 141-158. <https://doi.org/10.1119/1.2343497>
- Heyns, M. J., Lotz, S. I., & Gaunt, C. T. (2021). Geomagnetic Pulsations Driving Geomagnetically Induced Currents. *Space Weather*, 19(2), e2020SW002557.
<https://doi.org/10.1029/2020SW002557>
- Hines, C. O. (1960). Internal atmospheric gravity waves at ionospheric heights. *Canadian Journal of Physics*, 38(11), 1441–1481. <https://doi.org/10.1139/p60-150>
- Hines, C. O. (1974a). Internal atmospheric gravity waves at ionospheric heights. In C. O. Hines (Ed.), *The upper atmosphere in motion*, Geophysical Monograph Series (Vol. 18, pp. 248–328). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1029/GM018p0248>
- Hines, C. O. (Ed.). (1974b). *The upper atmosphere in motion*, Geophysical Monograph Series (Vol. 18). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1029/GM018>
- Hirshberg, J. (1968). The transport of flare plasma from the Sun to the Earth. *Planetary and Space Science*, 16(3), 309-319. [https://doi.org/10.1016/0032-0633\(68\)90005-6](https://doi.org/10.1016/0032-0633(68)90005-6)
- Ho, C. M., Tsurutani, B. T., Lin, N., Lanzerotti, L. J., Smith, E. J., Goldstein, B. E., Buti, B., Lakhina, G. S., & Zhou, X. Y. (1998). A pair of forward and reverse slow-mode shocks detected by Ulysses at ~5 AU. *Geophysical Research Letters*, 25(14), 2613–2616. <https://doi.org/10.1029/98GL02014>
- Hocke, K., & Schlegel, K. (1996). A review of atmospheric gravity waves and traveling ionospheric disturbances: 1982–1995. *Annales Geophysicae*, 14(9), 917–940.
<https://doi.org/10.1007/s00585-996-0917-6>
- Hodgson, R. (1859). On a curious appearance seen in the Sun. *Monthly Notices of the Royal Astronomical Society*, 20(1), 15-15. <https://doi.org/10.1093/mnras/20.1.15a>
- Hoffman, R. A., Cahill, L. J., Anderson, R. R., Maynard, N. C., Smith, P. H., Fritz, T. A., Williams, D. J., Konradi, A., & Gurnett, D. A. (1975). Explorer 45 (S³-A) observations of the magnetosphere and magnetopause during the August 4-6, 1972, magnetic storm period. *Journal of Geophysical Research*, 80(31), 4287–4296.
<https://doi.org/10.1029/JA080i031p04287>
- Homeier, N., & Wei, L. (2013). *Solar storm risk to the North American electric grid* (Tech. Rep.). Lexington, MA, United States: Lloyd’s Atmospheric and Environmental Research.
- Hones, E. W. (Ed.). (1984). *Magnetic reconnection in space and laboratory*, Geophysical Monograph Series (Vol. 30). Washington, D.C.: American Geophysical Union.

<https://doi.org/10.1029/GM030>

- Hong, Y., Deng, Y., Zhu, Q., Maute, A., Hairston, M. R., Sheng, C., Welling, D., & Lopez, R. (2023). Inter-Hemispheric Asymmetries in the High-Latitude Electrodynamic Forcing and the Thermosphere During the October 8-9, 2012 Geomagnetic Storm: An Integrated Data-Model Investigation. *Frontiers in Astronomy and Space Science*, 10. <https://doi.org/10.3389/fspas.2023.1062265>
- Honkonen, I., Rastätter, L., Grocott, A., Pulkkinen, A., Palmroth, M., Raeder, J., Ridley, A. J., & Wiltberger, M. (2013). On the performance of global magnetohydrodynamic models in the Earth's magnetosphere. *Space Weather*, 11(5), 313–326. <https://doi.org/10.1002/swe.20055>
- Horne, R. B., Glauert, S. A., Meredith, N. P., Boscher, D., Maget, V., Heynderickx, D., & Pitchford, D. (2013). Space weather impacts on satellites and forecasting the earth's electron radiation belts with SPACECAST. *Space Weather*, 11(4), 169–186. <https://doi.org/10.1002/swe.20023>
- Horvath, I., & Lovell, B. C. (2018). Polar Ion Temperature Variations During the 22 January 2012 Magnetic Storm. *Journal of Geophysical Research: Space Physics*, 123(9), 7806–7824. <https://doi.org/10.1029/2018JA025727>
- Horvath, I., & Lovell, B. C. (2023). Antisunward Streaming Westward Sub-Auroral Ion Drifts (SAID) Developed in the Postmidnight (1–4) Magnetic Local Time Sector During 2013. *Journal of Geophysical Research: Space Physics*, 128(9), e2023JA031677. <https://doi.org/10.1029/2023JA031677>
- Howard, T. (2011). *Coronal mass ejections, an introduction*. New York, NY: Springer. <https://doi.org/10.1007/978-1-4419-8789-1>
- Howard, T. (2014). *Space weather and coronal mass ejections*. New York, NY: Springer. <https://doi.org/10.1007/978-1-4614-7975-8>
- H.R. 1625 - 36th Congress. (March 4, 1867 - March 3, 1869). – *A Bill To extend the boundaries of the States of Nevada, Minnesota, and Nebraska, and the Territories of Colorado, Montana and Wyoming*. Retrieved from <https://www.congress.gov/bill/40th-congress/house-bill/1625/text?s=5&r=219>
- Hsieh, W.-C., Shue, J.-H., Chao, J.-K., Tsai, T.-C., Němeček, Z., & Šafránková, J. (2014). Possible observational evidence of contact discontinuities. *Geophysical Research Letters*, 41(22), 8228–8234. <https://doi.org/10.1002/2014GL062342>
- Hu, Y.-Q., Guo, X.-C., Li, G.-Q., Wang, C., & Huang, Z.-H. (2005). Oscillation of quasi-steady Earth's magnetosphere. *Chinese Physics Letters*, 22(10), 2723–2726. <https://doi.org/10.1088/0256-307X/22/10/073>
- Huang, C. Y., & Burke, W. J. (2004). Transient sheets of field-aligned current observed by DMSP during the main phase of a magnetic superstorm. *Journal of Geophysical Research*, 109(A6), 1–17. <https://doi.org/10.1029/2003JA010067>
- Huang, C. Y., Huang, Y., Su, Y.-J., Hairston, M. R., & Sotirelis, T. (2017). DMSP observations of high latitude Poynting flux during magnetic storms. *Journal of Atmospheric and Solar-Terrestrial Physics*, 164, 294–307. <https://doi.org/10.1016/j.jastp.2017.09.005>
- Huang, C. Y., Huang, Y., Su, Y.-J., Huang, T., & Sutton, E. K. (2017). High latitude

- neutral mass density maxima. *Journal of Geophysical Research: Space Physics*, 122. <https://doi.org/10.1002/2017JA024334>
- Huang, C. Y., Huang, Y., Su, Y.-J., Sutton, E. K., Hairston, M. R., & Coley, W. R. (2016). Ionosphere-thermosphere (IT) response to solar wind forcing during magnetic storms. *Journal of Space Weather and Space Climate*, 6(A4), 1–11. <https://doi.org/10.1051/swsc/2015041>
- Huang, C. Y., Su, Y.-J., Sutton, E. K., Weimer, D. R., & Davidson, R. L. (2014). Energy coupling during the August 2011 magnetic storm. *Journal of Geophysical Research: Space Physics*, 119(2), 1219–1232. <https://doi.org/10.1002/2013JA019297>
- Huang, Y., Wu, Q., Huang, C. Y., & Su, Y.-J. (2016). Thermosphere variation at different altitudes over the northern polar cap during magnetic storms. *Journal of Atmospheric and Solar-Terrestrial Physics*, 146, 140–148. <https://doi.org/10.1016/j.jastp.2016.06.003>
- Huba, J., Schunk, R., & Khazanov, G. (Eds.). (2013). *Modeling the ionosphere-thermosphere system*, Geophysical Monograph Series (Vol. 201). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118704417>
- Huba, J. D., & Sazykin, S. (2014). Storm time ionosphere and plasmasphere structuring: SAMI3-RCM simulation of the 31 March 2001 geomagnetic storm. *Geophysical Research Letters*, 41(23), 8208–8214. <https://doi.org/10.1002/2014GL062110>
- Hudson, J. L. (1965). Diffusion with consecutive heterogeneous reactions. *AIChE J.*, 11(5), 943–945. <https://doi.org/10.1002/aic.690110539>
- Hudson, M. K., Elkington, S. R., Lyon, J. G., Marchenko, V. A., Roth, I., Temerin, M., Blake, J. B., Gussenhoven, M. S., & Wygant, J. R. (1997). Simulations of radiation belt formation during storm sudden commencements. *Journal of Geophysical Research*, 102(A7), 14087–14102. <https://doi.org/10.1029/97JA03995>
- Hudson, P. D. (1970). Discontinuities in an anisotropic plasma and their identification in the solar wind. *Planetary and Space Science*, 18(11), 1611–1622. [https://doi.org/10.1016/0032-0633\(70\)90036-X](https://doi.org/10.1016/0032-0633(70)90036-X)
- Hughes, W. J. (1994). Magnetospheric ULF waves: A tutorial with a historical perspective. In M. J. Engebretson, K. Takahashi, & M. Scholer (Eds.), *Solar wind sources of magnetospheric ultra-low-frequency waves*, Geophysical Monograph Series (Vol. 81, p. 1–11). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM081p0001>
- Hugoniot, H. (1887). Sur la propagation du mouvement dans les corps et spécialement dans les gaz parfaits. *Journal de l'École Polytechnique*, 57, 3–97. (Première partie)
- Hugoniot, H. (1889). Sur la propagation du mouvement dans les corps et spécialement dans les gaz parfaits. *Journal de l'École Polytechnique*, 59, 1–125. (Deuxième partie)
- Hui, W., Ke-Deng, Z., & Xin, W. (2016). Zonal differences in thermospheric air densities at mid-latitudes. *Chinese Journal of Geophysics*, 59(6), 635–642. <https://doi.org/10.1002/cjg2.30013>
- Humble, J. E. (2006). The solar events of August/September 1859 – Surviving Australian observations. *Advances in Space Research*, 38(2), 155–158. <https://doi.org/10.1016/j.asr.2005.08.053>

- Hundhausen, A. J. (1970). Composition and dynamics of the solar wind plasma. *Reviews of Geophysics*, 8(4), 729–811. <https://doi.org/10.1029/RG008i004p00729>
- Hundhausen, A. J. (1972a). *Coronal expansion and solar wind*. New York, NY: Springer Berlin Heidelberg.
- Hundhausen, A. J. (1972b). Interplanetary shock waves and the structure of solar wind disturbances. In C. P. Sonett, P. J. Coleman Jr., & J. M. Wilcox (Eds.), *Solar wind* (p. 393). Washington, D.C.: NASA Spec. Publ.
- Hundhausen, A. J. (1979). Solar activity and the solar wind. *Reviews of Geophysics*, 17(8), 2034–2048. <https://doi.org/10.1029/RG017i008p02034>
- Hundhausen, A. J. (1995). The solar wind. In M. G. Kivelson & C. T. Russell (Eds.), *Introduction to space plasma physics* (chap. 4). Cambridge, United Kingdom: Cambridge University Press.
- Hundhausen, A. (1970). Solar wind disturbances associated with solar activity. In V. Manno & D. Page (Eds.), *Intercorrelated satellite observations related to solar events* (Vol. 19, pp. 111–129). Springer Netherlands. https://doi.org/10.1007/978-94-010-3278-0_8
- Hundhausen, A. J., & Gentry, R. A. (1969). Numerical simulation of flare-generated disturbances in the solar wind. *Journal of Geophysical Research*, 74(11), 2908–2918. <https://doi.org/10.1029/JA074i011p02908>
- Hunsucker, R. D. (1982). Atmospheric gravity waves generated in the high-latitude ionosphere: A review. *Reviews of Geophysics*, 20(2). <https://doi.org/10.1029/RG020i002p00293>
- Huttunen, K. E. J., Koskinen, H. E. J., & Schwenn, R. (2002). Variability of magnetospheric storms driven by different solar wind perturbations. *Journal of Geophysical Research*, 107(A7), SMP 20-1–SMP 20-8. <https://doi.org/10.1029/2001JA900171>
- Huttunen, K. E. J., Slavin, J., Collier, M., Koskinen, H. E. J., Szabo, A., Tanskanen, E., Balogh, A., Lucek, E., & Rème, H. (2005). Cluster observations of sudden impulses in the magnetotail caused by interplanetary shocks and pressure increases. *Annales Geophysicae*, 23(2), 609–624. <https://doi.org/10.5194/angeo-23-609-2005>
- Hwang, K.-J., Kuznetsova, M. M., Sahraoui, F., Goldstein, M. L., Lee, E., & Parks, G. K. (2011). Kelvin-Helmholtz waves under southward interplanetary magnetic field. *Journal of Geophysical Research*, 116(A8). <https://doi.org/10.1029/2011JA016596>
- Iijima, T. (2013). Field-aligned currents in geospace: Substance and significance. In S.-I. Ohtani, R. Fujii, M. Hesse, & R. L. Lysak (Eds.), *Magnetospheric current systems*, Geophysical Monograph Series (Vol. 118, pp. 107–129). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM118p0107>
- Iijima, T., Fujii, R., Potemra, T. A., & Saffelos, N. A. (1978). Field-aligned currents in the south polar cusp and their relationship to the interplanetary magnetic field. *Journal of Geophysical Research*, 83(A12), 5595–5603. <https://doi.org/10.1029/JA083iA12p05595>
- Iijima, T., & Potemra, T. A. (1976a). The amplitude distribution of field-aligned currents at northern high latitudes observed by Triad. *Journal of Geophysical Research*, 81(13), 2165–2174. <https://doi.org/10.1029/JA081i013p02165>

- Iijima, T., & Potemra, T. A. (1976b). Field-aligned currents in the dayside cusp observed by Triad. *Journal of Geophysical Research*, *81*(34), 5971-5979. <https://doi.org/10.1029/JA081i034p05971>
- Iijima, T., & Potemra, T. A. (1978). Large-scale characteristics of field-aligned currents associated with substorms. *Journal of Geophysical Research*, *83*(A2), 599-615. <https://doi.org/10.1029/JA083iA02p00599>
- Illing, R. M. E., & Hundhausen, A. J. (1985). Observation of a coronal transient from 1.2 to 6 solar radii. *Journal of Geophysical Research*, *90*(A1), 275-282. <https://doi.org/10.1029/JA090iA01p00275>
- International Association of Geomagnetism and Aeronomy (IAGA). (1959). Provisional atlas of rapid variations. In *Annals of the international geophysical year, volume 2* (pp. 668-709). London, United Kingdom: Pergamon Press.
- Isaacson, W. (2004). *Benjamin Franklin: An American Life*. New York, NY: Simon & Shuster Paperbacks.
- Isaacson, W. (2007). *Einstein: His Life and Universe*. New York, NY: Simon & Shuster Paperbacks.
- Isaacson, W. (2017). *Leonardo da Vinci*. New York, NY: Simon & Shuster Paperbacks.
- Ivanov, K. G. (1964). Interaction of running shock waves with strong discontinuities in the space vicinity of the Earth. *Geomagn. Aeron.*, *4*, 803-806.
- Ivanov, K. G. (1971). Rotational discontinuities in the solar wind. *Geomagnetism and Aeronomy*, *11*(5), 767-770.
- Ivanov, K. G. (19712). About identification of tangential discontinuities in the solar wind. *Cosmic Research*, *10*, 131-133.
- Ivanov, K. G. (1973). Contact discontinuities in cosmic plasma. *Geomagnetism and Aeronomy*, *13*, 3-9.
- Iyemori, T. (1990). Storm-time magnetospheric currents inferred from mid-latitude geomagnetic field variations. *Journal of Geomagnetism and Geoelectricity*, *42*(11), 1249-1265. <https://doi.org/10.5636/jgg.42.1249>
- Jacchia, L. G. (1959). Corpuscular radiation and the acceleration of artificial satellites. *Nature*, *183*(526), 1662-1663. <https://doi.org/10.1038/1831662a0>
- Jacchia, L. G. (1970). New static models of the thermosphere and exosphere with empirical temperature profiles. In *Spec. rep. 313* (p. 1-82). Cambridge, Massachusetts: Smithsonian, Astrophys. Obs.
- Jacchia, L. G. (1972). Atmospheric models in a region from 110 to 2000 km. In A. C. Stickland (Ed.), *Cira 1972* (pp. 227-238). New York, NY: Springer.
- Jacchia, L. G. (1977). Thermospheric temperature, density, and composition: New models. *SAO Special Report*, *375*.
- Jacchia, L. G., & Slowey, J. W. (1968). Diurnal and seasonal latitudinal variations in the upper atmosphere. *Planetary and Space Science*, *16*(4), 509-524. [https://doi.org/10.1016/0032-0633\(68\)90165-7](https://doi.org/10.1016/0032-0633(68)90165-7)
- Jackel, B. J., Cameron, T., & Weygand, J. M. (2013). Orientation of solar wind dy-

- namic pressure phase fronts. *Journal of Geophysical Research*, 118(4), 1379–1388. <https://doi.org/10.1002/jgra.50183>
- Jackel, B. J., & Kabin, K. (2017). Dayside magnetosphere response to solar wind dynamic pressure changes: Propagation geometry and speed. In S. Haaland, A. Runov, & C. Forsyth (Eds.), *Dawn-dusk asymmetries in planetary plasma environments*, Geophysical Monograph Series (Vol. 230, p. 15-28). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119216346.ch2>
- Jackiw, R., & Kostelecký, V. A. (1999). Radiatively induced Lorentz and CPT violation in electrodynamics. *Phys. Rev. Lett.*, 82, 3572–3575. <https://doi.org/10.1103/PhysRevLett.82.3572>
- Jackman, C. H., DeLand, M. T., Labow, G. J., Fleming, E. L., Weisenstein, D. K., Ko, M. K. W., Sinnhuber, M., & Russell, J. M. (2005). Neutral atmospheric influences of the solar proton events in October–November 2003. *Journal of Geophysical Research*, 110(A9). <https://doi.org/10.1029/2004JA010888>
- Jackson, A., Jonkers, A. R. T., & Walker, M. R. (2000). Four centuries of geomagnetic secular variation from historical records. *Philosophical Transactions of the Royal Society. Series A*, 358(1768), 957–990. <https://doi.org/10.1098/rsta.2000.0569>
- Jackson, J., & Vette, J. I. (1975). *The Orbiting Geophysical Observatories: OGO Program Summary* (Tech. Rep. No. NASA SP-7601). Washington, D.C.: National Aeronautics and Space Administration, Goddard Space Flight Center.
- Jackson, J. D. (1999). *Classical Electrodynamics* (3rd ed.). Hoboken, NJ: John Wiley & Inc.
- Jacobs, J. A., Kato, Y., Matsushita, S., & Troitskaya, V. A. (1964). Classification of geomagnetic micropulsations. *Journal of Geophysical Research*, 69(1), 180–181. <https://doi.org/10.1029/JZ069i001p00180>
- Jacobs, L. A. (1984). *Reversals of the earth's magnetic field*. New York, NY: University of Cambridge Press.
- Jain, A., Tiwari, S., Jain, S., & Gwal, A. K. (2011). Nighttime enhancements in TEC near the crest of northern equatorial ionization anomaly during low solar activity period. *Indian Journal of Physics*, 85(9), 1367–1380. <https://doi.org/10.1007/s12648-011-0159-7>
- Janhunen, P., Palmroth, M., Laitinen, T., Honkonen, I., Juusola, L., Facskó, G., & Pulkkinen, T. (2012). The GUMICS-4 global MHD magnetosphere–ionosphere coupling simulation. *Journal of Atmospheric and Solar-Terrestrial Physics*, 80, 48–59. <https://doi.org/10.1016/j.jastp.2012.03.006>
- Janhunen, P. (1996). GUMICS-3: A global ionosphere-magnetosphere coupling simulation with high ionospheric resolution. In T.-D. Guyenne & A. Hilgers (Eds.), *Environment modeling for space-based applications, symposium proceedings (esa sp-392)* (pp. 233–239). Noordwijk, The Netherlands: ESA/TSTEC.
- Janvier, M., Démoulin, P., & Dasso, S. (2014). Mean shape of interplanetary shocks deduced from in-situ observations and its relation with interplanetary CMEs. *Astronomy & Astrophysics*, 565(A99). <https://doi.org/10.1051/0004-6361/201423450>
- Jauer, P. R., Wang, C., Souza, V. M., Alves, M. V., Alves, L. R., Pádua, M. B., Marchezi,

- J. P., Da Silva, L. A., Liu, Z., Li, H., Vieira, L. E. A., Dal Lago, A., Gonzalez, W. D., Echer, E., Medeiros, C., Costa, J. E. R., & Denardini, C. M. (2019). A Global Magnetohydrodynamic Simulation Study of Ultra-low-frequency Wave Activity in the Inner Magnetosphere: Corotating Interaction Region + Alfvénic Fluctuations. *The Astrophysical Journal*, *886*(1). <https://doi.org/10.3847/1538-4357/ab4db5>
- Javaraiah, J. (2017). Will Solar Cycles 25 and 26 Be Weaker than Cycle 24? *Solar Physics*, *292*(172). <https://doi.org/10.1007/s11207-017-1197-x>
- Jeffrey, A., & Taniuti, T. (1964). *Nonlinear wave propagation*. New York, NY: Academic Press.
- Jeřáb, M., Němeček, Z., Šafránková, J., Jelínek, K., & Měrka, J. (2005). Improved bow shock model with dependence on the IMF strength. *Planetary and Space Science*, *53*(1-3), 85-93. <https://doi.org/10.1016/j.pss.2004.09.032>
- Jian, L. (2008). *Radial evolution of large-scale solar wind structures* (Ph.D thesis). University of California, Los Angeles, Los Angeles, California.
- Jian, L., Russell, C., Luhmann, J., & Skoug, R. (2006a). Properties of interplanetary coronal mass ejections at one AU during 1995-2004. *Solar Physics*, *239*(1-2), 393-436. <https://doi.org/10.1007/s11207-006-0133-2>
- Jian, L., Russell, C., Luhmann, J., & Skoug, R. (2006b). Properties of stream interactions at one AU during 1995-2004. *Solar Physics*, *239*(1-2), 337-392. <https://doi.org/10.1007/s11207-006-0132-3>
- Jian, L., Russell, C. T., Luhmann, J. G., & Skoug, R. M. (2008). Evolution of solar wind structures from 0.72 to 1 AU. *Advances in Space Research*, *41*(2), 259-266. <https://doi.org/10.1016/j.asr.2007.03.023>
- Jian, L. K., Russell, C. T., & Kuhmann, J. G. (2011). Comparing solar minimum 23/24 with historical solar Wind records at 1 AU. *Solar Physics*, *274*, 321-344. <https://doi.org/10.1007/s11207-011-9737-2>
- Jin, Y., Zhou, X., Moen, J. I., & Hairston, M. (2016). The auroral ionosphere TEC response to an interplanetary shock. *Geophysical Research Letters*, *43*(5), 1810-1818. <https://doi.org/10.1002/2016GL067766>
- Johannessen, J. A., Balmino, G., Le Provost, C., Rummel, R., Sabadini, R., Sünkel, H., Tscherning, C. C., Visser, P., Woodworth, P., Hughes, C., Legrand, P., Sneeuw, N., Perosanz, F., Aguirre-Martinez, M., Rebhan, H., & Drinkwater, M. (2003). The European Gravity Field and Steady-State Ocean Circulation Explorer Satellite Mission Its Impact on Geophysics. *Surveys in Geophysics*, *24*, 339-386. <https://doi.org/10.1023/B:GEOP.0000004264.04667.5e>
- Johnson, L. W., & Wolbarsht, M. L. (1979). Mercury poisoning: A probable cause of Isaac Newton's physical and mental ills. *Notes and Records of the Royal Society of London*, *34*(1), 1-9. <https://doi.org/10.1098/rsnr.1979.0001>
- Jokipii, J. R. (1966). Cosmic-ray propagation. I. Charged particles in a random magnetic field. *The Astrophysical Journal*, *146*, 480-487. <https://doi.org/10.1086/148912>
- Jonas, S., & McCarron, E. (2015). Recent U.S. policy developments addressing the effects of geomagnetically induced currents. *Space Weather*, *13*(11), 730-733. <https://doi.org/10.1002/2015SW001310>

- Jonas, S., McCarron, E., & Murtagh, W. (2016). Space Weather Policy and Effects. *Insight*, 19(4), 20-23. <https://doi.org/10.1002/inst.12121>
- Jonas, S., & McCarron, E. D. (2016). White House Releases National Space Weather Strategy and Action Plan. *Space Weather*, 14(2), 54-55. <https://doi.org/10.1002/2015SW001357>
- Jonas, S., Murtagh, W., & Bonadonna, M. (2017). Released for Public Comment: Space Weather Benchmarks and Operations-to-Research Plan. *Space Weather*, 15(2), 282-282. <https://doi.org/10.1002/2017SW001603>
- Jones, H. S. (1955). *Sunspot and geomagnetic-storm data derived from Greenwich observations: 1874-1954: derived from Greenwich Observations, 1874-1954*. Her Majesty's Stationery Office. London, England.
- Jonkers, A. R. T., Jackson, A., & Murray, A. (2003). Four centuries of geomagnetic data from historical records. *Reviews of Geophysics*, 41(2). <https://doi.org/10.1029/2002RG000115>
- Jornal do Commercio. (1875). Published on 17 February 1875 by Julio Constancio de Vileneuve, p. 3. Retrieved from http://memoria.bn.br/DocReader/DocReader.aspx?bib=364568_06&pesq=australis&pasta=ano%20187. (Accessed date of this reference: March 16, 2024)
- Joselyn, J. A. (1990). Case study of the great geomagnetic storm of 13 March 1989, Astrodynamics 1989. In *Proceedings of the AAS/AIAA Astrodynamics Conference, Stowe, VT, August 7-10, 1989* (p. 745-762). San Diego, CA: Univelt, Inc. (Part 2 (A90-46754 21-12))
- Joselyn, J. A., & Tsurutani, B. T. (1990). Geomagnetic Sudden impulses and storm sudden commencements: A note on terminology. *Eos Transactions AGU*, 71(47), 1808-1809. <https://doi.org/10.1029/90EO00350>
- Junginger, H., Haerendel, G., & Melzner, F. (1985). A statistical study of wave Poynting vectors measured during long-period magnetospheric pulsations at geostationary orbit. *Journal of Geophysical Research*, 90(A9), 8301-8307. <https://doi.org/10.1029/JA090iA09p08301>
- Jurac, S., Kasper, J. C., Richardson, J. D., & Lazarus, A. J. (2002). Geomagnetic disturbances and their relationship to interplanetary shock parameters. *Geophysical Research Letters*, 29(10). <https://doi.org/10.1029/2001GL014034>
- Jurac, S., & Richardson, J. D. (2001). The dependence of plasma and magnetic field correlations in the solar wind on geomagnetic activity. *Journal of Geophysical Research*, 106(A12), 29195-29205. <https://doi.org/10.1029/2000JA000180>
- Juusola, L., Heikki Vanhamäki, A. V., & Smirnov, M. (2020). Induced currents due to 3D ground conductivity play a major role in the interpretation of geomagnetic variations. *Annales Geophysicae*, 30(5), 983-998. <https://doi.org/10.5194/angeo-38-983-2020>
- Kabin, K. (2001). A note on the compression ratio in MHD shocks. *Journal of Plasma Physics*, 66(4), 259-274. <https://doi.org/10.1017/S0022377801001295>
- Kaeppler, S. R., Hampton, D. L., Nicolls, M. J., Strømme, A., Solomon, S. C., Hecht, J. H., & Conde, M. G. (2015). An investigation comparing ground-based techniques that quantify auroral electron flux and conductance. *Journal of Geophysical Research*:

Space Physics, 120(10), 9038–9056. <https://doi.org/10.1002/2015JA021396>

- Kajdič, P., Blanco-Cano, X., Aguilar-Rodriguez, E., Russell, C. T., Jian, L. K., & Luhmann, J. G. (2012). Waves upstream and downstream of interplanetary shocks driven by coronal mass ejections. *Journal of Geophysical Research*, 117(A6). <https://doi.org/10.1029/2011JA017381>
- Kalafatoglu Eyiguler, E. C., Kaymaz, Z., Frissell, N. A., Ruohoniemi, J. M., & Rastätter, L. (2018). Investigating upper atmospheric Joule heating using cross-combination of data for two moderate substorm cases. *Space Weather*, 16(8), 987-1012. <https://doi.org/10.1029/2018SW001956>
- Kalafatoglu Eyiguler, E. C., Kaymaz, Z., Kuznetsova, M. M., Soon Shim, J., & Rastätter, L. (2019). Relation Between Joule Heating and Thermospheric Neutral Density During Geomagnetic Storms. In *2019 9th International Conference on Recent Advances in Space Technologies (RAST)* (p. 663-666). Istanbul, Turkey: IEEE. <https://doi.org/10.1109/RAST.2019.8767867>
- Kalafatoglu Eyiguler, E. C., Shim, J. S., Kuznetsova, M. M., Kaymaz, Z., Bowman, B. R., Codrescu, M. V., Solomon, S. C., Fuller-Rowell, T. J., Ridley, A. J., Mehta, P. M., & Sutton, E. K. (2019). Quantifying the Storm Time Thermospheric Neutral Density Variations Using Model and Observations. *Space Weather*, 17(2), 269-284. <https://doi.org/10.1029/2018SW002033>
- Kallenrode, M. (2003). *Space physics - an introduction to plasmas and particles in the heliosphere and magnetosphere*. New York, NY: Spring. (Third Edition)
- Kalmoni, N. M. E., Rae, I. J., Watt, C. E. J., Murphy, K. R., Samara, M., Michell, R. G., Grubbs, G., & Forsyth, C. (2018). A diagnosis of the plasma waves responsible for the explosive energy release of substorm onset. *Nature Communications*, 9(4806). <https://doi.org/10.1038/s41467-018-07086-0>
- Kaltenegger, L., Traub, W. A., & Jucks, K. W. (2007). Spectral Evolution of an Earth-like Planet. *The Astrophysical Journal*, 658(1), 598-616. <https://doi.org/10.1086/510996>
- Kamide, Y. (2005). What determines the intensity of magnetospheric substorms? In A. Lui, Y. Kamide, & G. Consolini (Eds.), *Multiscale coupling of sun-earth processes* (p. 175-194). Amsterdam, The Netherlands: Elsevier Science B.V. <https://doi.org/10.1016/B978-044451881-1/50014-9>
- Kamide, Y., Ahn, B.-H., Akasofu, S.-I., Baumjohann, W., Friis-Christensen, E., Kroehl, H. W., Maurer, H., Richmond, A. D., Rostoker, G., Spiro, R. W., Walker, J. K., & Zaitzev, A. N. (1982). Global distribution of ionospheric and field-aligned currents during substorms as determined from six IMS meridian chains of magnetometers: Initial results. *Journal of Geophysical Research*, 87(A10), 8228–8240. <https://doi.org/10.1029/JA087iA10p08228>
- Kamide, Y., Baumjohann, W., Daglis, I. A., Gonzalez, W. D., Grande, M., Joselyn, J. A., McPherron, R. L., Phillips, J. L., Reeves, E. G. D., Rostoker, G., Sharma, A. S., Singer, H. J., Tsurutani, B. T., & Vasyliūnas, V. M. (1998). Current understanding of magnetic storms: Storm-substorm relationships. *Journal of Geophysical Research*, 103(A8), 17705–17728. <https://doi.org/10.1029/98JA01426>

- Kamide, Y., & Joselyn, J. A. (1991). Toward a standardized definition of geomagnetic sudden impulses and storm sudden commencements. *Eos Transactions AGU*, *72*(28), 300–300. <https://doi.org/10.1029/90EO20231>
- Kamide, Y., & Nakamura, R. (1996). The convection electrojet and the substorm electrojet. *Annales Geophysicae*, *14*, 589–592. <https://doi.org/10.1007/s00585-996-0589-2>
- Kamide, Y., & Slavin, J. A. (Eds.). (1986). *Solar wind - magnetosphere coupling* (Vol. 126). Springer.
- Kamide, Y., & Tostoker, G. (2004). What is the physical meaning of the AE index? *Eos Transactions AGU*, *85*(19), 188–192. <https://doi.org/10.1029/2004EO190010>
- Kan, J. R. (1990). Tail-like reconfiguration of the plasma sheet during the substorm growth phase. *Geophysical Research Letters*, *17*(13), 2309–2312. <https://doi.org/10.1029/GL017i013p02309>
- Kan, J. R., & Lee, L. C. (1979). Energy coupling function and solar wind–magnetosphere dynamo. *Geophysical Research Letters*, *6*(7), 577–580. <https://doi.org/10.1029/GL006i007p00577>
- Kan, J. R., & Sun, W. (1985). Simulation of the westward traveling surge and Pi 2 pulsations during substorms. *Journal of Geophysical Research*, *90*(A11), 10911–10922. <https://doi.org/10.1029/JA090iA11p10911>
- Kan, J. R., T. A. Potemr and, S. K., & Iijima, T. (Eds.). (1991). *Magnetospheric substorms* (Vol. 64). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM064>
- Kane, R. P. (2007a). Early history of cosmic rays and solar wind – Some personal remembrances. *Advances in Space Research*, *44*(10), 1252–1255. <https://doi.org/10.1016/j.asr.2008.10.041>
- Kane, R. P. (2007b). The idea of Space Weather – A historical perspective. *Advances in Space Research*, *37*(6), 1261–1264. <https://doi.org/10.1016/j.asr.2006.01.014>
- Kanekal, S. G., & Baker, D. N. (2016). Radiation Belts. In G. V. Khazanov (Ed.), *Space Weather Fundamentals* (p. 1473–184). Boca Raton, FL: CRC Press.
- Kang, S.-B., Fok, M.-C., Glocer, A., Min, K.-W., Choi, C.-R., Choi, E., & Hwang, J. (2016). Simulation of a rapid dropout event for highly relativistic electrons with the RBE model. *Journal of Geophysical Research: Space Physics*, *121*(5), 4092–4102. <https://doi.org/10.1002/2015JA021966>
- Kang, S.-B., Fok, M.-C., Komar, C., Glocer, A., Li, W., & Buzulukova, N. (2018). An Energetic Electron Flux Dropout Due to Magnetopause Shadowing on 1 June 2013. *Journal of Geophysical Research: Space Physics*, *123*(2), 1178–1190. <https://doi.org/10.1002/2017JA024879>
- Kang, S.-B., Min, K.-W., Fok, M.-C., Hwang, J., & Choi, C.-R. (2015). Estimation of pitch angle diffusion rates and precipitation time scales of electrons due to EMIC waves in a realistic field model. *Journal of Geophysical Research: Space Physics*, *120*(10), 8529–8546. <https://doi.org/10.1002/2014JA020644>
- Kangas, J., Kultima, J., Guglielmi, A., Potapov, A., & Hayashi, K. (2001). Impact of interplanetary shock on the ULF wave activity: A case study of the storm sudden

- commencement on September 22, 1999. *Earth, Planets and Space*, 53(12), 1177-1182. <https://doi.org/10.1186/BF03352413>
- Kantrowitz, A., & Petschek, H. E. (1966). MHD characteristics and shock waves. In W. B. Kunkel (Ed.), *Plasma physics in theory and application* (p. 148-207). McGraw-Hill, New York.
- Kapil, C., Seemala, G. K., Shetti, D. J., & Acharya, R. (2022). Reckoning ionospheric scintillation S4 from ROTI over Indian region. *Advances in Space Research*, 69(2), 915–925. <https://doi.org/10.1016/j.asr.2021.10.026>
- Kappenman, J. (2010). *Geomagnetic storms and their impacts on the US power grid* (Tech. Rep.). Goleta, California: Metatech Corp.
- Kappenman, J. G. (1996). Geomagnetic storms and their impact on power systems. *IEEE Power Engineering Review*, 16(5), 5. <https://doi.org/10.1109/MPER.1996.491910>
- Kappenman, J. G. (2001). Advanced geomagnetic storm forecasting for the electric power industry. In P. Song, H. J. Singer, & G. L. Siscoe (Eds.), *Space Weather*, Geophysical Monograph Series (Vol. 125, pp. 353–357). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM125p0353>
- Kappenman, J. G. (2003). Storm sudden commencement events and the associated geomagnetically induced current risks to ground-based systems at low-latitude and mid-latitude locations. *Space Weather*, 1(3). <https://doi.org/10.1029/2003SW000009>
- Kappenman, J. G. (2005). An overview of the impulsive geomagnetic field disturbances and power grid impacts associated with the violent Sun-Earth connection events of 29-31 October 2003 and a comparative evaluation with other contemporary storms. *Space Weather*, 3(8), 1–21. <https://doi.org/10.1029/2004SW000128>
- Kappenman, J. G. (2006). Great geomagnetic storms and extreme impulsive geomagnetic field disturbance events - An analysis of observational evidence including the great storm of May 1921. *Advances in Space Research*, 38(2), 188-199. <https://doi.org/10.1016/j.asr.2005.08.055>
- Karato, S., Forte, A., Liebermann, R., Masters, G., & Stixrude, L. (Eds.). (2000). *Earth's deep interior: Mineral physics and tomography from the atomic to the global scale*, Geophysical Monograph Series (Vol. 117). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM117>
- Karimabadi, H., Le, A., Roytershteyn, V., & Daughton, W. (2016). Magnetic Reconnection. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 95-114). Boca Raton, FL: CRC Press.
- Karinen, A., & Mursula, K. (2005). A new reconstruction of the D_{st} index for 1932-2002. *Annales Geophysicae*, 23, 475-485. <https://doi.org/10.5194/angeo-23-475-2005>
- Karoff, C., Knudsen, M. F., De Cat, P., Bonanno, A., Fogtman-Schulz, A., Fu, J., Frasca, A., Inceoglu, F., Olsen, J., Zhang, Y., Hou, Y., Wang, Y., Shi, J., & Zhang, W. (2016). Observational evidence for enhanced magnetic activity of superflare stars. *Nature Communications*, 7(11058).
- Karpen, J., & Antiochios, S. (2016). The Sun. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 3-20). Boca Raton, FL: CRC Press.

- Kasinskii, V. V., Ptitsyna, N. G., Lyahov, N. N., Tyasto, M. I., Villoresi, G., & Iucci, N. (2007). Effect of geomagnetic disturbances on the operation of railroad automated mechanisms and telemechanics. *Geomagnetism and Aeronomy*, *47*, 676–680. <https://doi.org/10.1134/S0016793207050179>
- Kasran, F. A. M., Jusoh, M. H., Adhikari, B., & Rahim, S. A. E. A. (2019). Field-aligned currents (FACs) behaviour during the arrival of interplanetary magnetic shock. *Journal of Physics: Conference Series*, *1152*(012027). <https://doi.org/10.1088/1742-6596/1152/1/012027>
- Kataoka, R. (2020). Extreme geomagnetic activities: a statistical study. *Earth, Planets and Space*, *72*(124). <https://doi.org/10.1186/s40623-020-01261-8>
- Kataoka, R., & Miyoshi, Y. (2006). Flux enhancement of radiation belt electrons during geomagnetic storms driven by coronal mass ejections and corotating interaction regions. *Space Weather*, *4*(9), 1–11. <https://doi.org/10.1029/2005SW000211>
- Kataoka, R., & Ngwira, C. (2016). Extreme geomagnetically induced currents. *Progress in Earth and Planetary Science*, *3*(1), 1–7. <https://doi.org/10.1186/s40645-016-0101-x>
- Kataoka, R., & Pulkkinen, A. (2008). Geomagnetically induced currents during intense storms driven by coronal mass ejections and corotating interacting regions. *Journal of Geophysical Research*, *113*(A3). <https://doi.org/10.1029/2007JA012487>
- Kataoka, R., Watari, S., Shimada, N., Shimazu, H., & Marubashi, K. (2005). Downstream structures of interplanetary fast shocks associated with coronal mass ejections. *Geophysical Research Letters*, *32*(12). <https://doi.org/10.1029/2005GL022777>
- Katus, R. M., Liemohn, M. W., Ionides, E. L., Ilie, R., Welling, D., & Sarno-Smith, L. K. (2014). Statistical analysis of the geomagnetic response to different solar wind drivers and the dependence on storm intensity. *Journal of Geophysical Research: Space Physics*, *120*(1), 310–327. <https://doi.org/10.1002/2014JA020712>
- Katus, R. M., Liemohn, M. W., Keesee, A. M., Immel, T. J., Ilie, R., Welling, D. T., Ganushkina, N. Y., Perlongo, N. J., & Ridley, A. J. (2016). Geomagnetic disturbance intensity dependence on the universal timing of the storm peak. *Journal of Geophysical Research: Space Physics*, *121*(8), 7561–7571. <https://doi.org/10.1002/2016JA022967>
- Kaufmann, R. L., & Konradi, A. (1969). Explorer 12 magnetopause observations: Large-scale nonuniform motion. *Journal of Geophysical Research*, *74*(14), 3609–3627. <https://doi.org/10.1029/JA074i014p03609>
- Kauristie, K., Morschhauser, A., Olsen, N., Finlay, C. C., McPherron, R. L., Gjerloev, J. W., & Opgenoorth, H. J. (2017). On the usage of geomagnetic indices for data selection in internal field modelling. *Space Science Reviews*, *206*(1–4), 61–90. <https://doi.org/10.1007/s11214-016-0301-0>
- Kavosi, S. (2015). *Kelvin–Helmholtz instability at Earth’s magnetopause: THEMIS observations and OpenGGCM simulations* (Ph.D thesis). University of New Hampshire, Durham, New Hampshire.
- Kavosi, S., & Raeder, J. (2015). Ubiquity of Kelvin-Helmholtz waves at Earth’s magnetopause. *Nature Communications*, *6*(7019), 1–6.

<https://doi.org/10.1038/ncomms8019>

- Kawasaki, K., Akasofu, S.-I., Yasuhara, F., & Meng, C.-I. (1971). Storm sudden commencements and polar magnetic substorms. *Journal of Geophysical Research*, *76*(28), 6781–6789. <https://doi.org/10.1029/JA076i028p06781>
- Kay, C., Mays, M. L., & Verbeke, C. (2020). Identifying Critical Input Parameters for Improving Drag-Based CME Arrival Time Predictions. *Space Weather*, *18*(1), e2019SW002382. <https://doi.org/10.1029/2019SW002382>
- Keesee, A. M., Pinto, V., Coughlan, M., Lennox, C., Mahmud, M. S., & Connor, H. K. (2020). Comparison of Deep Learning Techniques to Model Connections Between Solar Wind and Ground Magnetic Perturbations. *Frontiers in Astronomy and Space Science*, *7*(550874), 72. <https://doi.org/10.3389/fspas.2020.550874>
- Keika, K., Nakamura, R., Baumjohann, W., Runov, A., Takada, T., Volwerk, M., Zhang, T. L., Klecker, B., Lucek, E. A., Carr, C., Rème, H., Dandouras, I., André, M., & Frey, H. (2008). Response of the inner magnetosphere and the plasma sheet to a sudden impulse. *Journal of Geophysical Research*, *113*(A7). <https://doi.org/10.1029/2007JA012763>
- Keiling, A., Donovan, E., Bagenal, F., & Karlson, T. (Eds.). (2012). *Auroral phenomenology and magnetospheric processes: Earth and other planets*, Geophysical Monograph Series (Vol. 197). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM197>
- Keiling, A., Jackman, C. M., & Delamere, P. A. (Eds.). (2015). *Magnetotails in the solar system*, Geophysical Monograph Series (Vol. 207). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118842324>
- Keiling, A., Thaller, S., Wygant, J., & Dombeck, J. (2019). Assessing the global Alfvén wave power flow into and out of the auroral acceleration region during geomagnetic storms. *Science Advances*, *5*(5), eaav8411. <https://doi.org/10.1126/sciadv.aav8411>
- Keiling, A., Wygant, J. R., Cattell, C. A., Mozer, F. S., & Russell, C. T. (2003). The Global Morphology of Wave Poynting Flux: Powering the Aurora. *Science*, *299*(5605), 383–386. <https://doi.org/10.1126/science.1080073>
- Kelbert, A., & Lucas, G. M. (2020). Modified GIC Estimation Using 3-D Earth Conductivity. *Space Weather*, *18*(8), e2020SW002467. <https://doi.org/10.1029/2020SW002467>
- Keller, K. A., Hesse, M., Rastätter, L., Kuznetsova, M. M., Moretto, T., Reitan, P. J., Gombosi, T. I., Zeeuw, D. L. D., & Beq, B. V. (2002). Global MHD modeling of the impact of a solar wind pressure change. *Journal of Geophysical Research*, *107*(A7). <https://doi.org/10.1029/2001JA000060>
- Kelley, M. C. (2009). *The Earth's Ionosphere*. London, United Kingdom: Academic Press.
- Kelley, M. C., Knudsen, D. J., & Vickrey, J. F. (1991). Poynting flux measurements on a satellite: A diagnostic tool for space research. *Journal of Geophysical Research*, *06*(A1), 201–207. <https://doi.org/10.1029/90JA01837>
- Kellogg, P. J. (1962). Flow of plasma around the Earth. *Journal of Geophysical Research*, *67*(10), 3805–3811. <https://doi.org/10.1029/JZ067i010p03805>

- Kelly, M. A., Comberiate, J. M., Miller, E. S., & Paxton, L. J. (2014). Progress toward forecasting of space weather effects on UHF SATCOM after Operation Anaconda. *Space Weather*, *12*(10), 601-611. <https://doi.org/10.1002/2014SW001081>
- Kelvin, L. (1893). On the Question of the Influence of the Sun Upon Magnetic Storms on the Earth. *Publications of the Astronomical Society of the Pacific*, *5*(28), 44-45. <https://doi.org/10.1086/120596>
- Kempf, Y., Pokhotelov, D., Gutynska, O., Wilson III, L. B., Walsh, B. M., Alfthan, S. v., Hannuksela, O., Sibeck, D. G., & Palmroth, M. (2015). Ion distributions in the Earth's foreshock: Hybrid-Vlasov simulation and THEMIS observations. *Journal of Geophysical Research: Space Physics*, *120*(5), 3684-3701. <https://doi.org/10.1002/2014JA020519>
- Kennel, C. F. (1987). Critical Mach numbers in classical magnetohydrodynamics. *Journal of Geophysical Research*, *92*(A12), 13427—13437. <https://doi.org/10.1029/JA092iA12p13427>
- Kennel, C. F. (2020). Rosenbluth and Sagdeev in Trieste: The Birth of Modern Space Plasma Physics. *Journal of Geophysical Research: Space Physics*, *125*. <https://doi.org/10.1029/2020JA027859>
- Kennel, C. F., Blandford, R. D., & Coppi, P. (1989). MHD intermediate shock discontinuities. Part 1. Rankine-Hugoniot conditions. *Journal of Plasma Physics*, *42*(2), 299-319. <https://doi.org/10.1017/S0022377800014379>
- Kennel, C. F., Edmiston, J. P., & Hada, T. (1985). A quarter century of collisionless shock research. In R. G. Stone & B. Tsurutani (Eds.), *Collisionless Shocks in the Heliosphere: A Tutorial Review*, Geophysical Monograph Series (Vol. 34, p. 1-36). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM034p0001>
- Kennel, C. F., Edmiston, J. P., Scarf, F. L., Coroniti, F. V., Russell, C. T., Smith, E. J., Tsurutani, B. T., Scudder, J. D., Feldman, W. C., Anderson, R. R., Mozer, F. S., & Temerin, M. (1984). Structure of the November 12, 1978, quasi-parallel interplanetary shock. *Journal of Geophysical Research*, *89*(A7), 5436–5452. <https://doi.org/10.1029/JA089iA07p05436>
- Kennel, C. F., Scarf, F. L., Coroniti, F. V., Russell, C. T., Wenzel, K.-P., Sander-son, T. R., Van Nes, P., Feldman, W. C., Parks, G. K., Smith, E. J., Tsuru-tani, B. T., Mozer, F. S., Temerin, M., Anderson, R. R., Scudder, J. D., & Sc-holer, M. (1984). Plasma and energetic particle structure upstream of a quasi-parallel interplanetary shock. *Journal of Geophysical Research*, *89*(A7), 5419–5435. <https://doi.org/10.1029/JA089iA07p05419>
- Kessel, R. L., Fox, N. J., & Weiss, M. (2013). The Radiation Belt Storm Probes (RBSP) and Space Weather. *Space Science Reviews*, *179*, 531-543. <https://doi.org/10.1007/s11214-012-9953-6>
- Kessler, D. J., & Cour-Palais, B. G. (1978). Collision frequency of artificial satellites: The creation of a debris belt. *Journal of Geophysical Research*, *83*(A6), 2637-2646. <https://doi.org/10.1029/JA083iA06p02637>
- Kessler, D. J., Johnson, N. L., Liou, J.-C., & Matney, M. (2010). The Kessler Syndrome: Implications to Future Space Operation. In S. C. McQuerry (Ed.), *Guidance and*

- Control 2010* (Vol. 137, p. 47-62). San Diego, CA: American Astronautical Society.
- Khazanov, G., Neubert, T., & Gefan, G. (1994). A unified theory of ionosphere-plasmasphere transport of suprathermal electrons. *IEEE Trans. Plasma Sci.*, *22*(2), 187–198. <https://doi.org/10.1109/27.279022>
- Khazanov, G. V. (2016). *Space Weather Fundamentals*. Boca Raton, FL: CRC Press.
- Khazanov, G. V., Himwich, E. W., Glocer, A., & Sibeck, D. G. (2015). Role of multiple atmospheric reflections in formation of electron distribution function. In Y. Zhang & L. J. Paxton (Eds.), *Auroral Dynamics and Space Weather* (p. 115-130). Hoboken, NJ: John Wiley & Sons, Inc., <https://doi.org/10.1002/9781118978719.ch9>
- Khazanov, G. V., Sibeck, D. G., & Zesta, E. (2017). Is diffuse aurora driven from above or below? *Geophysical Research Letters*, *44*(2), 641–647. <https://doi.org/10.1002/2016GL072063>
- Khazanov, G. V., Tripathi, A. K., Sibeck, D., Himwich, E., Glocer, A., & Singhal, R. P. (2015). Electron distribution function formation in regions of diffuse aurora. *Journal of Geophysical Research: Space Physics*, *120*(11), 9891-9915. <https://doi.org/10.1002/2015JA021728>
- Kibble, T. W. B., & Berkshire, F. H. (2004). *Classical mechanics*. London, United Kingdom: Imperial College Press.
- Kikuchi, T., Lühr, H., Kitamura, T., Saka, O., & Schlegel, K. (1996). Direct penetration of the polar electric field to the equator during a DP 2 event as detected by the auroral and equatorial magnetometer chains and the EISCAT radar. *Journal of Geophysical Research*, *101*(A8), 17161-17173. <https://doi.org/10.1029/96JA01299>
- Kilcommons, L. M., Knipp, D. J., Hairston, M., & Coley, W. R. (2022). DMSF Poynting Flux: Data Processing and Inter-Spacecraft Comparisons. *Journal of Geophysical Research: Space Physics*, *127*(8), e2022JA030299. <https://doi.org/10.1029/2022JA030299>
- Kilcommons, L. M., Redmon, R. J., & Knipp, D. J. (2017). A new DMSF magnetometer and auroral boundary data set and estimates of field-aligned currents in dynamic auroral boundary coordinates. *Journal of Geophysical Research: Space Physics*, *122*(8), 9068-9079. <https://doi.org/10.1002/2016JA023342>
- Killeen, T. L. (1987). Energetics and dynamics of the Earth's thermosphere. *Reviews of Geophysics*, *25*(3), 433–454. <https://doi.org/10.1029/RG025i003p00433>
- Kilpua, E. K. J., Balogh, A., von Steiger, R., & Liu, Y. D. (2017). Geoeffective properties of solar transients and stream interaction regions. *Space Science Reviews*, *212*(3-4), 1271-1314. <https://doi.org/10.1007/s11214-017-0411-3>
- Kilpua, E. K. J., Fontaine, D., Moissard, C., Ala-Lahti, M., Palmerio, E., Yordanova, E., Good, S. W., Kalliokoski, M. M. H., Lumme, E., Osmane, A., Palmroth, M., & Turc, L. (2019). Solar Wind Properties and Geospace Impact of Coronal Mass Ejection-Driven Sheath Regions: Variation and Driver Dependence. *Space Weather*, *17*(8), 1257-1280. <https://doi.org/10.1029/2019SW002217>
- Kilpua, E. K. J., Hietala, H., Koskinen, H. E. J., Fontaine, D., & Turc, L. (2013). Magnetic field and dynamic pressure ULF fluctuations in coronal-mass-ejection-driven sheath regions. *Annales Geophysicae*, *31*(9), 1559–1567. <https://doi.org/10.5194/angeo-31->

- Kilpua, E. K. J., Lugaz, N., Mays, M. L., & Temmer, M. (2019). Forecasting the structure and orientation of earthbound coronal mass ejections. *Space Weather*, *17*(4), 498–526. <https://doi.org/10.1029/2018SW001944>
- Kilpua, E. K. J., Luhmann, J. G., Jian, L. K., Russell, C., & Li, Y. (2014). Why have geomagnetic storms been so weak during the recent solar minimum and the rising phase of cycle 24? *Journal of Atmospheric and Solar-Terrestrial Physics*, *107*, 12–19. <https://doi.org/10.1016/j.jastp.2013.11.001>
- Kilpua, E. K. J., Lumme, K., E. Andréevová, Isavnin, A., & Koskinen, H. E. J. (2015). Properties and drivers of fast interplanetary shocks near the orbit of the Earth (1995–2013). *Journal of Geophysical Research: Space Physics*, *120*(6), 4112–4125. <https://doi.org/10.1002/2015JA021138>
- Kilpua, E. K. J., Olsper, N., Grigorievskiy, A., Käpylä, M. J., Tanskanen, E. I., Miyahara, H., Kataoka, R., Pelt, J., & Liu, Y. D. (2015). Statistical Study of Strong and Extreme Geomagnetic Disturbances and Solar Cycle Characteristics. *The Astrophysical Journal*, *806*(2), 272. <https://doi.org/10.1088/0004-637X/806/2/272>
- Kim, H., Clauer, C. R., Engebretson, M. J., Matzka, J., Sibeck, D. G., Singer, H. J., Stolle, C., Weimer, D. R., & Xu, Z. (2015). Conjugate observations of traveling convection vortices associated with transient events at the magnetopause. *Journal of Geophysical Research: Space Physics*, *120*(3), 2015–2035. <https://doi.org/10.1002/2014JA020743>
- Kim, H., Soto-Chavez, A. R., Takahashi, K., Adewuyi, M., Gerrard, A. J., Lanzerotti, L. J., Hartinger, M. D., & Oliveira, D. M. (2018). Van Allen Probes observations of symmetric, compressional ULF waves in association with interplanetary shocks. In *Final paper number sm11c-1209*. Presented at 2018 AGU Fall Meeting, Washington, D.C., 10–14 Dec..
- Kim, K.-H., Takahashi, K., Ohtani, S., Yumoto, K., Lee, D.-H., Jin, H., Seon, J., & Sung, S.-K. (2010). Substorm and pseudo-substorm Pi2 pulsations observed during the interval of quasi-periodic magnetotail flow bursts: A case study. *Earth, Planets and Space*, *62*, 413–425. <https://doi.org/10.5047/eps.2009.12.003>
- Kimball, D. S. (1960). *A study of the Aurora of 1859* (Tech. Rep. No. Scientific Report No 6). Fairbanks, AK: Geophysical Institute, University of Alaska.
- King–Hele, D. (1987). *Satellite orbits in an atmosphere: Theory and applications*. Glasgow, Scotland: Blackie and Son Ltd.
- King, J. H., & Papitashvili, N. E. (2005). Solar wind spatial scales in and comparisons of hourly Wind and ACE plasma and magnetic field data. *Journal of Geophysical Research*, *110*(A2), 1–9. <https://doi.org/10.1029/2004JA010649>
- Kis, A., Scholer, M., Klecker, B., Kucharek, H., Lucek, E. A., & Rème, H. (2007). Scattering of field-aligned beam ions upstream of Earth’s bow shock. *Annales Geophysicae*, *25*(3), 785–799. <https://doi.org/10.5194/angeo-25-785-2007>
- Kivelson, M. G., & Bagenal, F. (2007). Planetary magnetospheres. In L.-A. McFadden, P. R. Weissman, & T. V. Johnson (Eds.), *Encyclopedia of the solar system* (chap. 28). Amsterdam, The Netherlands: Elsevier.

- Kivelson, M. G., Bargatze, L. F., Khurana, K. K., Southwood, D. J., Walker, R. J., & Coleman Jr., P. J. (1993). Magnetic field signatures near galileo's closest approach to gaspra. *Science*, *261*(5119), 331-334.
- Kivelson, M. G., & Russell, C. T. (1996). *Introduction to Space Physics*. Cambridge, MA: Cambridge University Press.
- Klein, L. W., & Burlaga, L. F. (1982). Interplanetary magnetic clouds at 1 AU. *Journal of Geophysical Research*, *87*(A2), 613-624. <https://doi.org/10.1029/JA087iA02p00613>
- Kletzing, C. A., Kurth, W. S., na, M. A., MacDowall, R. J., Torbert, R. B., Averkamp, T., Bodet, D., Bounds, S. R., Chutter, M., Connerney, J., Crawford, D., Dolan, J. S., Dvorsky, R., Hospodarsky, G. B., Howard, J., Jordanova, V., Johnson, R. A., Kirchner, D. L., Mokrzycki, B., Needell, G., Odom, J., Mark, D., Pfaff Jr., R., Phillips, J. R., Piker, C. W., Remington, S. L., Rowland, D., Santolik, O., Schnurr, R., Sheppard, D., Smith, C. W., Thorne, R. M., & Tyler, J. (2013). The Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) on RBSP. *Space Science Reviews*, *179*, 127-181. <https://doi.org/10.1007/s11214-013-9993-6>
- Klinger, B., & Mayer-Gürr, T. (2016). The role of accelerometer data calibration within GRACE gravity field recovery: Results from ITSG-Grace2016. *Advances in Space Research*, *58*(9), 1597-1609. <https://doi.org/10.1016/j.asr.2016.08.007>
- Knight, S. (1973). Parallel electric fields. *Planetary and Space Science*, *21*, 741-750. [https://doi.org/10.1016/0032-0633\(73\)90093-7](https://doi.org/10.1016/0032-0633(73)90093-7)
- Knipp, D., Eriksson, S., Kilcommons, L., Crowley, G., Lei, J., Hairston, M., & Drake, K. (2011). Extreme Poynting flux in the dayside thermosphere: Examples and statistics. *Geophysical Research Letters*, *38*(16), 1-4. <https://doi.org/10.1029/2011GL048302>
- Knipp, D., Kilcommons, L., Hairston, M., & Coley, W. R. (2021). Hemispheric Asymmetries in Poynting Flux Derived From DMSP Spacecraft. *Geophysical Research Letters*, *48*(17), e2021GL094781. <https://doi.org/10.1029/2021GL094781>
- Knipp, D., Tobiska, W., & Emery, B. (2004). Direct and indirect thermospheric heating sources for solar cycles 21-23. *Solar Physics*, *224*, 495-505. <https://doi.org/10.1007/s11207-005-6393-4>
- Knipp, D. J. (2015a). Forward to space weather collection on geomagnetically induced currents: Commentary and research. *Space Weather*, *13*(11), 742-746. <https://doi.org/10.1002/2015SW001318>
- Knipp, D. J. (2015b). Synthesis of Geomagnetically Induced Currents: Commentary and Research. *Space Weather*, *13*(11), 727-729. <https://doi.org/10.1002/2015SW001317>
- Knipp, D. J. (2016). Space Weather Research and Forecasting Act Introduced to Senate. *Eos Transactions AGU*, *87*. <https://doi.org/10.1029/2018EO053437>
- Knipp, D. J. (2017). On space weather during a total eclipse. *Space Weather*, *15*. <https://doi.org/10.1002/2017SW001723>
- Knipp, D. J., Fraser, B. J., Shea, M. A., & Smart, D. F. (2018). On the Little-Known Consequences of the 4 August 1972 Ultra-Fast Coronal Mass Ejecta: Facts, Commentary, and Call to Action. *Space Weather*, *16*(11), 1635-1643. <https://doi.org/10.1029/2018SW002024>

- Knipp, D. J., & Gannon, J. L. (2019). The 2019 National Space Weather Strategy and Action Plan and Beyond. *Space Weather*, *17*(6), 794-795. <https://doi.org/10.1029/2019SW002254>
- Knipp, D. J., & Giles, B. L. (2016). Global Positioning System Energetic Particle Data: The Next Space Weather Data Revolution. *Space Weather*, *14*(8), 526-527. <https://doi.org/10.1002/2016SW001483>
- Knipp, D. J., Hapgood, M. A., & Welling, D. (2018). Communicating uncertainty and reliability in space weather data, models, and applications. *Space Weather*, *16*(10), 1453-1454. <https://doi.org/10.1029/2018SW002083>
- Knipp, D. J., Kilcommons, L., Hunt, L., Mlynczak, M., Pilipenko, V., Bowman, B., Deng, Y., & Drake, K. (2013). Thermospheric damping response to sheath-enhanced geospace storms. *Geophysical Research Letters*, *40*(7), 1263-1267. <https://doi.org/10.1002/grl.50197>
- Knipp, D. J., Lin, C.-H., Emery, B. A., Ruohoniemi, J. M., Rich, F. J., & Evans, D. S. (2000). Hemispheric asymmetries in ionospheric electrodynamics during the solar wind void of 11 May 1999. *Geophysical Research Letters*, *27*(24), 4013-4016. <https://doi.org/10.1029/2000GL003801>
- Knipp, D. J., Pette, D. V., Kilcommons, L. M., Isaacs, T. L., Cruz, A. A., Mlynczak, M. G., Hunt, L. A., & Lin, C. Y. (2017). Thermospheric nitric oxide response to shock-led storms. *Space Weather*, *15*(2), 325-342. <https://doi.org/10.1002/2016SW001567>
- Knipp, D. J., Ramsay, A. C., Beard, E. D., Boright, A. L., Cade, W. B., Hewins, I. M., McFadden, R. H., Denig, W. F., Kilcommons, L. M., Shea, M. A., & Smart, D. F. (2016). The May 1967 great storm and radio disruption event: Extreme space weather and extraordinary responses. *Space Weather*, *14*(9), 614-633. <https://doi.org/10.1002/2016SW001423>
- Knipp, D. J., Welliver, T., McHarg, M. G., Chun, F. K., Tobiska, W. K., & Evans, D. (2005). Climatology of extreme upper atmospheric heating events. *Advances in Space Research*, *36*(12), 2506-2010. <https://doi.org/10.1016/j.asr.2004.02.019>
- Knowless, S. H., Picone, J. M., Thonnard, S. E., & Nicholas, A. C. (2001). The effect of atmospheric drag on satellite orbits during the Bastille Day event. *Solar Physics*, *204*(1-2), 387-397. <https://doi.org/10.1023/A:1014223807360>
- Knudsen, D. J. (1990). *Alfvén waves and static fields in magnetosphere/ionosphere coupling: In-situ measurements and numerical model* (Ph.D thesis). Cornell University, Ithaca, New York.
- Knudsen, D. J., Donovan, E. F., Cogger, L. L., Jackel, B., & Shaw, W. D. (2001). Width and structure of mesoscale optical auroral arcs. *Geophysical Research Letters*, *28*(4), 705-708. <https://doi.org/10.1029/2000GL011969>
- Knudsen, W. C. (1966). Evaluation and demonstration of the use of retarding potential analyzers for measuring several ionospheric quantities. *Journal of Geophysical Research*, *71*(19), 4669-4678. <https://doi.org/10.1029/JZ071i019p04669>
- Kockarts, G. (1980). Nitric oxide cooling in the terrestrial thermosphere. *Geophysical Research Letters*, *7*(2), 137-140. <https://doi.org/10.1029/GL007i002p00137>
- Kodikara, T., Carter, B., Norman, R., & Zhang, K. (2019). Density-temperature synchrony

- in the hydrostatic thermosphere. *Journal of Geophysical Research: Space Physics*, 124(1), 674-699. <https://doi.org/10.1029/2018JA025973>
- Koestler, A. (1959). *The sleepwalkers: A history of man's changing vision of the universe*. New York, NY: Mcmillan.
- Kokubun, S. (1983). Characteristics of storm sudden commencement at geostationary orbit. *Journal of Geophysical Research*, 88(A12), 10025–10033. <https://doi.org/10.1029/JA088iA12p10025>
- Kokubun, S., McPherron, R. L., & Russell, C. T. (1977). Triggering of substorms by solar wind discontinuities. *Journal of Geophysical Research*, 82(1), 74-86. <https://doi.org/10.1029/JA082i001p00074>
- Kokubun, S., Yamamoto, T., Acuña, M. H., Hayashi, K., & Kawano, K. S. H. (1994). The GEOTAIL Magnetic Field Experiment. *Journal of Geomagnetism and Geoelectricity*, 46(1), 7-21. <https://doi.org/10.5636/jgg.46.7>
- Komar, C. M., & Cassak, P. A. (2016). The local dayside reconnection rate for oblique interplanetary magnetic fields. *Journal of Geophysical Research: Space Physics*, 121(6), 5105-5120. <https://doi.org/10.1002/2016JA022530>
- Komar, C. M., Cassak, P. A., Dorelli, J. C., Glocer, A., & Kuznetsova, M. M. (2013). Tracing magnetic separators and their dependence on IMF clock angle in global magnetospheric simulations. *Journal of Geophysical Research*, 118(8), 4998-5007. <https://doi.org/10.1002/jgra.50479>
- Komar, C. M., Fermo, R. L., & Cassak, P. A. (2015). Comparative analysis of dayside magnetic reconnection models in global magnetosphere simulations. *Journal of Geophysical Research: Space Physics*, 120(1), 276-294. <https://doi.org/10.1002/2014JA020587>
- Komar, C. M., Glocer, A., Hartinger, M. D., Murphy, K. R., Fok, M.-C., & Kang, S.-B. (2017). Electron Drift Resonance in the MHD-Coupled Comprehensive Inner Magnetosphere-Ionosphere Model. *Journal of Geophysical Research: Space Physics*, 122(12), 12,006-12,018. <https://doi.org/10.1002/2017JA024163>
- Komar, C. M., Oliveira, D. M., Bhaskar, A. T., & Kang, S.-B. (2019). Modeling an Extreme Coronal Mass Ejection and its Consequences for the Earth's Magnetosphere. In *2019 agu chapman conference on scientific challenges pertaining to space weather forecasting including extremes*. Pasadena, CA, 11-15 February.
- Koochak, Z., & Fraser-Smith, A. C. (2017). An Update on the Centered and Eccentric Geomagnetic Dipoles and Their Poles for the Years 1980–2015. *Earth and Space Science*, 4(10), 626-636. <https://doi.org/10.1002/2017EA000280>
- Koons, H. C., & Fennell, J. F. (2006). Space weather effects on communications satellites. *The Radio Science Bulletin*, 2006(316), 27-41. <https://doi.org/10.23919/URSIRSB.2006.7909358>
- Kopp, G., Krivova, N., Wu, C. J., & Lean, J. (2016). The Impact of the Revised Sunspot Record on Solar Irradiance Reconstructions. *Solar Physics*, 291, 2951-2965. <https://doi.org/10.1007/s11207-016-0853-x>
- Korolev, A. S., & Pushkar, E. A. (2014). Collision of an interplanetary shock wave with the Earth's bow shock. Hydrodynamic parameters and magnetic field. *Fluid Dynamics*, 49(2), 270-287. <https://doi.org/10.1134/S001546281402015X>

- Kostelecký, V. A., & Samuel, S. (1989). Spontaneous breaking of Lorentz symmetry in string theory. *Phys. Rev. D*, *39*(2), 683–685. <https://doi.org/10.1103/PhysRevD.39.683>
- Koval, A., Šafránková, J., Němeček, Z., Samsonov, A. A., Přech, L., & Richardson, J. D. (2006). Interplanetary shock in the magnetosheath: Comparison of experimental data with MHD modeling. *Geophysical Research Letters*, *33*(L1102). <https://doi.org/10.1029/2006GL025707>
- Koval, A., & Szabo, A. (2008). Modified “Rankine-Hugoniot” shock fitting technique: Simultaneous solution for shock normal and speed. *Journal of Geophysical Research*, *113*(A10). <https://doi.org/10.1029/2008JA013337>
- Koval, A., & Szabo, A. (2010). Multispacecraft observations of interplanetary shock shapes on the scales of the Earth’s magnetosphere. *Journal of Geophysical Research*, *115*(A12105). <https://doi.org/10.1029/2010JA015373>
- Koval, A., Šafránková, J., Němeček, Z., Přech, L., Samsonov, A. A., & Richardson, J. D. (2005). Deformation of interplanetary shock fronts in the magnetosheath. *Geophysical Research Letters*, *32*(15). <https://doi.org/10.1029/2005GL023009>
- Kovner, M. S., Lebedev, V. V., Plyasova-Bakunina, T. A., & Troitskaya, V. A. (1976). On the generation of low frequency waves in the solar wind in the front of the bow shock. *Planetary and Space Science*, *24*(3), 261-267. [https://doi.org/10.1016/0032-0633\(76\)90022-2](https://doi.org/10.1016/0032-0633(76)90022-2)
- Kozlovsky, A. E., Safargaleev, V., Østgaard, N., Turunen, T., Koustov, A., Jussila, J., & Roldugin, A. (2005). On the motion of dayside auroras caused by a solar wind pressure pulse. *Annales Geophysicae*, *23*, 509–521. <https://doi.org/10.5194/angeo-23-509-2005>
- Kozyra, J. U., Fok, M.-C., Sanchez, E. R., Evans, D. S., Hamilton, D. C., & Nagy, A. F. (1998). The role of precipitation losses in producing the rapid early recovery phase of the great magnetic storm of february 1986. *Journal of Geophysical Research*, *103*(A4), 6801-6814. <https://doi.org/10.1029/97JA03330>
- Kozyra, J. U., & Liemohn, M. W. (2003). Ring current energy input and decay. *Space Science Reviews*, *109*(1), 105–131. <https://doi.org/10.1023/B:SPAC.0000007516.10433.ad>
- Kozyra, J. U., Nagy, A. F., & Slater, D. W. (1997). High-altitude energy source(s) for stable auroral red arcs. *Reviews of Geophysics*, *35*(2), 155-190. <https://doi.org/10.1029/96RG03194>
- Kozyreva, O. V., Pilipenko, V. A., Belakhovsky, V. B., & Sakharov, Y. A. (2018). Ground geomagnetic field and GIC response to March 17, 2015, storm. *Earth, Planets and Space*, *70*(157), 1-13. <https://doi.org/10.1186/s40623-018-0933-2>
- Krall, J., & Huba, J. D. (2016). Plasmasphere. In G. V. Khazanov (Ed.), *Space Weather Fundamentals* (p. 185-198). Boca Raton, FL: CRC Press.
- Krauss, S. (2013). *Response of the Earth’s thermosphere during extreme solar events: A contribution of satellite observations to atmospheric evolution studies* (Ph.D thesis). Graz University of Technology, Graz, Austria.
- Krauss, S., Behzadpour, S., Temmer, M., & Lhotka, C. (2020). Exploring thermospheric variations triggered by severe geomagnetic storm on August 26, 2018 using GRACE Follow-On data. *Journal of Geophysical Research: Space Physics*, *125*.

<https://doi.org/10.1029/2019JA027731>

- Krauss, S., Fichtinger, B., Lammer, H., and Yu. N. Kulikov, W. H., Ribas, I., Shematovich, V. I., Bisikalo, D., Lichtenegger, H. I. M., Zaqarashvili, T. V., Khodachenko, M. L., & Hanslmeier, A. (2012). Solar flares as proxy for the young Sun: satellite observed thermosphere response to an X17.2 flare of Earth's upper atmosphere. *Annales Geophysicae*, *30*, 1129-1141. <https://doi.org/10.5194/angeo-30-1129-2012>
- Krauss, S., Pflieger, M., & Lammer, H. (2014). Satellite-based analysis of thermosphere response to extreme solar flares. *Annales Geophysicae*, *32*, 1305–1309. <https://doi.org/10.5194/angeo-32-1305-2014>
- Krauss, S., Temmer, M., & Vennerstrom, S. (2018). Multiple satellite analysis of the Earth's thermosphere and interplanetary magnetic field variations due to ICME/CIR events during 2003-2015. *Journal of Geophysical Research: Space Physics*, *123*(10), 8884-8894. <https://doi.org/10.1029/2018JA025778>
- Krauss, S., Temmer, M., Veronig, A., Baur, O., & Lammer, H. (2015). Thermosphere and geomagnetic response to interplanetary coronal mass ejections observed by ACE and GRACE: Statistical results. *Journal of Geophysical Research: Space Physics*, *120*(10), 8848–8860. <https://doi.org/10.1002/2015JA021702>
- Krimigis, S. M., Decker, R. B., Roelof, E. C., Hill, M. E., Armstrong, T. P., Gloeckler, G., Hamilton, D. C., & Lanzerotti, L. J. (2013). Search for the exit: Voyager 1 at heliosphere's border with the galaxy. *Science*, *341*(6142), 144–147. <https://doi.org/10.1126/science.1235721>
- Kroisz, S. (2023). *Analysing the Impact of Interacting ICMEs on Satellite Orbit Decay From 2002 to 2022* (Master's thesis). Graz University of Technology, Graz, Austria.
- Kruparova, O., Maksimovic, M., Šafránková, Nĕmeček, Z., Santolik, O., & Krupar, V. (2013). Automated interplanetary shock detection and its application to Wind observations. *Journal of Geophysical Research*, *118*(8), 4793-4803. <https://doi.org/10.1002/jgra.50468>
- Kuhn, T. S. (1957). *The copernican revolution: Planetary astronomy in the development of western thought*. Cambridge, MA: Harvard University Press.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago, IL: The University of Chicago Press.
- Kumar, A., Badruddin, & Derouich, M. (2017). Passage of ICMEs, their associated shock structure, and transient modulation of galactic cosmic rays. *Solar Physics*, *292*, 166. <https://doi.org/10.1007/s11207-017-1190-4>
- Kumar, M. (2009). World geodetic system 1984: A modern and accurate global reference frame. *Marine Geology*, *12*(2), 117-126. <https://doi.org/10.1080/15210608809379580>
- Kunkel, W. B. (Ed.). (1966). *Plasma physics in theory and application*. New York, NY: McGraw-Hill.
- Kwon, R.-Y., & Vourlidas, A. (2018). The density compression ratio of shock fronts associated with coronal mass ejections. *Journal of Space Weather and Space Climate*, *8*(A08). <https://doi.org/10.1051/swsc/2017045>

- Lakhina, G. S., Alex, S., Tsurutani, B. T., & Gonzalez, W. D. (2012). Supermagnetic storms: Hazard to society. In A. S. Sharma, A. Bunde, V. P. Dimri, & D. N. Baker (Eds.), *Extreme Events and Natural Hazards: The Complexity Perspective*, Geophysical Monograph Series (Vol. 196, p. 267-278). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/2011GM001073>
- Lakhina, G. S., & Tsurutani, B. T. (2016). Geomagnetic storms: Historical perspective to modern view. *Geoscience Letters*, 3(5), 1–11. <https://doi.org/10.1186/s40562-016-0037-4>
- Lakhina, G. S., & Tsurutani, B. T. (2017). Satellite drag effects due to uplifted oxygen neutrals during super magnetic storms. *Nonlinear Processes in Geophysics*, 24, 745–750. <https://doi.org/10.5194/npg-24-745-2017>
- Lakhina, G. S., & Tsurutani, B. T. (2020). Electromagnetic Pulsations and Magnetic Storms. In H. Gupta (Ed.), *Encyclopedia of Solid Earth Geophysics. Encyclopedia of Earth Sciences Series* (p. 1-5). Dordrecht, The Netherlands: Springer, Cham. https://doi.org/10.1007/978-3-030-10475-7_156-1
- Lakhina, G. S., Tsurutani, B. T., & Zhou, X.-Y. (2001). Excitation of plasma instabilities in the Earth's magnetotail by interplanetary shocks. *Advances in Space Research*. (in press, COSPAR-00)
- Lamy, L. (2020). Auroral emissions from Uranus and Neptune. *Philosophical Transactions of the Royal Society. Series A*, 378(2187), 1-17. <https://doi.org/10.1098/rsta.2019.0481>
- Landau, L. D., & Lifshitz, E. M. (1960). *Electrodynamics of continuous media*. Oxford, England: Pergamon Press.
- Landau, L. D., & Lifshitz, E. M. (1971). *Quantum electrodynamics* (Nos. Course of Theoretical Physics, Volume 4). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1975). *The classical theory of fields* (Nos. Course of Theoretical Physics, Volume 2). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1976). *Mechanics* (Nos. Course of Theoretical Physics, Volume 1). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1977). *Quantum mechanics* (Nos. Course of Theoretical Physics, Volume 3). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1980a). *Statistical physics - part 1* (Nos. Course of Theoretical Physics, Volume 5). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1980b). *Statistical physics - theory of the condensed states* (Nos. Course of Theoretical Physics, Volume 9). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1981). *Physical kinetics* (Nos. Course of Theoretical Physics, Volume 10). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1982). *Electrodynamics of continuous media* (Nos. Course of Theoretical Physics, Volume 8). Burlington, MA: Elsevier.
- Landau, L. D., & Lifshitz, E. M. (1986). *Theory of elasticity* (Nos. Course of Theoretical Physics, Volume 7). Burlington, MA: Elsevier.

- Landau, L. D., & Lifshitz, E. M. (1987). *Fluid mechanics* (Nos. Course of Theoretical Physics, Volume 6). Burlington, MA: Elsevier.
- Lange, I., & Forbush, S. E. (1948). *Research of the department of terrestrial magnetism, XIV*. Washington, D.C.: Carnegie Institute of Washington Publication.
- Lange, I., & Forbush, S. E. (1957). *Research of the department of terrestrial magnetism, XV*. Washington, D.C.: Carnegie Institute of Washington Publication.
- Langhoff, S. R., Jaffe, R. L., Yee, J. H., & Dalgarno, A. (1983). The surface glow of the Atmosphere Explorer C and E satellites. *Geophysical Research Letters*, *10*(9), 896-899. <https://doi.org/10.1029/GL010i009p00896>
- Lanzerotti, L. J. (1979). Geomagnetic influences on man-made systems. *Journal of Atmospheric and Solar-Terrestrial Physics*, *41*(7), 787-796. [https://doi.org/10.1016/0021-9169\(79\)90125-9](https://doi.org/10.1016/0021-9169(79)90125-9)
- Lanzerotti, L. J. (1992). Comment on “Great magnetic storms” by Tsurutani et al. *Geophysical Research Letters*, *19*(19), 1991–1992. <https://doi.org/10.1029/92GL02238>
- Lanzerotti, L. J. (2001a). Space weather effects on communications. In I. A. Daglis (Ed.), *Space weather effects on communications* (pp. 313–334). Dordrecht, The Netherlands: Springer Netherlands. https://doi.org/10.1007/978-94-010-0983-6_12
- Lanzerotti, L. J. (2001b). Space weather effects on technologies. In P. Song, H. J. Singer, & G. L. Siscoe (Eds.), *Space Weather*, Geophysical Monograph Series (Vol. 125, p. 11-22). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM125p0011>
- Lanzerotti, L. J. (2015). Space Weather Strategy and Action Plan: The National Program Is Rolled Out. *Space Weather*, *13*(12), 824-825. <https://doi.org/10.1002/2015SW001334>
- Lanzerotti, L. J. (2017). Space Weather: Historical and Contemporary Perspectives. *Space Science Reviews*, *212*(3-4), 1253-1270. <https://doi.org/10.1007/s11214-017-0408-y>
- Lanzerotti, L. J., & Baker, D. N. (2017). Space weather research: Earth’s radiation belts. *Space Weather*, *15*(6), 742-745. <https://doi.org/10.1002/2017SW001654>
- Lanzerotti, L. J., & Fukunishi, H. (1974). Modes of magnetohydrodynamic waves in the magnetosphere. *Reviews of Geophysics*, *12*(4), 724-729. <https://doi.org/10.1029/RG012i004p00724>
- Larsen, B. A., Morley, S. K., Niehof, J. T., & Welling, D. T. (2022). SpacePy [Computer software manual]. Zenodo. <https://doi.org/10.5281/zenodo.3252523>
- Larsen, M. F., Christensen, A. B., & Odom, C. D. (1997). Observations of unstable atmospheric shear layers in the lower E region in the post-midnight auroral oval. *Geophysical Research Letters*, *24*(15), 1915-1918. <https://doi.org/10.1029/97GL01942>
- Larsen, M. F., & Meriwether, J. W. (2012). Vertical winds in the thermosphere. *Journal of Geophysical Research*, *117*(A9). <https://doi.org/10.1029/2012JA017843>
- Lathuillère, C., & Menvielle, M. (2010). Comparison of the observed and modeled low-to mid-latitude thermosphere response to magnetic activity: Effects of solar cy-

- cle and disturbance time delay. *Advances in Space Research*, 45(3), 1093–1100.
<https://doi.org/10.1016/j.asr.2009.08.016>
- Lathuillère, C., Menvielle, M., Marchaudon, A., & Bruinsma, S. (2008). A statistical study of the observed and modeled global thermosphere response to magnetic activity at middle and low latitudes. *Journal of Geophysical Research*, 113(A7).
<https://doi.org/10.1029/2007JA012991>
- Laundal, K. M., Cnossen, I., Milan, S. E., Haaland, S. E., Coxon, J., Pedatella, N. M., Förster, M., & Reistad, J. P. (2017). North–South Asymmetries in Earth’s Magnetic Field. *Space Science Reviews*, 206, 225–257. <https://doi.org/10.1007/s11214-016-0273-0>
- Laundal, K. M., Finlay, C. C., Olsen, N., & Reistad, J. P. (2018). Solar Wind and Seasonal Influence on Ionospheric Currents From Swarm and CHAMP Measurements. *Journal of Geophysical Research: Space Physics*, 123(5), 4402–4429.
<https://doi.org/10.1029/2018JA025387>
- Laundal, K. M., Madelaire, M., Ohma, A., Reistad, J., & Hatch, S. (2022). The relationship between interhemispheric asymmetries in polar ionospheric convection and the magnetic field line footpoint displacement field. *Frontiers in Astronomy and Space Science*, 9(957223). <https://doi.org/10.3389/fspas.2022.957223>
- Laundal, K. M., & Østgaard, N. (2009). Asymmetric auroral intensities in the Earth’s Northern and Southern hemispheres. *Nature*, 460, 491–493.
<https://doi.org/10.1038/nature08154>
- Laundal, K. M., & Richmond, A. D. (2017). Magnetic coordinate systems. *Space Science Reviews*, 206(1-4), 1–33. <https://doi.org/10.1007/s11214-016-0275-y>
- Launius, R. D. (2004). *Frontiers of Space Exploration*. Westport, Connecticut: Greenwood Press.
- Le, G., Cai, Z., Wang, H., & Zhu, Y. (2011). Solar cycle distribution of great geomagnetic storms. *Astrophysics and Space Science*, 339(1), 151–156.
<https://doi.org/10.1007/s10509-011-0960-y>
- Le, G., Lühr, H., Anderson, B. J., Strangeway, R. J., Russell, C. T., Slavin, J. A., Bromund, K. R., Plaschke, F., Magnes, W., Fischer, D., Nakamura, R., Leinweber, H. K., Torbert, R. B., Le Contel, O., Oliveira, D. M., Raeder, J., & Kepko, L. (2015). Swarm observations of field aligned currents during geomagnetic storms. In *Abstract SM11A-06*. AGU Fall Meeting, San Francisco, CA.
- Le, G., Slavin, J. A., & Strangeway, R. J. (2010). Space technology 5 observations of the imbalance of regions 1 and 2 field-aligned currents and its implication to the cross-polar cap Pedersen currents. *Journal of Geophysical Research*, 115(A7).
<https://doi.org/10.1029/2009JA014979>
- Le May, S., Gehly, S., Carter, B. A., & Flegel, S. (2018). Space debris collision probability analysis for proposed global broadband constellations. *Acta Astronautica*, 151, 445–455. <https://doi.org/10.1016/j.actaastro.2018.06.036>
- Lean, J. (2005). Living with a variable sun. *Physics Today*, 58(6), 32–38.
<https://doi.org/10.1063/1.1996472>
- Lean, J. L., Picone, J. M., Emmert, J. T., & Moore, G. (2006). Thermospheric densities

- derived from spacecraft orbits: Application to the Starshine satellites. *Journal of Geophysical Research*, 111(A4). <https://doi.org/10.1029/2005JA011399>
- Lee, D.-H. (1996). Dynamics of MHD wave propagation in the low-latitude magnetosphere. *Journal of Geophysical Research*, 101(A7), 15,371-15,386. <https://doi.org/10.1029/96JA00608>
- Lee, D.-Y., & Lyons, L. R. (2004). Geosynchronous magnetic field response to solar wind dynamic pressure pulse. *Journal of Geophysical Research*, 109(A4). <https://doi.org/10.1029/2003JA010076>
- Lee, L. C., Huang, L., & Chao, J. K. (1989). On the stability of rotational discontinuities and intermediate shocks. *Journal of Geophysical Research*, 94(A7), 8813-8825. <https://doi.org/10.1029/JA094iA07p08813>
- Lee, M. A. (1983). Coupled hydromagnetic wave excitation and ion acceleration at interplanetary traveling shocks. *Journal of Geophysical Research*, 88(A8), 6109–6119. <https://doi.org/10.1029/JA088iA08p06109>
- Lefèvre, L., Vennerstrøm, S., Dumbović, M., Vršnak, B., Sudar, D., Arlt, R., Clette, F., & Crosby, N. (2016). Detailed analysis of solar data related to historical extreme geomagnetic storms: 1868 - 2010. *Solar Physics*, 291(5), 1483-1531. <https://doi.org/10.1007/s11207-016-0892-3>
- Lehtinen, M., & Pirjola, R. (1985). Currents produced in earthed conductor networks by geomagnetically-induced electric fields. *Annales Geophysicae*, 3(4), 479–484.
- Lei, J., Burns, A. G., Thayer, J. P., Wang, W., Mlynczak, M. G., Hunt, L. A., Dou, X., & Sutton, E. (2012). Overcooling in the upper thermosphere during the recovery phase of the 2003 October storms. *Journal of Geophysical Research*, 117(A3). <https://doi.org/10.1029/2011JA016994>
- Lei, J., Chen, G., Xu, J., & Dou, X. (2013). Impact of Solar Forcing on Thermospheric Densities and Spacecraft Orbits from CHAMP and GRACE. In S. Jin (Ed.), *Geodetic sciences: Observations, modeling and applications* (p. 253-263). London, United Kingdom: IntechOpen. <https://doi.org/10.5772/56599>
- Lei, J., Dou, X., Burns, A., Wang, W., Luan, X., Zeng, Z., & Xu, J. (2013). Annual asymmetry in thermospheric density: Observations and simulations. *Journal of Geophysical Research*, 118(5), 2503–2510. <https://doi.org/10.1002/jgra.50253>
- Lei, J., Thayer, J. P., Burns, A. G., Lu, G., & Deng, Y. (2010). Wind and temperature effects on thermosphere mass density response to the November 2004 geomagnetic storm. *Journal of Geophysical Research*, 115(A5). <https://doi.org/10.1029/2009JA014754>
- Lei, J., Thayer, J. P., Lu, G., Burns, A. G., Wang, W., Sutton, E. K., & Emery, B. A. (2011). Rapid recovery of thermosphere density during the October 2003 geomagnetic storms. *Journal of Geophysical Research*, 116(A3). <https://doi.org/10.1029/2010JA016164>
- Lei, J., Thayer, J. P., Wang, W., & McPherron, R. L. (2011). Impact of CIR storms on thermosphere density variability during the solar minimum of 2008. *Solar Physics*, 274(1), 427–437. <https://doi.org/10.1007/s11207-010-9563-y>
- Lei, J., Wang, W., Burns, A. G., Solomon, S. C., Richmond, A. D., Wiltberger, M., Goncharenko, L. P., Coster, A., & Reinisch, B. W. (2008). Observations and simulations of the ionospheric and thermospheric response to the December 2006

- geomagnetic storm: Initial phase. *Journal of Geophysical Research*, 113(A1).
<https://doi.org/10.1029/2007JA012807>
- Lepping, R. P., Acuña, M. H., Burlaga, L. F., Farrell, W. M., Slavin, J. A., Schatten, K. H., Mariani, F., Ness, N. F., Neubauer, F. M., Whang, Y. C., Byrnes, J. B., Kennon, R. S., Panetta, P. V., Scheifele, J., & Worley, E. M. (1995). The WIND Magnetic Field Investigation. *Space Science Reviews*, 71(1–4), 207–229.
<https://doi.org/10.1007/BF00751330>
- Lepping, R. P., & Argentiero, P. D. (1971). Single spacecraft method of estimating shock normals. *Journal of Geophysical Research*, 76(19), 4349–4359.
<https://doi.org/10.1029/JA076i019p04349>
- Lepping, R. P., & Behannon, K. W. (1986). Magnetic field directional discontinuities: Characteristics between 0.46 and 1.0 AU. *Journal of Geophysical Research*, 91(A8), 8725–8741. <https://doi.org/10.1029/JA091iA08p08725>
- Leroy, M. M., Goodrich, C. C., Winske, D., Wu, C. S., & Papadopoulos, K. (1981). Simulation of a perpendicular bow shock. *Geophysical Research Letters*, 8(12), 1269–1272.
<https://doi.org/10.1029/GL008i012p01269>
- Lewis, C. D. (2019). The DARPA Space Environment Exploitation (SEE) Program. In *Friday AGU Chapman Conference Abstracts* (p. 1). Presented at the 2019 AGU Chapman Conference on Scientific Challenges Pertaining to Space Weather Forecasting Including Extremes, Pasadena, CA, 11–15 February.
- Li, H., Wang, C., Xu, W. Y., & Kan, J. R. (2012). Characteristics of magnetospheric energetics during geomagnetic storms. *Journal of Geophysical Research*, 117(A4).
<https://doi.org/10.1029/2012JA017584>
- Li, W., & Hudson, M. (2019). Earth’s Van Allen Radiation Belts: From Discovery to the Van Allen Probes Era. *Journal of Geophysical Research: Space Physics*.
<https://doi.org/10.1029/2018JA025940>
- Li, W., Knipp, D., Lei, J., & Raeder, J. (2011). The relation between dayside local Poynting flux enhancement and cusp reconnection. *Journal of Geophysical Research*, 116(A8), 1–16. <https://doi.org/10.1029/2011JA016566>
- Li, X., Temerin, M., Tsurutani, B. T., & Alex, S. (2006). Modeling of 1–2 September 1859 super magnetic storm. *Advances in Space Research*, 38(2), 273–279.
<https://doi.org/10.1016/j.asr.2005.06.070>
- Liais, E. (1851). Sur la hauteur des aurores boréales. *Comptes rendus de l’Académie des Sciences*, 33, 302–305.
- Liais, E. (1853). Observations sur une aurore boréale vue à Cherbourg, le 31 Octobre 1853. *Comptes rendus de l’Académie des Sciences*, 37, 746–749.
- Liais, E. (1859). Sur la hauteur de l’atmosphère déduite d’observations de polarisation fautes dans la zone intertropicale au commencement de l’aurore et à la fin de crépuscule. *Comptes rendus de l’Académie des Sciences*, 48, 109–112.
- Liais, E. (1860). Sur la troisième comète de 1860, découverte à Olinda de 26 Février. *Comptes rendus de l’Académie des Sciences*, 51, 65–67.
- Liais, E. (1861). Détermination de la longitude de Paranagua au moyen d’preuves pho-

- tographiques de l'éclipse du 7 Septembre 1858. *Comptes rendus de l'Académie des Sciences*, 53, 29-32.
- Liais, E. (1865). *L'espace celeste et la nature tropicale: Description physique de l'univers*. Paris, France: Garnier Frères.
- Licata, R. J., Mehta, P. M., Kent Tobiska, W., Bowman, B. R., & Pilinski, M. D. (2021). *CHAMP and GRACE-A Density Estimates with Associated HASDM and JB2008 Predictions*. [Data Set]. (Version v1). Zenodo. <https://doi.org/10.5281/zenodo.4602380>
- Licata, R. J., Mehta, P. M., Tobiska, W. K., Bowman, B. R., & Pilinski, M. D. (2021). Qualitative and Quantitative Assessment of the SET HASDM Database. *Space Weather*, 19(n/a), e2021SW002798. <https://doi.org/10.1029/2021SW002798>
- Licata, R. J., Mehta, P. M., Weimer, D. R., & Kent Tobiska, W. (2021). Improved Neutral Density Predictions through Machine Learning Enabled Exospheric Temperature Model. *Earth and Space Science Open Archive*. <https://doi.org/10.1002/essoar.10507687.1>
- Licata, R. J., Tobiska, W. K., & Mehta, P. M. (2020). Benchmarking Forecasting Models for Space Weather Drivers. *Space Weather*, 18(10), e2020SW002496. <https://doi.org/10.1029/2020SW002496>
- Lin, C. C., Chao, J. K., Lee, L. C., Lyu, L. H., & Wu, D. J. (2006). A new shock fitting procedure for the MHD Rankine-Hugoniot relations for the case of small He²⁺ slippage. *Journal of Geophysical Research*, 111(A9). <https://doi.org/10.1029/2005JA011449>
- Lin, C. C., Feng, H. Q., Wu, D. J., Chao, J. K., Lee, L. C., & Lyu, L. H. (2009). Two-spacecraft observations of an interplanetary slow shock. *Journal of Geophysical Research*, 114(A3). <https://doi.org/10.1029/2008JA013154>
- Lin, C. S., Sutton, E. K., Huang, C. Y., & Cooke, D. L. (2018). Occurrence locations, dipole tilt angle effects, and plasma cloud drift paths of polar cap neutral density anomalies. *Journal of Geophysical Research: Space Physics*, 123(2), 1627-1647. <https://doi.org/10.1002/2017JA024657>
- Lin, D., Wang, C., Li, W., Tang, B., Guo, X., & Peng, Z. (2014). Properties of Kelvin-Helmholtz waves at the magnetopause under northward interplanetary magnetic field: Statistical study. *Journal of Geophysical Research: Space Physics*, 119(9), 7485–7494. <https://doi.org/10.1002/2014JA020379>
- Lin, D., Wang, W., Garcia-Sage, K., Yue, J., Merkin, V., McInerney, J. M., Pham, K., & Sorathia, K. (2022). Thermospheric Neutral Density Variation During the “SpaceX” Storm: Implications From Physics-Based Whole Geospace Modeling. *Space Weather*, 20(12), e2022SW003254. <https://doi.org/https://doi.org/10.1029/2022SW003254>
- Lindell, I. V. (1996). *Methods for electromagnetic field analysis*. Hoboken, New Jersey: Wiley–Blackwell.
- Lindley, D. (2001). *Boltzmann's atom - the great debate that launched a revolution in physics*. New York, NY: The Free Press.
- Lindsay, G. M., Russell, C. T., Luhmann, J. G., & Gazis, P. (1994). On the sources of interplanetary shocks at 0.72 AU. *Journal of Geophysical Research*, 99(A1), 11–17. <https://doi.org/10.1029/93JA02666>

- Liou, K. (2006). Global auroral response to interplanetary media with emphasis on solar wind dynamic pressure enhancements. In B. T. Tsurutani, R. McPherron, G. Lu, J. H. A. Sobral, & N. Gopalswamy (Eds.), *Recurrent magnetic storms: Corotating solar wind streams*, Geophysical Monograph Series (Vol. 167, pp. 197–212). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/167GM17>
- Liou, K., & Mitchell, E. (2019). Effects of the interplanetary magnetic field y component on the dayside aurora. *Geoscience Letters*, *6*(11). <https://doi.org/10.1186/s40562-019-0141-3>
- Liou, K., Newell, P. T., Meng, C.-I., Wu, C.-C., & Lepping, R. P. (2003). Investigation of external triggering of substorms with Polar ultraviolet imager observations. *Journal of Geophysical Research*, *108*(A10). <https://doi.org/10.1029/2003JA009984>
- Liou, K., Newell, P. T., Sibeck, D. G., Meng, C., Brittnacher, M., & Parks, G. (2001). Observation of IMF and seasonal effects in the location of auroral substorm onset. *Journal of Geophysical Research*, *106*(A4), 5799-5810. <https://doi.org/10.1029/2000JA003001>
- Liu, C., Ganebo, Y. S., Wang, H., & Li, X. (2018). Geomagnetically induced currents in Ethiopia power grid: Calculation and analysis. *IEEE Access*, *6*, 64,649-64,658. <https://doi.org/10.1109/ACCESS.2018.2877618>
- Liu, C., Wang, X., Lin, C., & Song, J. (2019). Proximity Effects of Lateral Conductivity Variations on Geomagnetically Induced Electric Fields. *IEEE Access*, *7*, 6240-6248. <https://doi.org/10.1109/ACCESS.2018.2889461>
- Liu, C., Wang, X., Zhang, S., & Xie, C. (2019). Effects of Lateral Conductivity Variations on Geomagnetically Induced Currents: H-Polarization. *IEEE Access*, *7*, 6,310-6,318. <https://doi.org/10.1109/ACCESS.2018.2889462>
- Liu, C.-M., Liu, L.-G., Pirjola, R., & Wang, Z.-Z. (2009). Calculation of geomagnetically induced currents in mid- to low-latitude power grids based on the plane wave method: A preliminary case study. *Space Weather*, *7*(4), 1–9. <https://doi.org/10.1029/2008SW000439>
- Liu, H., Doornbos, E., & Nakashima, J. (2016). Thermospheric wind observed by GOCE: Wind jets and seasonal variations. *Journal of Geophysical Research: Space Physics*, n/a–n/a. <https://doi.org/10.1002/2016JA022938>
- Liu, H., & Lühr, H. (2005). Strong disturbance of the upper thermospheric density due to magnetic storms: CHAMP observations. *Journal of Geophysical Research*, *110*(A9), 1–9. <https://doi.org/10.1029/2004JA010908>
- Liu, H., Lühr, H., Henize, V., & Köhler, W. (2005). Global distribution of the thermospheric total mass density derived from CHAMP. *Journal of Geophysical Research*, *110*(A4). <https://doi.org/10.1029/2004JA010741>
- Liu, H., Ma, S.-Y., & Lühr, H. (2011). Predicting storm-time thermospheric mass density variations at CHAMP and GRACE altitudes. *Annales Geophysicae*, *29*, 443–453. <https://doi.org/10.5194/angeo-29-443-2011>
- Liu, H., Pedatella, N., & Hocke, K. (2017). Medium-scale gravity wave activity in the bottomside F region in tropical regions. *Geophysical Research Letters*, *44*(14), 7099-7105. <https://doi.org/10.1002/2017GL073855>
- Liu, J., Chakraborty, S., Chen, X., Wang, Z., He, F., Hu, Z., Liu, E., Bat-Erdene,

- A., Han, D., Ruohoniemi, J. M., Baker, J. B. H., Yang, H., Zong, Q., & Hu, H. (2023). Transient Response of Polar-Cusp Ionosphere to an Interplanetary Shock. *Journal of Geophysical Research: Space Physics*, *128*(3), e2022JA030565. <https://doi.org/https://doi.org/10.1029/2022JA030565>
- Liu, J., Liu, L., Zhao, B., Lei, J., Thayer, J. P., & McPherron, R. L. (2012). Superposed epoch analyses of thermospheric response to CIRs: Solar cycle and seasonal dependencies. *Journal of Geophysical Research*, *117*(A9). <https://doi.org/10.1029/2011JA017315>
- Liu, J.-J., Hu, H.-Q., Han, D.-S., Xing, Z.-Y., Hu, Z.-J., Huang, D.-H., & Yang, H.-G. (2013). Response of nightside aurora to interplanetary shock from ground optical observation. *Chinese Journal of Geophysics*, *56*(5), 598–611. <https://doi.org/10.1002/cjg2.20056>
- Liu, R., Lühr, H., & Ma, S.-Y. (2010). Storm-time related mass density anomalies in the polar cap as observed by CHAMP. *Annales Geophysicae*, *28*, 165-180. <https://doi.org/10.5194/angeo-28-165-2010>
- Liu, W., Tu, W., Li, X., Sarris, T., Khotyaintsev, Y., Fu, H., Zhang, H., & Shi, Q. (2016). On the calculation of electric diffusion coefficient of radiation belt electrons with in situ electric field measurements by THEMIS. *Geophysical Research Letters*, *43*(3), 1023-1030. <https://doi.org/10.1002/2015GL067398>
- Liu, Y. D., Luhmann, J. G., Kajdič, P., Kilpua, E. K. J., Lugaz, N., Nitta, N. V., Möstl, C., Lavraud, B., Bale, S. D., Farrugia, C. J., & Galvin, A. B. (2014). Observations of an extreme storm in interplanetary space caused by successive coronal mass ejections. *Nature Communications*, *5*(3481). <https://doi.org/10.1038/ncomms4481>
- Liu, Y. D., Zhao, X., Hu, H., Vourlidis, A., & Zhu, B. (2019). A Comparative Study of 2017 July and 2012 July Complex Eruptions: Are Solar Superstorms “Perfect Storms” in Nature? *The Astrophysical Journal Supplemental Series*, *241*(2). <https://doi.org/10.3847/1538-4365/ab0649>
- Liu, Z. Y., Zong, Q.-G., Hao, Y. X., Zhou, X.-Z., Ma, X. H., & Liu, Y. (2017). Electron dropout echoes induced by interplanetary shock: A statistical study. *Journal of Geophysical Research: Space Physics*, *122*. <https://doi.org/10.1002/2017JA024045>
- Liuzzo, L. R., Ridley, A. J., Perlongo, N. J., Mitchell, E. J., Conde, M., Hampton, D. L., Bristow, W. A., & Nicolls, M. J. (2015). High-latitude ionospheric drivers and their effects on wind patterns in the thermosphere. *Journal of Geophysical Research*, *120*(1), 715–735. <https://doi.org/10.1002/2014JA020553>
- Livermore, P. W., Finlay, C. C., & Bayliff, M. (2020). Recent north magnetic pole acceleration towards siberia caused by flux lobe elongation. *Nature Geosciences*, *13*, 387-391. <https://doi.org/10.1038/s41561-020-0570-9>
- Livesey, W. A., Kennel, C. F., & Russell, C. T. (1982). ISEE-1 and -2 observations of magnetic field strength overshoots in quasi-perpendicular bow shocks. *Geophysical Research Letters*, *9*(9), 1037–1040. <https://doi.org/10.1029/GL009i009p01037>
- Lkhagvadorj, M. (2023). *Propagation of Interplanetary Shocks in the Heliosphere* (Master’s thesis). Eötvös Loránd University, Budapest, Hungary.
- Lockwood, M., & Barnard, L. (2015). An arch in the UK. *Astronomy & Geophysics*,

56(4), 4.25-4.30. <https://doi.org/10.1093/astrogeo/atv132>

- Lockwood, M., Chambodut, A., Barnard, L. A., Owens, M. J., Clarke, E., & Mendel, V. (2018). A homogeneous aa index: 1. Secular variation. *Journal of Space Weather and Space Climate*, 8(A53), 27. <https://doi.org/10.1051/swsc/2018044>
- Lockwood, M., Finch, I. D., Chambodut, A., Barnard, L. A., Owens, M. J., & Clarke, E. (2018). A homogeneous aa index: 2. Hemispheric asymmetries and the equinoctial variation. *Journal of Space Weather and Space Climate*, 8(A58), 17. <https://doi.org/10.1051/swsc/2018044>
- Lockwood, M., Owens, M. J., Barnard, L., Scott, C. J., Usoskin, I. G., & Nevanlinna, H. (2016). Tests of Sunspot Number Sequences: 2. Using Geomagnetic and Auroral Data. *Solar Physics*, 291, 2811-2828. <https://doi.org/10.1007/s11207-016-0913-2>
- Lockwood, M., Owens, M. J., Barnard, L. A., Bentley, S., Scott, C. J., & Watt, C. E. (2016). On the origins and timescales of geoeffective IMF. *Space Weather*, 14(6), 406-432. <https://doi.org/10.1002/2016SW001375>
- Lockyer, W. J. S. (1903). Magnetic Storms, Auroræ and Solar Phenomena. *Nature*, 69(1775), 9-10. <https://doi.org/10.1038/069009a0>
- Lockyer, W. J. S. (1909). The Magnetic Storm of September 25, 1909, and the associated Solar Disturbance: (Plates 1, 2.). *Monthly Notices of the Royal Astronomical Society*, 70(1), 12-19. <https://doi.org/10.1093/mnras/70.1.12>
- Loewe, C. A., & Pröls, G. W. (1997). Classification and mean behavior of magnetic storms. *Journal of Geophysical Research*, 102(A7), 14209-14213. <https://doi.org/10.1029/96JA04020>
- Loomis, E. (1861). On the great auroral exhibition of Aug. 28th to Sept. 4th, 1859 and on auroras generally. *American Journal of Science*, 32(2), 318-335. <https://doi.org/10.2475/ajs.s2-32.96.318>
- Lopez, R. E., Baker, D. N., & Allen, J. (2004). Sun unleashes Halloween storm. *Eos Transactions AGU*, 85(11), 105-108. <https://doi.org/10.1029/2004EO110002>
- Lopez, R. E., Lyon, J. G., Mitchell, E., Bruntz, R., Merkin, V. G., Brogl, S., Toffoletto, F., & Wiltberger, M. (2009). Why doesn't the ring current injection rate saturate? *Journal of Geophysical Research*, 114(A2). <https://doi.org/10.1029/2008JA013141>
- López-Puertas, M., Funke, B., Gil-López, S., von Clarmann, T., Stiller, G. P., Höpfner, M., Kellmann, S., Fischer, H., & Jackman, C. H. (2005). Observation of NO_x enhancement and ozone depletion in the Northern and Southern Hemispheres after the October-November 2003 solar proton events. *Journal of Geophysical Research*, 110(A9). <https://doi.org/10.1029/2005JA011050>
- Loring, B. (2008). *Numerical and adaptive grid methods for ideal magnetohydrodynamics* (Master's thesis). University of New Hampshire, Durham, NH.
- Lotko, W., Smith, R. H., Zhang, B., Ouellette, J. E., Brambles, O. J., & Lyon, J. G. (2014). Ionospheric control of magnetotail reconnection. *Science*, 345(6193), 184-187. <https://doi.org/10.1126/science.1252907>
- Loto'aniu, T. M., Singer, H. J., Rodriguez, J. V., Green, J., Denig, W., Biesecker, D., & Angelopoulos, V. (2015). Space weather conditions during the Galaxy 15 spacecraft

- anomaly. *Space Weather*, 13(8), 484-502. <https://doi.org/10.1002/2015SW001239>
- Love, J. J. (2008). Magnetic monitoring of earth and space. *Physics Today*, 61(2), 31-37. <https://doi.org/10.1063/1.2883907>
- Love, J. J. (2018). The Electric Storm of November 1882. *Space Weather*, 16(1), 37-46. <https://doi.org/10.1002/2017SW001795>
- Love, J. J. (2021). Extreme-event magnetic storm probabilities derived from rank statistics of historical Dst intensities for solar cycles 14-24. *Space Weather*, 19, e2020SW002579. <https://doi.org/10.1029/2020SW002579>
- Love, J. J., Coisson, P., & Pulkkinen, A. (2016). Global statistical maps of extreme-event magnetic observatory 1 min first differences in horizontal intensity. *Geophysical Research Letters*, 43(9), 4126-4135. <https://doi.org/10.1002/2016GL068664>
- Love, J. J., & Finn, C. A. (2011). The USGS Geomagnetism Program and Its Role in Space Weather Monitoring. *Space Weather*, 9(7). <https://doi.org/10.1029/2011SW000684>
- Love, J. J., Hayakawa, H., & Cliver, E. W. (2019a). Intensity and impact of the New York Railroad superstorm of May 1921. *Space Weather*, 17(8), 1281-1292. <https://doi.org/10.1029/2019SW002250>
- Love, J. J., Hayakawa, H., & Cliver, E. W. (2019b). On the Intensity of the Magnetic Superstorm of September 1909. *Space Weather*, 17(1), 37-45. <https://doi.org/10.1029/2018SW002079>
- Love, J. J., Pulkkinen, A., Bedrosian, P. A., Jonas, S., Kelbert, A., Rigler, E. J., Finn, C. A., Balch, C. C., Rutledge, R., Waggel, R. M., Sabata, A. T., Kozyra, J. U., & Black, C. E. (2016). Geoelectric hazard maps for the continental United States. *Geophysical Research Letters*, 43(18), 9415-9424. <https://doi.org/10.1002/2016GL070469>
- Love, J. J., Rigler, E. J., Pulkkinen, A., & Riley, P. (2015). On the lognormality of historical magnetic storm intensity statistics: Implications for extreme-event probabilities. *Geophysical Research Letters*, 42(16), 6544-6553. <https://doi.org/10.1002/2015GL064842>
- Lovelock, J. F. (1975). Thermodynamics and the recognition of alien biospheres. *Proceedings of the Royal Society B*, 189(1095), 167-180. <https://doi.org/10.1098/rspb.1975.0051>
- Lu, G. (2016). Energetic and dynamic coupling of the Magnetosphere-Ionosphere-Thermosphere system. In C. R. Chappell, R. W. Schunk, P. M. Banks, J. L. Burch, & R. M. 2 (Eds.), *Magnetosphere-ionosphere coupling in the solar system*, Geophysical Monograph Series (Vol. 222, pp. 61-77). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119066880>
- Lu, G., Baker, D. N., McPherron, R. L., Farrugia, C. J., Lummerzheim, D., Ruohoniemi, J. M., Rich, F. J., Evans, D. S., Lepping, R. P., Brittnacher, M., Li, X., Greenwald, R., Sofko, G., Villain, J., Lester, M., Thayer, J., Moretto, T., Milling, D., Troshichev, O., Zaitzev, A., Odintzov, V., Makarov, G., & Hayashi, K. (1998). Global energy deposition during the January 1997 magnetic cloud event. *Journal of Geophysical Research*, 103(A6), 11685-11694. <https://doi.org/10.1029/98JA00897>
- Lu, G., Lyons, L. R., Reiff, P. H., Denig, W. F., de la Beaujardière, O., Kroehl,

- H. W., Newell, P. T., Rich, F. J., Opgenoorth, H., Persson, M. A. L., Ruohoniemi, J. M., Friis-Christensen, E., Tomlinson, L., Morris, R., Burns, G., & McEwin, A. (1995). Characteristics of ionospheric convection and field-aligned current in the dayside cusp region. *Journal of Geophysical Research*, *100*(A7), 11845–11861. <https://doi.org/10.1029/94JA02665>
- Lu, G., Mlynczak, M. G., Hunt, L. A., Woods, T. N., & Roble, R. G. (2010). On the relationship of joule heating and nitric oxide radiative cooling in the thermosphere. *Journal of Geophysical Research*, *115*(A5). <https://doi.org/10.1029/2009JA014662>
- Lu, G., Richmond, A. D., Lühr, H., & Paxton, L. (2016). High-latitude energy input and its impact on the thermosphere. *Journal of Geophysical Research: Space Physics*, *121*(7), 7108–7124. <https://doi.org/10.1002/2015JA022294>
- Lu, G., Richmond, A. D., Ruohoniemi, J. M., Greenwald, R. A., Hairston, M., Rich, F. J., & Evans, D. S. (2001). An investigation of the influence of data and model inputs on assimilative mapping of ionospheric electrodynamics. *Journal of Geophysical Research*, *106*(A1), 417–433. <https://doi.org/10.1029/2000JA000606>
- Lu, Z., & Hu, W. (2017). Estimation of ballistic coefficients of space debris using the ratios between different objects. *Chinese Journal of Aeronautics*, *30*(3), 1204–1216. <https://doi.org/10.1016/j.cja.2017.03.009>
- Luan, X., Wang, W., Burns, A., Solomon, S., Zhang, Y., & Paxton, L. J. (2010). Seasonal and hemispheric variations of the total auroral precipitation energy flux from TIMED/GUVI. *Journal of Geophysical Research*, *115*(A11). <https://doi.org/https://doi.org/10.1029/2009JA015063>
- Luan, X., Wang, W., Lei, J., Burns, A., Dou, X., & Xu, J. (2013). Geomagnetic and auroral activity driven by corotating interaction regions during the declining phase of Solar Cycle 23. *Journal of Geophysical Research: Space Physics*, *118*(3), 1255–1269. <https://doi.org/10.1002/jgra.50195>
- Lugaz, N., Farrugia, C. J., Huang, C.-L., & Spence, H. E. (2015). Extreme geomagnetic disturbances due to shocks within CMEs. *Geophysical Research Letters*, *42*(12), 4694–4701. <https://doi.org/10.1002/2015GL064530>
- Lugaz, N., Farrugia, C. J., Smith, C. W., & Paulson, K. (2015). Shocks inside CMEs: A survey of properties from 1997 to 2006. *Journal of Geophysical Research: Space Physics*, *120*(4), 2409–2427. <https://doi.org/10.1002/2014JA020848>
- Lugaz, N., Farrugia, C. J., Winslow, R. M., Al-Haddad, N., Kilpua, E. K. J., & Riley, P. (2016). Factors affecting the geo-effectiveness of shocks and sheaths at 1 AU. *Journal of Geophysical Research: Space Physics*, *120*(11), 10,861–10,879. <https://doi.org/10.1002/2016JA023100>
- Lugaz, N., Temmer, M., Wang, Y., & Farrugia, C. J. (2017). The interaction of successive coronal mass ejections: A review. *Solar Physics*, *292*(64). <https://doi.org/10.1007/s11207-017-1091-6>
- Luhmann, J. G. (1995). Sources of interplanetary shocks. *Advances in Space Research*, *15*(8-9), 355–364. [https://doi.org/10.1016/0273-1177\(94\)00117-J](https://doi.org/10.1016/0273-1177(94)00117-J)
- Luhmann, J. G. (1997). CMEs and space weather. In N. Crooker, J. A. Joselyn, & J. Feynman (Eds.), *Coronal mass ejections*, Geophysical Monograph Se-

- ries (Vol. 99, p. 291-299). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1029/GM099p0291>
- Luhmann, J. G., Gopalswamy, N., Jian, L. K., & Lugaz, N. (2020). ICME Evolution in the Inner Heliosphere. *Solar Physics*, 295(61). <https://doi.org/10.1007/s11207-020-01624-0>
- Luhmann, J. G., Ledvina, S. A., & Russell, C. T. (2004). Induced magnetospheres. *Advances in Space Research*, 33(11), 1905-1912. <https://doi.org/10.1016/j.asr.2003.03.031>
- Luhmann, J. G., Solomon, S. C., Linker, J. A., Lyon, J. G., Mikic, Z., Odstreil, D., Wang, W., & Wiltberger, M. (2004). Coupled model simulation of a Sun-to-Earth space weather event. *Advances in Space Research*, 66(15-16), 1243-1256. <https://doi.org/10.1016/j.jastp.2004.04.005>
- Luhmann, J. G., Walker, R. J., Russell, C. T., Crooker, N. U., Spreiter, J. R., & Stahara, S. S. (1984). Patterns of potential magnetic field merging sites on the dayside magnetopause. *Journal of Geophysical Research*, 89(A3), 1739-1742. <https://doi.org/10.1029/JA089iA03p01739>
- Luhmann, J. G., Zhang, T.-L., Petrinec, S. M., Russell, C. T., Gazis, P., & Barnes, A. (1993). Solar cycle 21 effects on the interplanetary magnetic field and related parameters at 0.7 and 1.0 AU. *Journal of Geophysical Research*, 98(A4), 5559-5572. <https://doi.org/10.1029/92JA02235>
- Lühr, H., & Liu, H. (2006). The thermospheric response to geomagnetic storms. In N. Gopalswamy & A. Bhattacharyya (Eds.), *Solar influence on the heliosphere and earth's environment: Recent progress and prospects* (pp. 369-375). Goa, India: Quest Publications for ILWS and Indian Institute of Geomagnetism.
- Lühr, H., Maus, S., & Rother, M. (2004). Noon-time equatorial electrojet: Its spatial features as determined by the CHAMP satellite. *Journal of Geophysical Research*, 109(A1). <https://doi.org/10.1029/2002JA009656>
- Lühr, H., Park, J., Gjerloev, J. W., Rauberg, J., Michaelis, I., Merayo, J. M. G., & Brauer, P. (2015). Field-aligned currents' scale analysis performed with the Swarm constellation. *Geophysical Research Letters*, 42(1), 1-8. <https://doi.org/10.1002/2014GL062453>
- Lühr, H., Rentz, S., Ritter, P., Liu, H., & Häusler, K. (2007). Average thermospheric wind patterns over the polar regions, as observed by CHAMP. *Annales Geophysicae*, 25, 1093-1101. <https://doi.org/10.5194/angeo-25-1093-2007>
- Lühr, H., Thöner, M., Köhler, W., Ritter, P., & Grunwaldt, L. (2004). Thermospheric upwelling in the cusp region: Evidence from CHAMP observations. *Geophysical Research Letters*, 31(L06805), 1-4. <https://doi.org/10.1029/2003GL019314>
- Lühr, H., Warnecke, J. F., & Rother, M. K. A. (1996). An algorithm for estimating field-aligned currents from single spacecraft magnetic field measurements: a diagnostic tool applied to Freja satellite data. *Geoscience and Remote Sensing*, 34(6), 1369-1376. <https://doi.org/10.1109/36.544560>
- Lui, A. T. Y. (1993). What determines the intensity of magnetospheric substorms? *Journal of Atmospheric and Solar-Terrestrial Physics*, 55(8), 1123-1136. [https://doi.org/10.1016/0021-9169\(93\)90041-V](https://doi.org/10.1016/0021-9169(93)90041-V)
- Lui, A. T. Y., Lopez, R. E., Krimigis, S. M., McEntire, R. W., Zanetti, L. J., & Potemra,

- T. A. (1988). A case study of magnetotail current sheet disruption and diversion. *Geophysical Research Letters*, *15*(7), 721–724. <https://doi.org/10.1029/GL015i007p00721>
- Lui, A. T. Y., Mankofsky, A., Chang, C.-L., Papadopoulos, K., & Wu, C. S. (1990). A current disruption mechanism in the neutral sheet: A possible trigger for substorm expansions. *Journal of Geophysical Research*, *17*(6), 745–748. <https://doi.org/10.1029/GL017i006p00745>
- Lukianova, R., Troshichev, O., & Lu, G. (2002). The polar cap magnetic activity indices in the southern (PCS) and northern (PCN) polar caps: Consistency and discrepancy. *Geophysical Research Letters*, *29*(18). <https://doi.org/10.1029/2002GL015179>
- Lyon, J. G. (1994). MHD simulations of the magnetosheath. *Advances in Space Research*, *14*(7), 21–28. [https://doi.org/10.1016/0273-1177\(94\)90043-4](https://doi.org/10.1016/0273-1177(94)90043-4)
- Lyon, J. G. (2000). The solar wind-magnetosphere-ionosphere system. *Science*, *288*(5473), 1987–1991. <https://doi.org/10.1126/science.288.5473.1987>
- Lyon, J. G., Fedder, J. A., & Mobarry, C. M. (2004). The Lyon-Fedder-Mobarry (LFM) global MHD magnetospheric simulation code. *Journal of Atmospheric and Solar-Terrestrial Physics*, *66*(15–16), 1333–1350. <https://doi.org/10.1016/j.jastp.2004.03.020>
- Lyons, L. R. (1995). A new theory for magnetospheric substorms. *Journal of Geophysical Research*, *100*(A10), 19069–19081. <https://doi.org/10.1029/95JA01344>
- Lyons, L. R. (1996). Substorms: Fundamental observational features, distinction from other disturbances, and external triggering. *Journal of Geophysical Research*, *101*(A6), 13011–13025. <https://doi.org/10.1029/95JA01987>
- Lyons, L. R. (2000). Geomagnetic disturbances: characteristics of, distinction between types, and relations to interplanetary conditions. *Journal of Atmospheric and Solar-Terrestrial Physics*, *62*(12), 1087–1114. [https://doi.org/10.1016/S1364-6826\(00\)00097-3](https://doi.org/10.1016/S1364-6826(00)00097-3)
- Mac Manus, D. H., Rodger, C. J., Dalzell, M., Thomson, A. W. P., Clilverd, M. A., Petersen, T., Wolf, M. M., Thomson, N. R., & Divett, T. (2017). Long-term geomagnetically induced current observations in New Zealand: Earth return corrections and geomagnetic field driver. *Space Weather*, *15*(8), 1020–1038. <https://doi.org/10.1002/2017SW001635>
- MacAlester, M. H., & Murtagh, W. (2014). Extreme space weather impact: An emergency management perspective. *Space Weather*, *12*(8), 530–537. <https://doi.org/10.1002/2014SW001095>
- MacDonald, E. A., Donovan, E., Nishimura, Y., Case, N. A., Gillies, D. M., Gallardo-Lacourt, B., Archer, W. E., Spanswick, E. L., Bourassa, N., Connors, M., Heavner, M., Jackel, B., Kosar, B., Knudsen, D. J., Ratzlaff, C., & Schofield, I. (2018). New science in plain sight: Citizen scientists lead to the discovery of optical structure in the upper atmosphere. *Science Advances*, *4*(3), eaaq0030. <https://doi.org/10.1126/sciadv.aaq0030>
- Mackeler, D. A. (2016). *An observational study of the relationship between precipitating ions and ENAs emerging from the ion/atmosphere interaction region* (Ph.D thesis). The

University of Texas at San Antonio, San Antonio, Texas.

- Mackler, D. A., Jahn, J.-M., Perez, J. D., Pollock, C. J., & Valek, P. W. (2016). Statistical correlation of low-altitude ENA emissions with geomagnetic activity from IMAGE/MENA observations. *Journal of Geophysical Research: Space Physics*, *121*(3), 2046–2066. <https://doi.org/10.1002/2015JA021545>
- Mac Manus, D. H., Rodger, C. J., Ingham, M., Clilverd, M. A., Dalzell, M., Divett, T., Richardson, G. S., & Petersen, T. (2022). Geomagnetically Induced Current Model in New Zealand Across Multiple Disturbances: Validation and Extension to Non-Monitored Transformers. *Space Weather*, *20*(2), e2021SW002955. <https://doi.org/10.1029/2021SW002955>
- Madelaire, M., Laundal, K. M., Reistad, J. P., Hatch, S. M., & and, A. O. (2022). Transient high latitude geomagnetic response to rapid increases in solar wind dynamic pressure. *Frontiers in Astronomy and Space Science*, *9*(953954). <https://doi.org/10.3389/fspas.2022.953954>
- Madelaire, M., Laundal, K. M., Reistad, J. P., Hatch, S. M., Ohma, A., & Haaland, S. (2022). Geomagnetic Response to Rapid Increases in Solar Wind Dynamic Pressure: Event Detection and Large Scale Response. *Frontiers in Astronomy and Space Science*, *9*(904620). <https://doi.org/10.3389/fspas.2022.904620>
- Maeda, H., Sakurai, K., Ondoh, T., & Yamamoto, M. (1962). A study of solar-terrestrial relationships during the IGY and IGC. *Ann. Geophys.*, *18*, 305–333.
- Maeda, S., Fuller-Rowell, T. J., & Evans, D. S. (1989). Zonally averaged dynamical and compositional response of the thermosphere to auroral activity during September 18-24, 1984. *Journal of Geophysical Research*, *94*(A12), 16869–16883. <https://doi.org/10.1029/JA094iA12p16869>
- Maeda, S., Fuller-Rowell, T. J., & Evans, D. S. (1992). Heat budget of the thermosphere and temperature variations during the recovery phase of a geomagnetic storm. *Journal of Geophysical Research*, *97*(A10), 14947–14957. <https://doi.org/10.1029/92JA01368>
- Mahajan, K. K., Lodhi, N. K., & Upadhyaya, A. K. (2010). Observations of X-ray and EUV fluxes during X-class solar flares and response of upper ionosphere. *Journal of Geophysical Research*, *115*(A12). <https://doi.org/10.1029/2010JA015576>
- Mahon, B. (2003). *The Man Who Changed Everything: The Life of James Clerk Maxwell*. Hoboken, NJ: Wiley.
- Maillet, C. P. (2018). *Relationship between interplanetary conditions and changes in the geomagnetic field to understand the causes of geomagnetically induced currents* (Bachelor's Honor Theses and Capstones). University of New Hampshire, Durham, New Hampshire.
- Mailyan, B., Munteanu, C., & Haaland, S. (2008). What is the best method to calculate the solar wind propagation delay? *Annales Geophysicae*, *26*(8), 2383–2394. <https://doi.org/10.5194/angeo-26-2383-2008>
- Mäkelä, P., Gopalswamy, N., & Yashiro, S. (2016). The radial speed-expansion speed relation for Earth-directed CMEs. *Space Weather*, *14*(5), 368–378. <https://doi.org/10.1002/2015SW001335>

- Malaspina, D. M., Claudepierre, S. G., Takahashi, K., Jaynes, A. N., Elkington, S. R., Ergun, R. E., Wygant, J. R., Reeves, G. D., & Kletzing, C. A. (2015). Kinetic Alfvén waves and particle response associated with a shock-induced, global ULF perturbation of the terrestrial magnetosphere. *Geophysical Research Letters*, *42*(21), 9203-9212. <https://doi.org/10.1002/2015GL065935>
- Malin, S. R. C., & Barraclough, D. R. (1981). An algorithm for synthesizing the geomagnetic field. *Computer & Geosciences*, *7*(4), 401-405. [https://doi.org/10.1016/0098-3004\(81\)90082-0](https://doi.org/10.1016/0098-3004(81)90082-0)
- Manchester, W. B., Ridley, A. J., Gombosi, T. I., & DeZeeuw, D. L. (2006). Modeling the Sun-to-Earth propagation of a very fast CME. *Advances in Space Research*, *38*(2), 253-262. <https://doi.org/10.1016/j.asr.2005.09.044>
- Manchester IV, W. B., Gombosi, T. I., De Zeeuw, D. L., Sokolov, I. V., Roussev, I. I., Powell, K. G., Kóta, J., Tóth, G., & Zurbuchen, T. H. (2005). Coronal mass ejection shock and sheath structures relevant to particle acceleration. *The Astrophysical Journal*, *622*(2), 1225-1239. <https://doi.org/10.1086/427768>
- Mann, I. R., Di Pippo, S., Opgenoorth, H. J., Kuznetsova, M., & Kendall, D. J. (2018). International Collaboration Within the United Nations Committee on the Peaceful Uses of Outer Space: Framework for International Space Weather Services (2018–2030). *Space Weather*, *16*(5), 428-433. <https://doi.org/10.1029/2018SW001815>
- Mannucci, A., Berger, T., Bortnik, J., Cherniak, I., Gulyaeva, T., Hoeg, P., Horne, R., Kilpua, E., Knipp, D., Liemohn, M. W., Liu, H., McGranaghan, R., Meng, X., Oliveira, D., Pulkkinen, T., Surjalal Sharma, A., Tsurutani, B., & Verkhoglyadova, O. (2020). *Chapman Conference on Scientific Challenges Pertaining to Space Weather Forecasting Including Extremes: Recommendations for the Community*. <https://doi.org/10.5281/zenodo.3986940>
- Mannucci, A. J., Hagan, M. E., Vourlidas, A., Huang, C. Y., Verkhoglyadova, O. P., & D, Y. (2016). Scientific challenges in thermosphere-ionosphere forecasting – conclusions from the October 2014 NASA JPL community workshop. *Journal of Space Weather and Space Climate*, *6*, E01. <https://doi.org/10.1051/swsc/2016030>
- Mannucci, A. J., Tsurutani, B. T., Abdu, M. A., Gonzalez, W. D., Komjathy, A., Echer, E., Iijima, B. A., Crowley, G., & Anderson, D. (2008). Superposed epoch analysis of the dayside ionospheric response to four intense geomagnetic storms. *Journal of Geophysical Research*, *113*(A3). <https://doi.org/10.1029/2007JA012732>
- Mannucci, A. J., Tsurutani, B. T., Iijima, B. A., Komjathy, A., Saito, A., Gonzalez, W. D., Guarnieri, F. L., Kozyra, J. U., & Skoug, R. (2005a). Dayside global ionospheric response to the major interplanetary events of October 29-30, 2003 “Halloween Storms”. *Geophysical Research Letters*, *32*(12). <https://doi.org/10.1029/2004GL021467>
- Mannucci, A. J., Tsurutani, B. T., Iijima, B. A., Komjathy, A., Saito, A., Gonzalez, W. D., Guarnieri, F. L., Kozyra, J. U., & Skoug, R. (2005b). Dayside global ionospheric response to the major interplanetary events of October 29–30, 2003 “Halloween Storms”. *Geophysical Research Letters*, *32*(12). <https://doi.org/10.1029/2004GL021467>
- Mansilla, G. (2008). Solar wind and IMF parameters associated with geomagnetic storms with Dst < -50 nT. *Phys. Scr.*, *78*(045902). <https://doi.org/10.1088/0031-8949/78/04/045902>

- Mansilla, G. A. (2014). Solar Cycle and Seasonal Distribution of Geomagnetic Storms with Sudden Commencement. *Earth Science Research*, 3(1), 50-55. <https://doi.org/0.5539/esr.v3n1p50>
- Marchand, R., Mackay, F., Lu, J. Y., & Kabin, K. (2008). Consistency check of a global MHD simulation using the test-kinetic approach. *Plasma Physics and Controlled Fusion*, 50(7). <https://doi.org/10.1088/0741-3335/50/7/074007>
- Marcos, F. A., Bowman, B. R., & Sheehan, R. E. (2006). Accuracy of earth's thermospheric neutral density models. In *AIAA Guidance, Navigation, and Control Conference* (p. 1-29). Keystone, Colorado. <https://doi.org/10.2514/6.2006-6167>
- Marcos, F. A., Delay, S. H., & Sutton, E. K. (2010). Toward next level satellite drag modeling. In *AIAA/AAS Astrodynamics Specialist Conference and Exhibit* (p. 1-20). Toronto, Ontario Canada. <https://doi.org/10.2514/6.2010-7840>
- Mariz, T., Nascimento, J. R., & Passos, E. (2006). Remarks on Lorentz and CPT violation in field theory. *Brazilian Journal of Physics*, 36(4a), 1171-1177. <https://doi.org/10.1590/S0103-97332006000700010>
- Mariz, T., Nascimento, J. R., Passos, E., & Ribeiro, R. F. (2004). Chern-Simons-like action induced radiatively in general relativity. *Phys. Rev. D*, 70, 024014. <https://doi.org/10.1103/PhysRevD.70.024014>
- Mariz, T., Nascimento, J. R., Petrov, A. Y., Santos, L. Y., & da Silva, A. J. (2008). Lorentz violation and the proper-time method. *Phys. Lett. B*, 661(4), 312-318. <https://doi.org/10.1016/j.physletb.2007.10.089>
- Marsal, S., Richmond, A. D., Maute, A., & Anderson, B. J. (2012). Forcing the TIEGCM model with Birkeland currents from the active magnetosphere and planetary electrodynamics response experiment. *Journal of Geophysical Research*, 117(A6). <https://doi.org/10.1029/2011JA017416>
- Marsch, E. (2006). Kinetic physics of the solar corona and solar wind. *Living Reviews in Solar Physics*, 3(1). <https://doi.org/10.12942/lrsp-2006-1>
- Marsh, D. R., Solomon, S. C., & Reynolds, A. E. (2004). Empirical model of nitric oxide in the lower thermosphere. *Journal of Geophysical Research*, 109(A7). <https://doi.org/10.1029/2003JA010199>
- Marshall, R. A., Dalzell, M., Waters, C. L., Goldthorpe, P., & Smith, E. A. (2012). Geomagnetically induced currents in the New Zealand power network. *Space Weather*, 10(8). <https://doi.org/10.1029/2012SW000806>
- Marshall, R. A., Smith, E. A., Francis, M. J., Waters, C. L., & Sciffer, M. D. (2011). A preliminary risk assessment of the Australian region power network to space weather. *Space Weather*, 9(10). <https://doi.org/10.1029/2011SW000685>
- Martin, B. A. (1993). Telluric effects on a buried pipeline. *CORROSION*, 49(4), 343-350. <https://doi.org/10.5006/1.3316059>
- Martines-Bedenko, V. A., Pilipenko, V. A., Hartinger, M. D., Engebretson, M. J., Lorentzen, D. A., & Willer, A. N. (2018). Correspondence between the latitudinal ULF wave power distribution and auroral oval in conjugate ionospheres. *Sun and Geosphere*, 13(1), 41-47. <https://doi.org/10.31401/SunGeo.2018.01.06>

- Mason, R. F., Cummack, C. H., & King, G. A. M. (1961). Possible identification of atmospheric waves associated with ionospheric storms. *Nature*, *190*(898). <https://doi.org/10.1038/190898a0>
- Matamba, T. M., Habarulema, J. B., & McKinnell, L.-A. (2015). Statistical analysis of the ionospheric response during geomagnetic storm conditions over South Africa using ionosonde and GPS data. *Space Weather*, *13*(9), 536-547. <https://doi.org/10.1002/2015SW001218>
- Matsuo, T., & Richmond, A. D. (2008). Effects of high-latitude ionospheric electric field variability on global thermospheric Joule heating and mechanical energy transfer rate. *Journal of Geophysical Research*, *113*(A7). <https://doi.org/10.1029/2007JA012993>
- Matuura, N. (1972). Theoretical models of ionospheric storms. *Space Science Reviews*, *13*(1), 124–189. <https://doi.org/10.1007/BF00198166>
- Matzka, J., Bronkalla, O., Tornow, K., Elger, K., & Stolle, C. (2021). *Geomagnetic Kp index*. [Data Set]. (Version 1). GFZ Data Services. <https://doi.org/10.5880/Kp.0001>
- Matzka, J., Stolle, C., Yamazaki, Y., Bronkalla, O., & Morschhauser, A. (2021). The Geomagnetic Kp Index and Derived Indices of Geomagnetic Activity. *Space Weather*, *19*(5), e2020SW002641. <https://doi.org/10.1029/2020SW002641>
- Maunder, E. W. (1890). Prof. Spoerer's researches on Sun-spots. *Monthly Notices of the Royal Astronomical Society*, *50*(4), 251-252. <https://doi.org/10.1093/mnras/50.4.251>
- Maunder, E. W. (1905). Magnetic Disturbances as recorded at the Royal Observatory, Greenwich, and their Association with Sun-spots. Second Paper. *Monthly Notices of the Royal Astronomical Society*, *55*(6), 538-559. <https://doi.org/10.1093/mnras/65.6.538>
- Maute, A., Lu, G., Knipp, D. J., Anderson, B. J., & Vines, S. K. (n.d.). Importance of lower atmospheric forcing and magnetosphere-ionosphere coupling in simulating neutral density during the February 2016 geomagnetic storm. *Frontiers in Astronomy and Space Science*, *9*(932748). <https://doi.org/10.3389/fspas.2022.932748>
- Maxwell, J. C. (1873a). *A treatise on electricity and magnetism*. Cambridge, United Kingdom: Oxford, United Kingdom. (Vol. II)
- Maxwell, J. C. (1873b). *A treatise on electricity and magnetism*. Cambridge, United Kingdom: Oxford. (Vol. I)
- Mayaud, P.-N. (1972). The aa indices: A 100-year series characterizing the magnetic activity. *Journal of Geophysical Research*, *77*(34), 6870-6874. <https://doi.org/10.1029/JA077i034p06870>
- Mayaud, P. N. (1973). A hundred year series of geomagnetic data 1868–1967. In *International union of geodesy and geophysics, vol. 33*. Paris, France: IUGG Publications.
- Mayaud, P. N. (1975). Analysis of storm sudden commencements for the years 1868–1967. *Journal of Geophysical Research*, *80*(1), 111–122. <https://doi.org/10.1029/JA080i001p00111>
- Mayaud, P. N. (1980a). The AU, AL and AE indices. In P. N. Mayaud (Ed.),

- Derivation, meaning and use of geomagnetic indices*, Geophysical Monograph Series (Vol. 22, p. 96-115). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1002/97811186663837.ch7>
- Mayaud, P. N. (Ed.). (1980b). *Derivation, meaning and use of geomagnetic indices*, Geophysical Monograph Series (Vol. 22). Washington, D.C.: American Geophysical Union.
<https://doi.org/10.1029/GM022>
- Mayr, H. G., Harris, I., Herrero, F. A., Spencer, N. W., Varosi, F., & Pesnell, W. D. (1990). Thermospheric gravity waves: Observations and interpretation using the transfer function model (TFM). *Space Science Reviews*, 54(3), 297–375.
<https://doi.org/10.1007/BF00177800>
- Mayr, H. G., & Trinks, H. (1977). Spherical asymmetry in thermospheric magnetic storms. *Planetary and Space Science*, 25(27), 607–613. [https://doi.org/10.1016/0032-0633\(77\)90099-X](https://doi.org/10.1016/0032-0633(77)90099-X)
- Mays, M. L. (2009). *The Study of Interplanetary Shocks, Geomagnetic Storms, and Substorms with the WINDMI Model* (Ph.D thesis). University of Texas at Austin, Austin, Texas.
- Mays, M. L., Horton, W., Kozyra, J., Zurbuchen, T. H., Huang, C., & Spencer, E. (2007). Effect of interplanetary shocks on the AL and Dst indices. *Geophysical Research Letters*, 34(11). <https://doi.org/10.1029/2007GL029844>
- Mazelle, C., Meziane, K., LeQuéau, D., Wilber, M., P. Eastwood, J., Sauvaud, H. R. J. A., Bosqued, J. M., McCarthy, I. D. M., Kistler, L. M., Klecker, B., Korth, A., Bavassano-Cattaneo, M. B., Pallochia, G., & Balogh, R. L. A. (2003). Production of gyrating ions from nonlinear wave–particle interaction upstream from the Earth’s bow shock: A case study from Cluster-CIS. *Planetary and Space Science*, 51(12), 785–795.
<https://doi.org/10.1016/j.pss.2003.05.002>
- McComas, D., Elliott, H. A., Schwadron, N. A., Gosling, J. T., Skoug, R. M., & Goldstein, B. E. (2003). The three–dimensional solar wind around solar maximum. *Geophysical Research Letters*, 30(10). <https://doi.org/10.1029/2003GL017136>
- McComas, D. J., Bame, S. J., Barker, P., Feldman, W. C., Phillips, J. L., Riley, P., & Griffée, J. W. (1998). Solar Wind Electron Proton Alpha Monitor (SWEPAM) for the Advanced Composition Explorer. *Space Science Reviews*, 86(1–4), 563–612.
<https://doi.org/10.1023/A:1005040232597>
- McComas, D. J., Buzulukova, N., Connors, M. G., Dayeh, M. A., Goldstein, J., Funsten, H. O., Fuselier, S., Schwadron, N. A., & Valek, P. (2012). Two Wide-Angle Imaging Neutral-Atom Spectrometers and Interstellar Boundary Explorer energetic neutral atom imaging of the 5 April 2010 substorm. *Journal of Geophysical Research*, 117(A3).
<https://doi.org/10.1029/2011JA017273>
- McCormac, F. G., & Smith, R. W. (1984). The influence of the interplanetary magnetic field Y component on ion and neutral motions in the polar thermosphere. *Geophysical Research Letters*, 11(9), 935–938. <https://doi.org/10.1029/GL011i009p00935>
- McCracken, K. G. (2007). High frequency of occurrence of large solar energetic particle events prior to 1958 and a possible repetition in the near future. *Space Weather*, 5(7).
<https://doi.org/10.1029/2006SW000295>

- McDonald, F. B., Teegarden, B. J., Trainor, J. H., von Roseninge, T. T., & Webber, W. R. (1976). The interplanetary acceleration of energetic nucleons. *The Astrophysical Journal*, *203*(2), L149–L154. <https://doi.org/10.1086/182040>
- McDowell, J. C. (2020). The Low Earth Orbit Satellite Population and Impacts of the SpaceX Starlink Constellation. *The Astrophysical Journal Letters*, *892*(2), 1-10. <https://doi.org/10.3847/2041-8213/ab8016>
- McFadden, J. P., Carlson, C. W., Larson, D., Bonnell, J., Mozer, F., Angelopoulos, V., Glassmeier, K.-H., & Auster, U. (2008). THEMIS ESA First Science Results and Performance Issues. *Space Science Reviews*, *141*, 477-508. <https://doi.org/10.1007/s11214-008-9433-1>
- McGranaghan, R., Knipp, D. J., Matsuo, T., & Cousins, E. (2016). Optimal interpolation analysis of high-latitude ionospheric Hall and Pedersen conductivities: Application to assimilative ionospheric electrodynamics reconstruction. *Journal of Geophysical Research: Space Physics*, *121*(5), 4898–4923. <https://doi.org/10.1002/2016JA022486>
- McGranaghan, R., Knipp, D. J., Solomon, S. C., & Fang, X. (2015). A fast, parameterized model of upper atmospheric ionization rates, chemistry, and conductivity. *Journal of Geophysical Research: Space Physics*, *120*(6), 4936–4949. <https://doi.org/10.1002/2015JA021146>
- McGranaghan, R. M., Mannucci, A. J., & Forsyth, C. (2017). A comprehensive analysis of multiscale field-aligned currents: Characteristics, controlling parameters, and relationships. *Journal of Geophysical Research: Space Physics*, *122*(12), 11,931-11,960. <https://doi.org/10.1002/2017JA024742>
- McIntos, S. W., Chapman, S., Leamon, R. J., Egeland, R., & Watkins, N. W. (2020). Overlapping Magnetic Activity Cycles and the Sunspot Number: Forecasting Sunspot Cycle 25 Amplitude. *Solar Physics*, *295*(163). <https://doi.org/10.1007/s11207-020-01723-y>
- McIntosh, D. H. (1951). Geomagnetic solar flare effects at Lerwick and Eskdalemuir, and relationship with allied ionospheric effects. *Journal of Atmospheric and Terrestrial Physics*, *1*(5-6), 315-342.
- McIntosh, R. C., & Anderson, P. C. (2014). Maps of precipitating electron spectra characterized by Maxwellian and kappa distributions. *Journal of Geophysical Research: Space Physics*, *119*(12), 10,116–10,132. <https://doi.org/10.1002/2014JA020080>
- McIntosh, S. W., Leamon, R. J., & Egeland, R. (2023). Deciphering solar magnetic activity: The (solar) hale cycle terminator of 2021. *Frontiers in Astronomy and Space Science*, *10*(1050523). <https://doi.org/10.3389/fspas.2023.1050523>
- McLaughlin, C. A., Mance, S., & Lichtenberg, T. (2011). Drag Coefficient Estimation in Orbit Determination. *The Journal of the Astronautical Sciences*, *58*(3), 513-530. <https://doi.org/10.1007/BF03321183>
- McNish, A. G. (1940). The magnetic storm of March 24, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, *45*(3), 359-364. <https://doi.org/10.1029/TE045i003p00359>
- McPherron, M. L. (1991). Physical processes producing magnetospheric substorms and

- magnetic storms. In J. Jacobs (Ed.), *Geomagnetism* (Vol. 4, chap. 7). Cambridge, MA: Academic Press Ltd.
- McPherron, R. L. (1970). Growth phase of magnetospheric substorms. *Journal of Geophysical Research*, *75*(28), 5592–5599. <https://doi.org/10.1029/JA075i028p05592>
- McPherron, R. L. (1972). Substorm related changes in the geomagnetic tail: The growth phase. *Planetary and Space Science*, *20*(9), 1521–1539. [https://doi.org/10.1016/0032-0633\(72\)90054-2](https://doi.org/10.1016/0032-0633(72)90054-2)
- McPherron, R. L. (2005). Magnetic pulsations: Their sources and relation to solar wind and geomagnetic activity. *Surveys in Geophysics*, *26*(5), 545–594. <https://doi.org/10.1007/s10712-005-1758-7>
- McPherron, R. L. (2015). Earth’s magnetotail. In A. Keiling, C. M. Jackman, & P. A. Delamere (Eds.), *Magnetotails in the solar system*, Geophysical Monograph Series (Vol. 207, pp. 61–84). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118842324.ch4>
- McPherron, R. L., & Baker, D. N. (1993). Factors influencing the intensity of magnetospheric substorms. *Journal of Atmospheric and Solar-Terrestrial Physics*, *55*(8), 1091–1122. [https://doi.org/10.1016/0021-9169\(93\)90040-6](https://doi.org/10.1016/0021-9169(93)90040-6)
- Mehta, P. M., Linares, R., & Sutton, E. K. (2018). A quasi-physical dynamic reduced order model for thermospheric mass density via hermitian space-dynamic mode decomposition. *Space Weather*, *16*(5), 569–588. <https://doi.org/10.1029/2018SW001840>
- Meier, R. R., & Prinz, D. K. (1971). Observations of the O I 1304-A air-glow from Ogo 4. *Journal of Geophysical Research*, *76*(19), 4608–4620. <https://doi.org/10.1029/JA076i019p04608>
- Mekhaldi, F., Muscheler, R., Adolphi, F., Aldahan, A., Beer, J., McConnell, J. R., Possnert, G., Sigl, M., Svensson, A., Synal, H.-A., Welten, K. C., & Woodruff, T. E. (2015). Multiradionuclide evidence for the solar origin of the cosmic-ray events of ad 774/5 and 993/4. *Nature Communications*, *6*(8611), 1–8. <https://doi.org/10.1038/ncomms9611>
- Meldrun, J. (1872). Aurora Australis. *Nature*, *5*, 392–393. <https://doi.org/10.1038/005392a0>
- Mende, S. B., Harris, S. E., Frey, H. U., Angelopoulos, V., Russell, C. T., Donovan, E., Jackel, B., Greffen, M., & Peticolas, L. M. (2008). The THEMIS Array of Ground-based Observatories for the Study of Auroral Substorms. *Space Science Reviews*, *141*, 3570387. <https://doi.org/10.1007/s11214-008-9380-x>
- Mendes, O., Schneider, K., Domingues, M. O., Farge, M., Trivedi, N. B., Frick, P., & Nguyen van yen, N. (2022). Geomagnetically Induced Current Analyzed with Wavelet Extraction. *Brazilian Journal of Physics*, *52*(192). <https://doi.org/10.1007/s13538-022-01177-6>
- Mendillo, M., & Tyler, A. (1983). Geometry of depleted plasma regions in the equatorial ionosphere. *Journal of Geophysical Research*, *88*(A7), 5778–5782. <https://doi.org/10.1029/JA088iA07p05778>
- Meng, X., Tóth, G., Liemohn, M. W., Gombosi, T. I., & Runov, A. (2012). Pressure anisotropy in global magnetospheric simulations: A magnetohydrodynamics model.

- Journal of Geophysical Research*, 117(A8). <https://doi.org/10.1029/2012JA017791>
- Meng, X., Tsurutani, B. T., & Mannucci, A. J. (2019). The Solar and Interplanetary Causes of Superstorms (Minimum Dst ≤ -250 nT) During the Space Age. *Journal of Geophysical Research: Space Physics*, 124(6), 3926-3948. <https://doi.org/10.1029/2018JA026425>
- Menk, F. W. (2011). Magnetospheric ULF Waves: A Review. In W. Liu & M. Fujimoto (Eds.), *The Dynamic Magnetosphere* (p. 223-256). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-94-007-0501-2_13
- Menvielle, M., & Berthelier, A. (1991). The K-derived planetary indices: Description and availability. *Reviews of Geophysics*, 29(3), 415-432. <https://doi.org/10.1029/91RG00994>
- Meredith, N. P., Horne, R. B., Thorne, R. M., & Anderson, R. R. (2003). Favored regions for chorus-driven electron acceleration to relativistic energies in the Earth's outer radiation belt. *Geophysical Research Letters*, 30(16). <https://doi.org/10.1029/2003GL017698>
- Meurant, M., Gérard, J.-C., Blockx, C., Coumans, V., Hubert, B., Connors, M., Lyons, L. R., & Donovan, E. (2005). Comparison of intense nightside shock-induced precipitation and substorm activity. *Journal of Geophysical Research*, 110(A7). <https://doi.org/10.1029/2004JA010916>
- Meurant, M., Gérard, J.-C., Blockx, C., Hubert, B., & Coumans, V. (2004). Propagation of electron and proton shock-induced aurora and the role of the interplanetary magnetic field and solar wind. *Journal of Geophysical Research*, 109(A10). <https://doi.org/10.1029/2004JA010453>
- Mewaldt, R. A., Cohen, C. M. S., Labrador, A. W., Leske, R. A., Mason, G. M., Desai, M. I., Looper, M. D., Mazur, J. E., Selesnick, R. S., & Haggerty, D. K. (2005). Proton, helium, and electron spectra during the large solar particle events of October-November 2003. *Journal of Geophysical Research*, 110(A9). <https://doi.org/10.1029/2005JA011038>
- Meziane, K., Wilber, M., Mazelle, C., LeQuéau, D., Kucharek, H., Lucek, E. A., Rème, H., Hamza, A. M., Sauvaud, J. A., Bosqued, J. M., Dandouras, I., Parks, G. K., McCarthy, M., Klecker, B., Korth, A., Bavassano-Cattaneo, M. B., & Lundin, R. N. (2004). Simultaneous observations of field-aligned beams and gyrating ions in the terrestrial foreshock. *Journal of Geophysical Research*, 109(A5). <https://doi.org/10.1029/2003JA010374>
- Mihalov, J. D., Russell, C. T., Knudsen, W. C., & Scarf, F. L. (1987). Pioneer Venus and near-Earth observations of interplanetary shocks. *Journal of Geophysical Research*, 92(A4), 3385-3391. <https://doi.org/10.1029/JA092iA04p03385>
- Milan, S. E., Clausen, L. B. N., Coxon, J. C., Carter, J. A., Walach, M.-T., Laundal, K., Østgaard, N., Tenfjord, P., Reistad, J., Snekvik, K., Korth, H., & Anderson, B. J. (2017). Overview of Solar Wind-Magnetosphere-Ionosphere-Atmosphere Coupling and the Generation of Magnetospheric Currents. *Space Science Reviews*, 206(1-4), 547-573. <https://doi.org/10.1007/s11214-017-0333-0>
- Minnaert, N. (1993). *Light and Color in the Outdoors*. New York, NY: Springer-Verlag New York.

- Mishin, E. V., Marcos, F. A., Burke, W. J., Cooke, D. L., Roth, C., & Petrov, V. P. (2007). Prompt thermospheric response to the 6 November 2001 magnetic storm. *Journal of Geophysical Research*, *112*(A5), 1–11. <https://doi.org/10.1029/2006JA011783>
- Mitchell, J. F. B. (1989). The “Greenhouse” effect and climate change. *Reviews of Geophysics*, *27*(1), 115–139. <https://doi.org/10.1029/RG027i001p00115>
- Miyake, F., Nagaya, K., Masuda, K., & Nakamura, T. (2012). A signature of cosmic-ray increase in AD 774-775 from tree rings in Japan. *Nature*, *486*, 240-242. <https://doi.org/10.1038/nature11123>
- Miyake, F., Usoskin, I., & Poluianov, S. (Eds.). (2019). *Extreme Solar Particle Storms: The hostile Sun*. Philadelphia, PA: IOP Publishing. <https://doi.org/10.1088/2514-3433/ab404a>
- Miyoshi, Y., & Fujiwara, H. (2008). Gravity waves in the thermosphere simulated by a general circulation model. *Journal of Geophysical Research*, *113*(D1). <https://doi.org/10.1029/2007JD008874>
- Miyoshi, Y., Shinohara, I., Takashima, T., Asamura, K., Higashio, N., Mitani, T., Kasahara, S., Yokota, S., Kazama, Y., Wang, S.-Y., Tam, S. W. Y., Ho, P. T. P., Kasahara, Y., Kasaba, Y., Yagitani, S., Matsuoka, A., Kojima, H., Katoh, Y., Shiokawa, K., & Seki, K. (2018). Geospace exploration project ERG. *Earth, Planets and Space*, *70*(101). <https://doi.org/10.1186/s40623-018-0862-0>
- Mlynczak, M. G., Hunt, L. A., Marshall, B. T., Martin-Torres, F. J., Mertens, C. J., Russell, J. M., Remsberg, E. E., López-Puertas, M., Picard, R., Winick, J., Wintersteiner, P., Thompson, R. E., & Gordley, L. L. (2010). Observations of infrared radiative cooling in the thermosphere on daily to multiyear timescales from the TIMED/SABER instrument. *Journal of Geophysical Research*, *115*(A3). <https://doi.org/10.1029/2009JA014713>
- Mlynczak, M. G., Hunt, L. A., Marshall, B. T., Russell, J. M., Mertens, C. J., Thompson, R. E., & Gordley, L. L. (2015). A combined solar and geomagnetic index for thermospheric climate. *Geophysical Research Letters*, *42*(10), 3677–3682. <https://doi.org/10.1002/2015GL064038>
- Mlynczak, M. G., Hunt, L. A., Marshall, B. T., & Russell III, J. M. (2018). Infrared radiation in the thermosphere near the end of solar cycle 24. *Geophysical Research Letters*, *45*(21), 11,581-11,587. <https://doi.org/10.1029/2018GL080389>
- Mlynczak, M. G., Hunt, L. A., Mertens, C. J., Thomas Marshall, B., Russell III, J. M., Woods, T., Earl Thompson, R., & Gordley, L. L. (2014). Influence of solar variability on the infrared radiative cooling of the thermosphere from 2002 to 2014. *Geophysical Research Letters*, *41*(7), 2508-2513. <https://doi.org/10.1002/2014GL059556>
- Mlynczak, M. G., Knipp, D. J., Hunt, L. A., Gaebler, J., Matsuo, T., Kilcommons, L. M., & Young, C. L. (2018). Space-based sentinels for measurement of infrared cooling in the thermosphere for space weather nowcasting and forecasting. *Space Weather*, *16*(4), 363-375. <https://doi.org/10.1002/2017SW001757>
- Mlynczak, M. G., Martin-Torres, F. J., Russell, J., Beaumont, K., Jacobson, S., Kozyra, J., López-Puertas, M., Funke, B., Mertens, C., Gordley, L., Picard, R., Winick, J., Wintersteiner, P., & Paxton, L. (2003). The natural thermostat of nitric oxide emis-

- sion at $5.3 \mu\text{m}$ in the thermosphere observed during the solar storms of April 2002. *Geophysical Research Letters*, *30*(21). <https://doi.org/10.1029/2003GL017693>
- Mlynczak, M. G., Martin-Torres, F. J., Mertens, C. J., Marshall, B. T., Thompson, R. E., Kozyra, J. U., Remsberg, E. E., Gordley, L. L., Russell III, J. M., & Woods, T. (2008). Solar-terrestrial coupling evidenced by periodic behavior in geomagnetic indexes and the infrared energy budget of the thermosphere. *Geophysical Research Letters*, *35*(5). <https://doi.org/10.1029/2007GL032620>
- Moe, K., & Moe, M. M. (2005). Gas-surface interactions and satellite drag coefficients. *Planetary and Space Science*, *53*(8), 793-801. <https://doi.org/10.1016/j.pss.2005.03.005>
- Moldwin, M. (2008). *An introduction to space weather*. New York, NY: Cambridge University Press.
- Moldwin, M. B., Mayerberger, S., Rassoul, H. K., Collier, M. R., Lepping, R. P., Slavin, J. A., & Szabo, A. (2001). Evidence of different magnetotail responses to small solar wind pressure pulses depending on IMF B_z polarity. *Geophysical Research Letters*, *28*(22), 4163-4166. <https://doi.org/10.1029/2001GL013045>
- Moldwin, M. B., & Tsu, J. S. (2016). Stormtime Equatorial Electrojet Ground-Induced Currents. In T. Fuller-Rowell, E. Yizengaw, P. H. Doherty, & S. Basu (Eds.), *Ionospheric Space Weather*, Geophysical Monograph Series (Vol. 220, p. 33-40). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118929216.ch3>
- Moldwin, M. B., Zesta, E., Burleigh, M., Datta-Barua, S., Hartinger, M., Hoffmann, A., Oliveira, D., Ridley, A. J., Akhavan-Tafti, M., Wendel, D. E., Zou, S., Barnhart, R., Bonalsky, T. M., Dechaine, G., Heckathorn, C., Lee, D., Saca, F., Shores, B., & Noord, J. V. (2023). The Geospace Dynamics Constellation (GDC) NEMISIS Magnetometer Investigation. In *Final paper number: SA24A-08*. Presented at 2023 AGU Fall Meeting, San Francisco, CA, 10-14 Dec..
- Molinski, T. S. (2002). Why utilities respect geomagnetically induced currents. *Journal of Atmospheric and Solar-Terrestrial Physics*, *64*(16), 1765-1778. [https://doi.org/10.1016/S1364-6826\(02\)00126-8](https://doi.org/10.1016/S1364-6826(02)00126-8)
- Molinski, T. S., Feero, W. E., & Damsky, B. L. (2000). Shielding grids from solar storms. *IEEE Spectrum*, *37*(11), 55-60. <https://doi.org/10.1109/6.880955>
- Monreal Mc, R., & Llop, C. (2002). Particle precipitation influence in the conductance of the auroral ionosphere during magnetic storms. *Revista Mexicana de Física*, *48*(3), 151-153.
- Moos, N. A. F. (1910a). *Magnetic observations made at the Government observatory, Bombay, for the period 1846 to 1905 and their discussion, Part II: The phenomenon and its description*. Bombay, India: Central Government Press.
- Moos, N. A. F. (1910b). *Magnetic observations made at the Government observatory, Bombay, for the period 1846 to 1905 and their discussion, Part I: Magnetic data and instruments*. Bombay, India: Central Government Press.
- Moraes, A. (1958). Astronomia no Brasil. In F. Azevedo (Ed.), *As Ciências no Brasil* (p. 84-161). São Paulo, Brazil: Melhoramentos.
- Moretto, T., Ridley, A. J., Engebretson, M. J., & Rasmussen, O. (2000). High-

- latitude ionospheric response to a sudden impulse event during northward IMF conditions. *Journal of Geophysical Research*, *105*(A2), 2521–2531. <https://doi.org/10.1029/1999JA900475>
- Moritz, H. (2000). Geodetic Reference System 1980. *Journal of Geodesy*, *74*, 128-133. <https://doi.org/10.1007/s001900050278>
- Morize, H. C. (1987). *O observatório astronômico: um século de história 1827-1927*. São Paulo, Brazil: Melhoramentos.
- Morley, S. K. (2020). Challenges and Opportunities in Magnetospheric Space Weather Prediction. *Space Weather*, *18*(3), e2018SW002108. <https://doi.org/10.1029/2018SW002108>
- Morley, S. K., Koller, J., Welling, D. T., Larsen, B. A., Henderson, M. G., & Niehof, J. T. (2011). Spacepy - A Python-based library of tools for the space sciences. In *Proceedings of the 9th Python in science Conference (SciPy 2010)* (p. 67-72). Austin, TX.
- Morley, S. K., Sullivan, J. P., Carver, M. R., Kippen, R. M., Friedel, R. H. W., Reeves, G. D., & Henderson, M. G. (2017). Energetic particle data from the global positioning system constellation. *Space Weather*, *15*(2), 283-289. <https://doi.org/10.1002/2017SW001604>
- Morris, B. M., Davenport, J. R. A., Giles, H. A. C., Hebb, L., Hawley, S. L., Angus, R., Gilman, P. A., & Agol, E. (2019). The solar benchmark: rotational modulation of the Sun reconstructed from archival sunspot records. *Monthly Notices of the Royal Astronomical Society*, *484*(3), 3244-3250. <https://doi.org/10.1093/mnras/stz199>
- Mostafavi, P., Burlaga, L. F., Cairns, I. H., Fuselier, S. A., Fraternali, F., Gurnett, D. A., Kim, T. K., Kurth, W. S., Pogorelov, N. V., Provornikova, E., Richardson, J. D., Turner, D. L., & Zank, G. P. (2022). Shocks in the Very Local Interstellar Medium. *Space Science Reviews*, *218*(27). <https://doi.org/10.1007/s11214-022-00893-4>
- Muniz Barreto, L. (1997). *El geomagnetismo*. San Rafael, Mexico: Plaza y Valdés.
- Mursula, K., Holappa, L., & Karinen, A. (2008). Correct normalization of the Dst index. *Astrophysics and Space Science Transactions*, *4*, 41-45. <https://doi.org/10.5194/astrat-4-41-2008>
- Mutschler, S., Tobiska, W. K., Zesta, E., Oliveira, D., & Delano, K. W. K. (2023). Impact of Nitric Oxide Post-Storm Overproduction on Thermospheric Density during the September 7, 2002 Geomagnetic Storm. In *Final paper number, sa13a-02*. Presented at 2023 AGU Fall Meeting, San Francisco, CA, 11-15 Dec..
- Nagano, H., & Araki, T. (1984). Polarization of geomagnetic sudden commencements observed by geostationary satellites. *Journal of Geophysical Research*, *89*(A12), 11018–11022. <https://doi.org/10.1029/JA089iA12p11018>
- Nahayo, E., Guerrero, A., Lotz, S., Cid, C., Tshisaphungo, M., & Saiz, E. (2022). Validating the LDi and LCi Indices in the Southern Hemisphere. *Space Weather*, *20*(10), e2022SW003092. <https://doi.org/10.1029/2022SW003092>
- Nakano, S., Iyemori, T., & Yamashita, S. (2002). Net field-aligned currents controlled by the polar ionospheric conductivity. *Journal of Geophysical Research*, *107*(A5), SMP 4-1-SMP 4-6. <https://doi.org/10.1029/2001JA900177>

- Nascimento, J. R., Passos, E., Petrov, A. Y., & Brito, F. A. (2007). Lorentz-CPT violation, radiative corrections and finite temperature. *Journal of High Energy Physics*, *6*, 016. <https://doi.org/10.1088/1126-6708/2007/06/016>
- National Research Council. (2008). *Severe Space Weather Events - Understanding Societal and Economic Impacts: A Workshop Report* (Tech. Rep.). The National Academies Press, Washington, D.C.: National Research Council (NRC). Retrieved from http://www.nap.edu/openbook.php?record_id=12507
- National Science and Technology Council. (2015a). *National Space Weather Action Plan* (Tech. Rep.). Washington, D.C.: Executive Office of the President of the United States. Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/final_nationalspaceweatheractionplan_20151028.pdf
- National Science and Technology Council. (2015b). *National Space Weather Strategy* (Tech. Rep.). Washington, D.C.: Executive Office of the President of the United States. Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/final_nationalspaceweatherstrategy_20151028.pdf
- Nelson, O. R. (2013). A pedagogical approach of the nature of the heating processes in the stellar atmosphere. *Revista Brasileira de Ensino de Física*, *35*(3), 3317. <https://doi.org/10.1590/S1806-11172013000300017>
- Ness, N. F., Scarce, C. S., & Seek, J. B. (1964). Initial results of the IMP-1 magnetic field experiment. *Journal of Geophysical Research*, *69*(17), 3531-3569. <https://doi.org/10.1029/JZ069i017p03531>
- Neubert, T., & Christiansen, F. (2003). Small-scale, field-aligned currents at the top-side ionosphere. *Geophysical Research Letters*, *30*(19), 1-4. <https://doi.org/10.1029/2003GL017808>
- Neugebauer, M. (2003). In-situ measurements of the solar wind. In M. Velli, R. Bruno, & F. Malara (Eds.), *Solar wind ten: Proceedings of the tenth international solar wind conference* (Vol. 679, p. 8-13). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.1618532>
- Neugebauer, M., & Giacalone, J. (2005). Multispacecraft observations of interplanetary shocks: Nonplanarity and energetic particles. *Journal of Geophysical Research*, *110*(A12). <https://doi.org/10.1029/2005JA011380>
- Neugebauer, M., & Snyder, C. W. (1962). Solar plasma experiment. *Science*, *138*(3545), 1095-1097. <https://doi.org/10.1126/science.138.3545.1095-a>
- Neumayer, G. (1864). *Results of the meteorological observations taken in the Colony of Victoria during the years 1859-1862; and of the nautical observations collected and discussed at the Flagstaff Observatory, Melbourne, during the years 1858-1862*. Melbourne, Australia: John Ferres, Government Printer.
- Nevanlinna, H. (2004). Results of the Helsinki magnetic observatory 1844-1912. *Annales Geophysicae*, *21*, 1691-1704. <https://doi.org/10.5194/angeo-22-1691-2004>
- Neves, J. C. S. (2021). *Demiurgos: Sobre a Criação de Mundos*. São Paulo, Brazil: Livraria da Física.
- Newbury, J. A. (2000). *Plasma heating and thermal transport in the solar wind near 1 AU* (Ph.D thesis). University of California, Los Angeles, Los Angeles, California.

- Newell, P. T., & Gjerloev, J. W. (2011a). Evaluation of SuperMAG auroral electrojet indices as indicators of substorms and auroral power. *Journal of Geophysical Research*, *116*(A12). <https://doi.org/10.1029/2011JA016779>
- Newell, P. T., & Gjerloev, J. W. (2011b). Substorm and magnetosphere characteristic scales inferred from the SuperMAG auroral electrojet indices. *Journal of Geophysical Research*, *116*(A12211), 1-12. <https://doi.org/10.1029/2011JA016936>
- Newell, P. T., & Gjerloev, J. W. (2012). SuperMAG-based partial ring current indices. *Journal of Geophysical Research*, *117*(A05215), 1–15. <https://doi.org/10.1029/2012JA017586>
- Newell, P. T., & Gjerloev, J. W. (2014). Local geomagnetic indices and the prediction of auroral power. *Journal of Geophysical Research: Space Physics*, *119*(12), 9790–9803. <https://doi.org/10.1002/2014JA020524>
- Newell, P. T., & Meng, C.-I. (1992). Mapping the dayside ionosphere to the magnetosphere according to particle precipitation characteristics. *Geophysical Research Letters*, *19*(6), 609–612. <https://doi.org/10.1029/92GL00404>
- Newell, P. T., Meng, C.-I., & Lyons, K. M. (1996). Suppression of discrete aurorae by sunlight. *Nature*, *381*, 766-767. <https://doi.org/10.1038/381766a0>
- Newell, P. T., Sotirelis, T., Liou, K., Meng, C.-I., & Rich, F. J. (2007). A nearly universal solar wind-magnetosphere coupling function inferred from 10 magnetospheric state variables. *Journal of Geophysical Research*, *112*(A1). <https://doi.org/10.1029/2006JA012015>
- Newell, P. T., Sotirelis, T., & Wing, S. (2009). Diffuse, monoenergetic, and broadband aurora: The global precipitation budget. *Journal of Geophysical Research*, *114*(A9). <https://doi.org/10.1029/2009JA014326>
- Newell, P. T., Sotirelis, T., & Wing, S. (2010). Seasonal variations in diffuse, monoenergetic, and broadband aurora. *Journal of Geophysical Research*, *115*(A3). <https://doi.org/10.1029/2009JA014805>
- Newton, H. W. (1940). The active solar and magnetic period 1940 March 20 to April 2. *The Observatory*, *63*, 129-134.
- Newton, H. W. (1943). Solar flares and magnetic storms. *Monthly Notices of the Royal Astronomical Society*, *103*(5), 244–257. <https://doi.org/10.1093/mnras/103.5.244>
- Newton, I. (1687). *Philosophiæ naturalis principia mathematica*. London, United Kingdom: Benjamin Motte.
- Ngwira, C. M., McKinnell, L.-A., Cilliers, P. J., & Coster, A. J. (2012). Ionospheric observations during the geomagnetic storm events on 24–27 July 2004: Long-duration positive storm effects. *Journal of Geophysical Research*, *117*(A9). <https://doi.org/10.1029/2011JA016990>
- Ngwira, C. M., McKinnell, L.-A., Cilliers, P. J., Viljanen, A., & Pirjola, R. (2009). Limitations of the modeling of geomagnetically induced currents in the South African power network. *Space Weather*, *7*(10). <https://doi.org/10.1029/2009SW000478>
- Ngwira, C. M., & Pulkkinen, A. (2019). An Introduction to Geomagnetically Induced Currents. In J. L. Gannon, A. Swidinsky, & Z. Xu (Eds.), *Geomagnetically induced*

- currents from the sun to the power grid* (p. 3-13). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119434412.ch1>
- Ngwira, C. M., Pulkkinen, A., Kuznetsova, M. M., & Glocer, A. (2014). Modeling extreme “Carrington-type” space weather events using three-dimensional global MHD simulations. *Journal of Geophysical Research: Space Physics*, *119*(6), 4456-4474. <https://doi.org/10.1002/2013JA019661>
- Ngwira, C. M., Pulkkinen, A., Kuznetsova, M. M., & Glocer, A. (2018). Reply to comments by Tsurutani et al. on “Modeling extreme ‘Carrington-type’ space weather events using three-dimensional global MHD simulations”. *Journal of Geophysical Research: Space Physics*, *123*. <https://doi.org/10.1002/2017JA024928>
- Ngwira, C. M., Pulkkinen, A., Leila Mays, M., Kuznetsova, M. M., Galvin, A. B., Simunac, K., Baker, D. N., Li, X., Zheng, Y., & Glocer, A. (2013). Simulation of the 23 July 2012 extreme space weather event: What if this extremely rare CME was Earth directed? *Space Weather*, *11*(12), 671–679. <https://doi.org/10.1002/2013SW000990>
- Ngwira, C. M., Pulkkinen, A., McKinnell, L.-A., & Cilliers, P. J. (2008). Improved modeling of geomagnetically induced currents in the South African power network. *Space Weather*, *6*(11). <https://doi.org/10.1029/2008SW000408>
- Ngwira, C. M., Pulkkinen, A., Wilder, F. D., & Crowley, G. (2013). Extended study of extreme geoelectric field event scenarios for geomagnetically induced current applications. *Space Weather*, *11*(3), 121–131. <https://doi.org/10.1002/swe.20021>
- Ngwira, C. M., Pulkkinen, A. A., Bernabeu, E., Eichner, J., Viljanen, A., & Crowley, G. (2015). Characteristics of extreme geoelectric fields and their possible causes: Localized peak enhancements. *Geophysical Research Letters*, *42*(17), 6916–6921. <https://doi.org/10.1002/2015GL065061>
- Ngwira, C. M., Sibeck, D., Silveira, M. V. D., Georgiou, M., Weygand, J. M., Nishimura, Y., & Hampton, D. (2018). A Study of Intense Local dB/dt Variations During Two Geomagnetic Storms. *Space Weather*, *16*(6), 676-693. <https://doi.org/10.1029/2018SW001911>
- Nicholson, S. B. (1940). The Great Magnetic Storm of March 24, 1940. *Publications of the Astronomical Society of the Pacific*, *52*(307), 169-171.
- Nilam, B., Tulasi Ram, S., Ankita, M., Oliveira, D. M., & Dimri, A. P. (2023). Equatorial Electrojet (EEJ) response to Interplanetary (IP) shocks. *Journal of Geophysical Research: Space Physics*, *128*(12). <https://doi.org/10.1029/2023JA032010>
- Nilam, B., & Tulasi Ram, S. (2022). Large Geomagnetically Induced Currents at Equator Caused by an Interplanetary Magnetic Cloud. *Space Weather*, *20*(6), e2022SW003111. <https://doi.org/10.1029/2022SW003111>
- Nilsson, C. S., Wright, F. W., & Wilson, D. (1969). Attempts to measure micrometeoroid flux on the OGO 2 and OGO 4 satellites. *Journal of Geophysical Research*, *74*(22), 5268-5276. <https://doi.org/10.1029/JB074i022p05268>
- Nishida, A. (1964). Transmission of storm sudden commencements through the interplanetary space; shock wave mode and non-shock mode. *Report of Ionosphere and Space Research in Japan*, *18*, 295.

- Nishida, A. (1966). Interpretation of SSC rise time. *Report of Ionosphere and Space Research in Japan*, 20, 42–44.
- Nishida, A. (1994). The Geotail Mission. *Geophysical Research Letters*, 21(25), 2871–2873. <https://doi.org/10.1029/94GL01223>
- Nishida, A., & Jacobs, J. A. (1962). Equatorial enhancement of world-wide changes. *Journal of Geophysical Research*, 67(12), 4937–4940. <https://doi.org/10.1029/JZ067i012p04937>
- Nishimura, Y., Gallardo-Lacourt, B., Zou, Y., Mishin, E., Knudsen, D. J., Donovan, E. F., Angelopoulos, V., & Raybell, R. (2019). Magnetospheric Signatures of STEVE: Implications for the Magnetospheric Energy Source and Interhemispheric Conjugacy. *Geophysical Research Letters*, 46(11), 5637–5644. <https://doi.org/10.1029/2019GL082460>
- Nishimura, Y., Kikuchi, T., Ebihara, Y., Yoshikawa, A., Imajo, S., Li, W., & Utada, H. (2016). Evolution of the current system during solar wind pressure pulses based on aurora and magnetometer observations. *Earth, Planets and Space*, 68(144). <https://doi.org/10.1186/s40623-016-0517-y>
- Nishimura, Y., Lyons, L. R., Gabrielse, C., Sivasdas, N., Donovan, E. F., Varney, R. H., Angelopoulos, V., Weygand, J. M., Conde, M. G., & Zhang, S. R. (2020). Extreme magnetosphere-ionosphere-thermosphere responses to the 5 april 2010 super-substorm. *Journal of Geophysical Research: Space Physics*, 125(4), e2019JA027654. <https://doi.org/10.1029/2019JA027654>
- Nopper, R. W., Hughes, W. J., MacLennan, C. G., & McPherron, R. L. (1982). Impulse-excited pulsations during the July 29, 1977, event. *Journal of Geophysical Research*, 87(A8), 5911–5916. <https://doi.org/10.1029/JA087iA08p05911>
- Notsu, Y., Maehara, H., Honda, S., Hawley, S. L., Davenport, J. R. A., Namekata, K., Notsu, S., Ikuta, K., Nogami, D., & Shibata, K. (2019). Do Kepler Superflare Stars Really Include Slowly Rotating Sun-like Stars?—Results Using APO 3.5 m Telescope Spectroscopic Observations and Gaia-DR2 Data. *The Astrophysical Journal*, 876(1). <https://doi.org/10.3847/1538-4357/ab14e6>
- Němeček, Z., Šafránková, J., Koval, A., Merka, J., & Přech, L. (2011). MHD analysis of propagation of an interplanetary shock across magnetospheric boundaries. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(1), 20–29. <https://doi.org/10.1016/j.jastp.2010.05.017>
- Nussenzveig, H. M. (2013). *Curso de física básica - mecânica* (Vol. 1). São Paulo, Brazil: Blücher.
- Nussenzveig, H. M. (2014a). *Curso de física básica - oscilações e ondas de calor* (Vol. 2). São Paulo, Brazil: Blücher.
- Nussenzveig, H. M. (2014b). *Curso de física básica - ótica, relatividade, física quântica* (Vol. 4). São Paulo, Brazil: Blücher.
- Nussenzveig, H. M. (2015). *Curso de física básica - eletromagnetismo* (Vol. 3). São Paulo, Brazil: Blücher.
- Nwankwo, V. U. J., Denig, W., Chakrabarti, S. K., Ajakaiye, M. P., Fatokun, J., Akanni, A. W., Raulin, J.-P., Correia, E., Enoh, J. E., & Anekwe, P. I. (2021). Atmospheric

- drag effects on modelled low Earth orbit (LEO) satellites during the July 2000 Bastille Day event in contrast to an interval of geomagnetically quiet. *Annales Geophysicae*, *39*(3), 397-412. <https://doi.org/10.5194/angeo-39-397-2021>
- Nykyri, K., Ma, X., Burkholder, B., Liou, Y.-L., Cuéllar, R., Borovsky, S. K. J. E., Parker, J., De Moudt, M. R. L., Ebert, R. W., Ogasawara, K., Opher, M., Di Matteo, D. G. S. S., Viall, N., Wallace, S., Jorgensen, T. M., Hesse, M., Adhikari, M. J. W. L., Argall, M. R., Egedal, J., Wilder, F., Broll, J., Poh, G., Wing, S., & Russell, C. (2023). Seven Sisters: a mission to study fundamental plasma physical processes in the solar wind and a pathfinder to advance space weather prediction. *Frontiers in Astronomy and Space Science*, *10*. <https://doi.org/10.3389/fspas.2023.1179344>
- Ober, D. M. (2014). *The DMSP Space Weather Sensors Data Archive Listing (1982-2013) and File Formats Descriptions* (AFRL-RV-PS-TR-2014-0174, Accession Number: ADA613822). Kirtland Air Force Base, NM: Air Force Research Laboratory.
- Ober, D. M., Maynard, N. C., & Burke, W. J. (2003). Testing the Hill model of transpolar potential saturation. *Journal of Geophysical Research*, *108*(A12). <https://doi.org/10.1029/2003JA010154>
- Ober, D. M., Wilson, G. R., Maynard, N. C., Burke, W. J., & Siebert, K. D. (2006). MHD simulation of the transpolar potential after a solar-wind density pulse. *Geophysical Research Letters*, *33*(4), 1-4. <https://doi.org/10.1029/2005GL024655>
- Odenwald, S. (2007). Newspaper reporting of space weather: End of a golden age. *Space Weather*, *5*(11). <https://doi.org/10.1029/2007SW000344>
- Odenwald, S. (2015). *Solar Storms: 2000 Years of Human Calamity!* San Bernardino, CA: CreateSpace Independent Publishing Platform.
- Odstrčil, D. (2003). Modeling 3-D solar wind structure. *Advances in Space Research*, *32*(4), 497-506. [https://doi.org/10.1016/S0273-1177\(03\)00332-6](https://doi.org/10.1016/S0273-1177(03)00332-6)
- Odstrčil, D., & Pizzo, V. J. (1999). Three-dimensional propagation of coronal mass ejections (CMEs) in a structured solar wind flow: 1. CME launched within the streamer belt. *Journal of Geophysical Research*, *104*(A1), 483-492. <https://doi.org/10.1029/1998JA900019>
- Ogg, A. (1941). Capetown Magnetic Observatory January to September, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, *46*(1), 118-120. <https://doi.org/10.1029/TE046i001p00118-02>
- Ogilvie, K. W., & Burlaga, L. F. (1969). Hydromagnetic shocks in the solar wind. *Solar Physics*, *8*(2), 422-434. <https://doi.org/10.1007/BF00155390>
- Ogilvie, K. W., Chornay, D. J., Fritzenreiter, R. J., Hunsaker, F., Keller, J., Lobell, J., Miller, G., Scudder, J. D., Sittler, J. E. C., Torbert, R. B., Bodet, D., Needell, G., Lazarus, A. J., Steinberg, J. T., Tappan, J. H., Mavretic, A., & Gergin, E. (1995). SWE, a comprehensive plasma instrument for the WIND spacecraft. *Space Science Reviews*, *71*(1-4), 55-77. <https://doi.org/10.1007/BF00751326>
- Ogino, T., Walker, R. J., & Ashour-Abdalla, M. (1992). A global magnetohydrodynamic simulation of the magnetosheath and magnetosphere when the interplanetary magnetic field is northward. *IEEE Trans. Plasma Sci.*, *20*(6), 817-828. <https://doi.org/10.1109/27.199534>

- Oh, S. Y., Yi, Y., & Kim, Y. H. (2007). Solar cycle variation of the interplanetary forward shock drivers observed at 1 AU. *Solar Physics*, *245*(2), 391–410. <https://doi.org/10.1007/s11207-007-9042-2>
- Oh, S. Y., Yi, Y., Nah, J.-K., & Cho, K.-S. (2002). Classification of the interplanetary shocks by shock drivers. *Journal of The Korean Astronomical Society*, *35*, 151–157. <https://doi.org/10.5303/JKAS.2002.35.3.151>
- Ohma, A., Laundal, K. M., Reistad, J. P., & Østgaard, N. (2022). Evolution of IMF B_y induced asymmetries during substorms: Superposed epoch analysis at geosynchronous orbit. *Frontiers in Astronomy and Space Science*, *9*(958749). <https://doi.org/10.3389/fspas.2022.958749>
- Ohtani, S., & Gjerloev, J. W. (2020). Is the Substorm Current Wedge an Ensemble of Wedgelets?: Revisit to Midlatitude Positive Bays. *Journal of Geophysical Research: Space Physics*, *125*(9), e2020JA027902. <https://doi.org/https://doi.org/10.1029/2020JA027902>
- Ohtani, S., Gjerloev, J. W., Anderson, B. J., Kataoka, R., Troshichev, O., & Watari, S. (2018). Dawnside wedge current system formed during intense geomagnetic storms. *Journal of Geophysical Research: Space Physics*, *123*(11), 9093–9109. <https://doi.org/10.1029/2018JA025678>
- Ohtani, S., Sorathia, K., Merkin, V. G., Frey, H. U., & Gjerloev, J. W. (2023). External and Internal Causes of the Stormtime Intensification of the Dawnside Westward Auroral Electrojet. *Journal of Geophysical Research: Space Physics*, *128*(10), e2023JA031457. <https://doi.org/10.1029/2023JA031457>
- Ohtani, S., Wing, S., Merkin, V. G., & Higuchi, T. (2014). Solar cycle dependence of nightside field-aligned currents: Effects of dayside ionospheric conductivity on the solar wind-magnetosphere-ionosphere coupling. *Journal of Geophysical Research: Space Physics*, *119*(1), 322–334. <https://doi.org/10.1002/2013JA019410>
- Ohtani, S.-I., Fujii, R., Hesse, M., & Lysak, R. L. (Eds.). (2000). *Magnetospheric Current Systems*, Geophysical Monograph Series (Vol. 118). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM118>
- Okoh, D., & Okoro, E. (2020). On the Relationships Between Sunspot Number and Solar Radio Flux at 10.7 Centimeters. *Solar Physics*, *295*, 1–13. <https://doi.org/10.1007/s11207-019-1566-8>
- Oliveira, D. (2014). Ionosphere-magnetosphere coupling and field-aligned currents. *Revista Brasileira de Ensino de Física*, *36*(1), 1305. <https://doi.org/10.1590/S1806-11172014000100005>
- Oliveira, D., & Raeder, J. (2013). Role of symmetry in the geo-effectiveness of interplanetary shocks. In *Abstract SM41B-2232*. AGU Fall Meeting, San Francisco, CA.
- Oliveira, D. M. (2010). *Lorentz symmetry breaking in quantum electrodynamics* (Master's thesis). University of São Paulo, São Paulo, Brazil.
- Oliveira, D. M. (2011). A proposal for the teaching of quantum field theory in the undergraduate level: The Maxwell-Chern-Simons electrodynamics as motivation. *Revista Brasileira de Ensino de Física*, *33*(3), 3309. <https://doi.org/10.1590/S1806-11172011000300009>

- Oliveira, D. M. (2015). *A study of interplanetary shock geoeffectiveness controlled by impact angles using simulations and observations* (Ph.D. thesis). University of New Hampshire, Durham, New Hampshire.
- Oliveira, D. M. (2017). Magnetohydrodynamic shocks in the interplanetary space: A theoretical review. *Brazilian Journal of Physics*, *47*(1), 81-95. <https://doi.org/10.1007/s13538-016-0472-x>
- Oliveira, D. M. (2019). Satellite Orbital Drag During Extreme Geomagnetic Storms: How Accurate are our Predictions? In *2019 AGU Chapman Conference on Scientific Challenges Pertaining to Space Weather Forecasting Including Extremes*. Pasadena, CA, 11-15 February.
- Oliveira, D. M. (2020). Uma andorinha só não faz verão: 160 anos do legado de Richard Carrington. *Revista Brasileira de Ensino de Física*, *42*(1), 1-9. <https://doi.org/10.1590/1806-9126-RBEF-2019-0213>
- Oliveira, D. M. (2023a). Geoeffectiveness of Interplanetary Shocks Controlled by Impact Angles: Past Research, Recent Advancements, and Future Work. *Frontiers in Astronomy and Space Science*, *10*. <https://doi.org/10.3389/fspas.2023.1179279>
- Oliveira, D. M. (2023b). Interplanetary Shock Data Base. *Frontiers in Astronomy and Space Science*, *10*(1240323). <https://doi.org/10.3389/fspas.2023.1240323>
- Oliveira, D. M. (2023c). *Interplanetary shock data base*. [Data Set]. (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.7991430>
- Oliveira, D. M., Arel, D., Raeder, J., Zesta, E., Ngwira, C. M., Carter, B. A., Yizengaw, E., Halford, A. J., Tsurutani, B. T., & Gjerloev, J. W. (2018b). Geomagnetically induced currents caused by interplanetary shocks with different impact angles and speeds. *Space Weather*, *16*(6), 636-647. <https://doi.org/10.1029/2018SW001880>
- Oliveira, D. M., Arel, D. M., Raeder, J., Zesta, E., Ngwira, C. M., Carter, B. A., Yizengaw, E., Halford, A. J., Tsurutani, B. T., & Gjerloev, J. W. (2018a). Causes of unusually high dB/dt variations at magnetic equatorial regions. In *Final paper number, sm31c-1794*. Presented at 2018 AGU Fall Meeting, Washington, D.C., 10-14 Dec..
- Oliveira, D. M., & Emygdio, A. S. (2016). A science fiction novel for high school students. *A Física na Escola*, *14*(1).
- Oliveira, D. M., Hartinger, M. D., Xu, Z., Zesta, E., Pilipenko, V. A., Giles, B. L., & Silveira, M. V. D. (2020). Interplanetary shock impact angles control magnetospheric ULF wave activity: Wave amplitude, frequency, and power spectra. *Geophysical Research Letters*, *47*(24), e2020GL090857. <https://doi.org/10.1029/2020GL090857>
- Oliveira, D. M., Hayakawa, H., Zesta, E., Bhaskar, A., & Vichare, G. (2020). A possible case of sporadic aurora observed at Rio de Janeiro. *Earth, Planets and Space*, *72*(1), 82-90. <https://doi.org/10.1186/s40623-020-01208-z>
- Oliveira, D. M., & Ngwira, C. M. (2017). Geomagnetically Induced Currents: Principles. *Brazilian Journal of Physics*, *47*(5), 552-560. <https://doi.org/10.1007/s13538-017-0523-y>
- Oliveira, D. M., & Raeder, J. (2014a). Impact angle control of interplanetary shock geoeffectiveness. *Journal of Geophysical Research: Space Physics*, *119*(10), 8188-8201. <https://doi.org/10.1002/2014JA020275>

- Oliveira, D. M., & Raeder, J. (2014b). Impact angle control of interplanetary shock geoeffectiveness. In *Abstract SM31D-4226*. AGU Fall Meeting, San Francisco, CA.
- Oliveira, D. M., & Raeder, J. (2014c). Role of interplanetary shock impact angles in substorm triggering. In *Abstract P-MON06*. 12th International Conference on Substorms, Ise, Japan.
- Oliveira, D. M., & Raeder, J. (2015). Impact angle control of interplanetary shock geoeffectiveness: A statistical study. *Journal of Geophysical Research: Space Physics*, *120*(6), 4313-4323. <https://doi.org/10.1002/2015JA021147>
- Oliveira, D. M., Raeder, J., Tsurutani, B. T., & Gjerloev, J. W. (2015a). Effects of interplanetary shock inclinations on auroral power intensity. *arXiv:1507.02027*.
- Oliveira, D. M., Raeder, J., Tsurutani, B. T., & Gjerloev, J. W. (2015b). Geomagnetic activity triggered by interplanetary shocks: The shock impact angle as a controlling factor. In *Abstract SM41B-2232*. AGU Fall Meeting, San Francisco, CA.
- Oliveira, D. M., Raeder, J., Tsurutani, B. T., & Gjerloev, J. W. (2016). Effects of interplanetary shock inclinations on nightside auroral power intensity. *Brazilian Journal of Physics*, *46*(1), 97-104. <https://doi.org/10.1007/s13538-015-0389-9>
- Oliveira, D. M., & Samsonov, A. A. (2018). Geoeffectiveness of interplanetary shocks controlled by impact angles: A review. *Advances in Space Research*, *61*(1), 1-44. <https://doi.org/10.1016/j.asr.2017.10.006>
- Oliveira, D. M., & Silveira, M. V. D. (2016). Clima espacial e choques interplanetários. *Revista Brasileira de Ensino de Física*, *38*(1), 1305. <https://doi.org/10.1590/S1806-11173812083>
- Oliveira, D. M., & Silveira, M. V. D. (2017). Reação da termosfera a tempestades geomagnéticas. *Revista Brasileira de Ensino de Física*, *39*(3), e3305. <https://doi.org/10.1590/1806-9126-RBEF-2016-0219>
- Oliveira, D. M., Welling, D. T., Kim, H., Gabrielse, C., Reistad, J. P., & Laundal, K. M. (2023). Editorial: Understanding the Causes of Asymmetries in Earth's Magnetosphere-Ionosphere System. *Frontiers in Astronomy and Space Science*, *10*. <https://doi.org/10.3389/fspas.2023.1173630>
- Oliveira, D. M., Weygand, J. M., Coxon, J. C., & Zesta, E. (2024). Impact Angle Control of Local Intense dB/dt Variations During Shock-Induced Substorms: A Statistical Study. *Space Weather*, *22*, e2023SW003767. <https://doi.org/10.1029/2023SW003767>
- Oliveira, D. M., Weygand, J. M., Ngwira, C. M., Hartinger, M. D., Xu, Z., Silveira, M. V. D., Zesta, E., & Giles, B. L. (2021). Factors controlling local intense dB/dt variations during shock-induced substorms. In *Final paper abstract number: SM35B-1965*. Presented at the 2021 AGU Fall Meeting, 12-17 Dec, New Orleans, LA.
- Oliveira, D. M., Weygand, J. M., Zesta, E., Ngwira, C. M., Hartinger, M. D., Xu, Z., Giles, B. L., Gershman, D. J., Silveira, M. V. D., & Souza, V. M. (2021). Impact angle control of local intense dB/dt variations during shock-induced substorms. *Space Weather*, *19*(12), e2021SW002933. <https://doi.org/10.1029/2021SW002933>
- Oliveira, D. M., & Zesta, E. (2019). Satellite Orbital Drag During Magnetic Storms. *Space Weather*, *17*(11), 1510-1533. <https://doi.org/10.1029/2019SW002287>

- Oliveira, D. M., & Zesta, E. (2020). Nitric oxide response to geomagnetic storms: A superposed epoch analysis study. In *Final paper abstract number: SA022-0004*. Presented at the 2020 AGU Fall Meeting (virtual), 1-17 Dec.
- Oliveira, D. M., & Zesta, E. (2024a). First direct observations of interplanetary shock impact angle effects on real geomagnetically induced currents: The case of the Finnish natural gas pipeline system. *Frontiers in Astronomy and Space Science*. (Under review)
- Oliveira, D. M., & Zesta, E. (2024b). Inter-hemispheric Energy Input into the Ionosphere-Thermosphere System: What We Can and Cannot Learn From DMSP Observations. *Journal of Geophysical Research: Space Physics*. (Under review)
- Oliveira, D. M., Zesta, E., Connor, H. K., Su, Y.-J., Sutton, E. K., Huang, C. Y., Ober, D. M., Delay, S., & Schuck, P. W. (2015). Superposed epoch analysis of storm time response of the ionosphere-thermosphere (IT) system. In *Abstract SM23B-2565*. AGU Fall Meeting, San Francisco, CA.
- Oliveira, D. M., Zesta, E., Delano, K., & Dorelli, J. (2022). Inter-hemispheric comparisons of Poynting flux and particle precipitation during magnetic storms with different intensities. In *Final paper abstract number: SA33A-04*. Presented at the 2022 AGU Fall Meeting (virtual), 12-16 Dec.
- Oliveira, D. M., Zesta, E., Hayakawa, H., & Bhaskar, A. (2020). Estimating satellite orbital drag during historical magnetic superstorms. *Space Weather*, *18*(11), e2020SW002472. <https://doi.org/10.1029/2020SW002472>
- Oliveira, D. M., Zesta, E., Mehta, P. M., Licata, R. J., Pilinski, M. D., Kent Tobiska, W., & Hayakawa, H. (2021). The current state and future directions of modeling thermosphere density enhancements during extreme magnetic storms. *Frontiers in Astronomy and Space Science*, *8*(764144). <https://doi.org/10.3389/fspas.2021.764144>
- Oliveira, D. M., Zesta, E., Schuck, P. W., Connor, H. K., & Sutton, E. K. (2017). Ionosphere-thermosphere global time response to geomagnetic storms. In K. M. Groves & M. S. Magoun (Eds.), *Proceedings of the 15th international ionospheric effects symposium*. Alexandria, VA.
- Oliveira, D. M., Zesta, E., Schuck, P. W., & Sutton, E. K. (2017). Thermosphere global time response to geomagnetic storms caused by coronal mass ejections. *Journal of Geophysical Research: Space Physics*, *122*(10), 10,762-10,782. <https://doi.org/10.1002/2017JA024006>
- Oliveira, D. M., Zesta, E., Sutton, E. K., & Schuck, P. W. (2016). Superposed epoch analysis of the thermosphere global time response to geomagnetic storms. In *Abstract SM51C-2499*. AGU Fall Meeting, San Francisco, CA.
- Oliveira, D. M., Zesta, E., Sutton, E. K., & Schuck, P. W. (2017). North-south asymmetric thermosphere response to geomagnetic storms caused by coronal mass ejections. In *Abstract SM41A-2682*. 2017 AGU Fall Meeting, New Orleans, LA.
- Olsen, N. (2016). Earth's magnetic field. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 35-46). Boca Raton, FL: CRC Press.
- Olsson, A., Janhunen, P., Karlsson, T., Ivchenko, N., & Blomberg, L. G. (2005). Statistics of Joule heating in the auroral zone and polar cap using Astrid-2 satellite Poynting

- flux. *Annales Geophysicae*, 22(12), 4133–4142. <https://doi.org/10.5194/angeo-22-4133-2004>
- Omidi, N., Blanco-Cano, X., Russell, C. T., Karimabadi, H., & Acuña, M. (2002). Hybrid simulations of solar wind interaction with magnetized asteroids: General characteristics. *Journal of Geophysical Research*, 107(A12), 1487. <https://doi.org/10.1029/2002JA009441>
- Omidi, N., Zhou, X.-Z., Russell, C. T., & Angelopoulos, V. (2023). Interaction of Interplanetary Shocks with the Moon: Hybrid Simulations and ARTEMIS observations. *Journal of Geophysical Research: Space Physics*, e2022JA030499. <https://doi.org/10.1029/2022JA030499>
- Ondoh, T. (1963). Longitudinal distribution of ssc rise time. *Journal of Geomagnetism and Geoelectricity*, 14(4), 198-207. <https://doi.org/10.5636/jgg.14.198>
- O’Neil, R., & Picard, R. (1985). The aurora: Phenomenology, morphology, and occurrence. In A. Jursa (Ed.), *Handbook of geophysics and the space environment* (pp. 12(13)–12(16)). Springfield, VA: Air Force Geophysics Laboratory.
- O’Neill, G. K. (1974). The colonization of space. *Physics Today*, 27(9), 33–40. <https://doi.org/10.1063/1.3128863>
- Opher, M. (2010). Shocks in heliophysics. In C. J. Schrijver & G. L. Siscoe (Eds.), *Heliophysics - space storms and radiation: Causes and effects*. Cambridge, United Kingdom: Cambridge University Press.
- Orr, L., Chapman, S. C., Gjerloev, J. W., & Guo, W. (2021). Network community structure of substorms using SuperMAG magnetometers. *Nature Communications*, 12(1842). <https://doi.org/10.1038/s41467-021-22112-4>
- Osherovich, V. A., Benson, R. F., Fainberg, J., Green, J. L., Garcia, L., Boardsen, S., Tsyganenko, N., & Reinisch, B. W. (2007). Enhanced high-altitude polar cap plasma and magnetic field values in response to the interplanetary magnetic cloud that caused the great storm of 31 March 2001: A case study for a new magnetospheric index. *Journal of Geophysical Research*, 112(A6). <https://doi.org/10.1029/2006JA012105>
- Østgaard, N., Humberset, B. K., & Laundal, K. M. (2011). Evolution of auroral asymmetries in the conjugate hemispheres during two substorms. *Geophysical Research Letters*, 38(3). <https://doi.org/10.1029/2010GL046057>
- Oughton, E. J., Skelton, A., Horne, R. B., Thomson, A. W. P., & Gaunt, C. T. (2017). Quantifying the daily economic impact of extreme space weather due to failure in electricity transmission infrastructure. *Space Weather*, 15(1), 65–83. <https://doi.org/10.1002/2016SW001491>
- Owens, M. J., Cargill, P. J., Pagel, C., Siscoe, G. L., & Crooker, N. U. (2005). Characteristic magnetic field and speed properties of interplanetary coronal mass ejections and their sheath regions. *Journal of Geophysical Research*, 110(A1). <https://doi.org/10.1029/2004JA010814>
- Owens, M. J., Riley, P., & Horbury, T. S. (2017). Probabilistic Solar Wind and Geomagnetic Forecasting Using an Analogue Ensemble or “Similar Day” Approach. *Solar Physics*, 292(5), 69. <https://doi.org/10.1007/s11207-017-1090-7>
- Öztürk, D. S., Garcia-Sage, K., & Connor, H. K. (2020). All hands on deck for ionospheric

- modeling. *Eos Transactions AGU*, 101. <https://doi.org/10.1029/2020EO144365>
- Ozturk, D. S., Zou, S., Ridley, A. J., & Slavin, J. A. (2018). Modeling study of geospace system response to the solar wind dynamic pressure enhancement on March 17, 2015. *Journal of Geophysical Research: Space Physics*, 123(4), 2974-2989. <https://doi.org/10.1002/2017JA025099>
- Pacini, A. A. (2017). Cosmic rays: Bringing messages from the sky to the Earth's surface. *Revista Brasileira de Ensino de Física*, 39(1). <https://doi.org/10.1590/1806-9126-RBEF-2016-0168>
- Paetzold, K. K., & Zschörner, H. (1961). An annual and a semiannual variation of the upper air density. *Geofísica Pura e Aplicata*, 48(1), 85-92. <https://doi.org/10.1007/BF01992371>
- Page, J. (1903). The Polar Aurora of October 30 – November 1, 1903. *Monthly Weather Review*, 31(12), 592-593. [https://doi.org/10.1175/1520-0493\(1903\)31\[592c:TPA00N\]2.0.CO;2](https://doi.org/10.1175/1520-0493(1903)31[592c:TPA00N]2.0.CO;2)
- Pakhotin, I. P., Mann, I. R., Xie, K., Burchill, J. K., & Knudsen, D. J. (2021). Northern preference for terrestrial electromagnetic energy input from space weather. *Nature Communications*, 21(199), 1-9. <https://doi.org/10.1038/s41467-020-20450-3>
- Pallochia, G. (2013). A sunward propagating fast wave in the magnetosheath observed after the passage of an interplanetary shock. *Journal of Geophysical Research*, 118(1), 331-339. <https://doi.org/10.1029/2012JA017851>
- Pallochia, G., Samsonov, A. A., Bavassano-Cattaneo, M. B., Marcucci, M. F., Rème, H., Carr, C. M., & Cao, J. B. (2010). Interplanetary shock transmitted into the Earth's magnetosheath: Cluster and Double Star observations. *Annales Geophysicae*, 28(5), 1141-1156. <https://doi.org/10.5194/angeo-28-1141-2010>
- Palmerio, E., Kilpua, E. K. J., & Savani, N. P. (2016). Planar magnetic structures in coronal mass ejection-driven sheath regions. *Annales Geophysicae*, 34(2), 313-322. <https://doi.org/10.5194/angeo-34-313-2016>
- Palmroth, M. (2003). *Solar wind-magnetosphere interaction as determined by observations and a global MHD simulation* (Ph.D thesis). University of Helsinki, Helsinki, Finland.
- Palmroth, M., Janhunen, P., Pulkkinen, T. I., & Koskinen, H. E. J. (2004). Ionospheric energy input as a function of solar wind parameters: global MHD simulation results. *Annales Geophysicae*, 22, 549-566. <https://doi.org/10.5194/angeo-22-549-2004>
- Palmroth, M., Partamies, N., Polvi, J., Pulkkinen, T. I., McComas, D. J., Barnes, R. J., Stauning, P., Smith, C. W., Singer, H. J., & Vainio, R. (2007). Solar wind-magnetosphere coupling efficiency for solar wind pressure impulses. *Geophysical Research Letters*, 34(11). <https://doi.org/10.1029/2006GL029059>
- Palmroth, M., Pulkkinen, T. I., Janhunen, P., McComas, D. J., Smith, C. W., & Koskinen, H. E. J. (2004). Role of solar wind dynamic pressure in driving ionospheric Joule heating. *Journal of Geophysical Research*, 109(A11), 1-7. <https://doi.org/10.1029/2004JA010529>
- Pan, Y., Jin, M., Zhang, S., & Deng, Y. (2021). TEC Map Completion Through a Deep Learning Model: SNP-GAN. *Space Weather*, 19(11), e2021SW002810. <https://doi.org/10.1029/2021SW002810>

- Paolini, F. R., & Theodoridis, G. C. (1967). Charged Particle Transmission Through Spherical Plate Electrostatic Analyzers. *Review of Scientific Instruments*, 38(5), 579-588. <https://doi.org/10.1063/1.1720771>
- Papadopoulos, K. (1979). The role of microturbulence on collisionless reconnection. In S.-I. Akasofu (Ed.), *Dynamics of the magnetosphere* (p. 289-309). Amsterdam, The Netherlands: Springer Netherlands. <https://doi.org/10.1007/978-94-009-9519-214>
- Pardini, C., & Anselmo, L. (2009). Assessment of the consequences of the Fengyun-1C breakup in low Earth orbit. *Advances in Space Research*, 44(5), 545-557. <https://doi.org/10.1016/j.asr.2009.04.014>
- Pardini, C., Anselmo, L., Moe, K., & Moe, M. M. (2010). Drag and energy accommodation coefficients during sunspot maximum. *Advances in Space Research*, 45(5), 638-650. <https://doi.org/10.1016/j.asr.2009.08.034>
- Park, J.-S., Kim, K.-H., Kwon, H.-J., Lee, E., Lee, D.-H., Jin, H., & Hwang, J. (2014). Statistical analysis of geosynchronous magnetic field perturbations near midnight during sudden commencements. *Journal of Geophysical Research: Space Physics*, 119(6), 4668-4680. <https://doi.org/10.1002/2013JA019380>
- Parker, E. N. (1958a). Dynamics of the interplanetary gas and magnetic fields. *The Astrophysical Journal*, 128, 664. <https://doi.org/10.1086/146579>
- Parker, E. N. (1958b). Superthermal particle generation on the solar corona. *The Astrophysical Journal*, 128, 677-685. <https://doi.org/10.1086/146580>
- Parker, E. N. (1961). Sudden expansion of the corona following a large solar flare and the attendant magnetic field and cosmic ray effects. *The Astrophysical Journal*, 133, 1014-1033. <https://doi.org/10.1086/147105>
- Parker, E. N. (1963). *Interplanetary dynamic processes*. Hoboken, NJ: Interscience.
- Parker, E. N. (1969). Theoretical studies of the solar wind phenomenon. *Space Science Reviews*, 9(3), 325-360. <https://doi.org/10.1007/BF00175236>
- Parker, E. N. (1979). *Cosmical magnetic fields: Their origin and their activity*. Oxford, United Kingdom: Oxford University Press.
- Parker, E. N. (1999). Space Physics before the Space Age. In S. R. Habbal & C. D. Halas (Eds.), *The solar wind nine conference* (Vol. 471). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.58782>
- Parker, E. N. (2001). A history of early work on the heliospheric magnetic field. *Journal of Geophysical Research*, 106(A8), 15797-15801. <https://doi.org/10.1029/2000JA000100>
- Parker, E. N. (2002). A history of the solar wind concept. In J. A. M. Bleeker, J. Geiss, & M. C. E. Huber (Eds.), *The century of space science*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Parkinson, W. C. (1940). Watheroo Magnetic Observatory January to March, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, 45(2), 233.
- Parks, G. K. (2004). *Physics of Space Plasmas*. Boulder, CO: Westview Press.
- Paschmann, G., Schwartz, S., Escoubet, C., & Haaland, S. (Eds.). (2005). *Outer magneto-*

- spheric boundaries: Cluster results* (Vol. 20). Amsterdam, The Netherlands: Springer Netherlands. <https://doi.org/10.1007/1-4020-4582-4>
- Passos, E., & Petrov, A. Y. (2008). Two-dimensional Lorentz-violating Chern-Simons-like action. *Phys. Lett. B*, *662*(5), 441-444. <https://doi.org/10.1016/j.physletb.2008.03.053>
- Patari, A., & Guha, A. (2023). Comparative study on the effects of CME and CIR-induced geomagnetic storms on the ionosphere of northern and southern hemispheric regions during the different phases of solar cycle 24. *Advances in Space Research*, *71*(12), 5147-5170. <https://doi.org/10.1016/j.asr.2023.02.010>
- Patel, B. H., Percivalle, C., Ritson, D. J., Duffy, C. D., & Sutherland, J. D. (2015). Common origins of RNA, protein and lipid precursors in a cyanosulfidic protometabolism. *Nature Chemistry*, *7*. <https://doi.org/10.1038/nchem.2202>
- Patel, V., & Cahill, L. (1974). Magnetic field variations of the SI in the magnetosphere and correlated effects in interplanetary space. *Planetary and Space Science*, *22*(7), 1117-1129. [https://doi.org/10.1016/0032-0633\(74\)90066-X](https://doi.org/10.1016/0032-0633(74)90066-X)
- Patel, V. L. (1968). Sudden impulses in the geomagnetotail. *Journal of Geophysical Research*, *73*(11), 3407-3419. <https://doi.org/10.1029/JA073i011p03407>
- Patel, V. L., & Coleman, P. J. (1970). Sudden impulses in the magnetosphere observed at synchronous orbit. *Journal of Geophysical Research*, *75*(34), 7255-7260. <https://doi.org/10.1029/JA075i034p07255>
- Pathak, K., Devi, M., Barbara, A. K., & Zahan, Y. (2018). Growth of L-band scintillation at anomaly crest station in association with strong TEC gradient: A study covering wide solar activity period. *Indian Journal of Physics*, *92*(7), 819-825. <https://doi.org/10.1007/s12648-018-1165-9>
- Patterson, C. J., Wild, J. A., & Boteler, D. H. (2023). Modeling the Impact of Geomagnetically Induced Currents on Electrified Railway Signaling Systems in the United Kingdom. *Space Weather*, *21*(3), e2022SW003385. <https://doi.org/10.1029/2022SW003385>
- Pattison, W. D. (1957). *Beginnings of the American Rectangular Land Survey System, 1784-1800* (Ph.D thesis). The University of Chicago, Chicago, Illinois.
- Paulson, K. W., Taylor, D. K., Smith, C. W., Vasquez, B. J., & Hu, Q. (2012). Advance warning of high-speed ejecta based on real-time shock analyses: When fast-moving ejecta appear to be overtaking slow-moving shocks. *Space Weather*, *10*(12). <https://doi.org/10.1029/2012SW000855>
- Paxton, L. J., & Zhang, Y. (2016). Far Ultraviolet Imaging of the Aurora. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 213-244). Boca Raton, FL: CRC Press.
- Peoples, C. (2008). *Sputnik* and 'skill thinking' revisited: technological determinism in American responses to the Soviet missile threat. *Cold War History*, *8*(1), 55-75. <https://doi.org/10.1080/14682740701791334>
- Pérez-Alanis, C. A., Janvier, M., Nieves-Chinchilla, T., Aguilar-Rodríguez, E., Démoulin, P., & Corona-Romero, P. (2023). Statistical Analysis of Interplanetary Shocks from Mercury to Jupiter. *Solar Physics*, *298*(60). <https://doi.org/10.1007/s11207-023-02152-3>

- Pérez-Victoria, M. (1999). Exact calculation of the radiatively induced Lorentz and CPT violation in QED. *Phys. Rev. Lett.*, *83*, 2518-2521. <https://doi.org/10.1103/PhysRevLett.83.2518>
- Peristykh, A. N., & Damon, P. E. (2003). Persistence of the Gleissberg 88-year solar cycle over the last $\sim 12,000$ years: Evidence from cosmogenic isotopes. *Journal of Geophysical Research*, *108*(A1), SSH 1-1-SSH 1-15. <https://doi.org/10.1029/2002JA009390>
- Perlono, N. J., & Ridley, A. J. (2016). Universal time effect in the response of the thermosphere to electric field changes. *Journal of Geophysical Research: Space Physics*, *121*(4), 3681–3698. <https://doi.org/10.1002/2015JA021636>
- Perosanz, F., Biancale, R., Loyer, S., Lemoine, J.-M., Perret, A., Touboul, P., Foulon, B., Pradels, G., Grunwald, L., Fayard, T., Vales, N., & Sarrailh, M. (2003). On board evaluation of the STAR accelerometer. In *First champ mission results for gravity, magnetic and atmospheric studies* (pp. 11–18). New York, NY: Springer. <https://doi.org/10.1007/978-3-540-38366-6-2>
- Perreault, P., & Akasofu, S.-I. (1978). A study of geomagnetic storms. *Geophys. J. Roy. Astron. Soc.*, *54*(3), 547–573. <https://doi.org/10.1111/j.1365-246X.1978.tb05494.x>
- Peskin, M. E., & Schroeder, D. V. (1995). *An introduction to quantum field theory*. Reading, MA: Perseus Books.
- Pesnell, W. D. (2015). Predictions of solar cycle 24: How are we doing? *Space Weather*, *14*(1), 10-21. <https://doi.org/10.1002/2015SW001304>
- Pesses, M. E., Tsurutani, B. T., Van Allen, J. A., & Smith, E. J. (1979). Acceleration of energetic protons by interplanetary shocks. *Journal of Geophysical Research*, *84*(A12), 7297–7301. <https://doi.org/10.1029/JA084iA12p07297>
- Peterson, A. W. (1979). Airglow events visible to the naked eye. *Applied Optics*, *18*(20), 3390-3393. <https://doi.org/10.1364/AO.18.003390>
- Petrinec, S. M., & Russell, C. T. (1996). Near-Earth magnetotail shape and size as determined from the magnetopause flaring angle. *Journal of Geophysical Research*, *101*(A1), 137–152. <https://doi.org/10.1029/95JA02834>
- Petrukovich, A. A. (2006). The elusive onset of geomagnetic substorms. *Science*, *321*(5891), 920-921. <https://doi.org/10.1126/science.1162426>
- Petschek, H. E. (1958). Aerodynamic dissipation. *Reviews of Modern Physics*, *30*, 966–974. <https://doi.org/10.1103/RevModPhys.30.966>
- Pevtsov, A. A., Tlatova, K. A., Pevtsov, A. A., Heikkinen, E., Virtanen, I., Karachik, N. V., Bertello, L., Tlatov, A. G., Ulrich, R., & Mursula, K. (2019). Reconstructing solar magnetic fields from historical observations. *Astronomy & Astrophysics*, *628*(A13). <https://doi.org/10.1051/0004-6361/201834985>
- Pfaff, R. F., Borovsky, J. E., & Young, D. T. (Eds.). (1998). *Measurement Techniques in Space Plasmas: Particles*, Geophysical Monograph Series (Vol. 102). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM102>
- Piccinelli, R., & Krausmann, E. (2018). North Europe power transmission system vulnerability during extreme space weather. *Journal of Space Weather and Space Climate*,

8(A03). <https://doi.org/10.1051/swsc/2017033>

- Picone, J. M., Emmert, J. T., & Lean, J. L. (2005). Thermospheric densities derived from spacecraft orbits: Accurate processing of two-line element sets. *Journal of Geophysical Research*, *110*(A3). <https://doi.org/10.1029/2004JA010585>
- Picone, J. M., Hedin, A. E., Drob, D. P., & Aikin, A. C. (2002). NRLMSISE-00 empirical model of the atmosphere: Statistical comparisons and scientific issues. *Journal of Geophysical Research*, *107*(A12), SIA 15-1–SIA 15-16. <https://doi.org/10.1029/2002JA009430>
- Piddington, J. H. (1965). The magnetosphere and its environments. *Planetary and Space Science*, *13*(5), 363-376. [https://doi.org/10.1016/0032-0633\(65\)90029-2](https://doi.org/10.1016/0032-0633(65)90029-2)
- Piel, A. (2010). *Plasma Physics*. New York, NY: Springer.
- Piersanti, M., & Carter, B. (2020). Geomagnetically induced currents. In M. Materassi, B. Forte, A. J. Coster, & S. Skone (Eds.), *The Dynamical Ionosphere: A Systems Approach to Ionospheric Irregularity* (p. 121-134). Amsterdam, The Netherlands: Elsevier. <https://doi.org/10.1016/B978-0-12-814782-5.00010-8>
- Piersanti, M., De Michelis, P., Del Moro, D., Tozzi, R., Pezzopane, M., Consolini, G., Marcucci, M. F., Laurenza, M., Di Matteo, S., Pignalberi, A., Quattrocioni, V., & Diego, P. (2020). From the Sun to Earth: effects of the 25 August 2018 geomagnetic storm. *Annales Geophysicae*, *38*, 703-724. <https://doi.org/10.5194/angeo-38-703-2020>
- Piersanti, M., Di Matteo, S., Carter, B. A., Currie, J., & D'Angelo, G. (2019). Geoelectric Field Evaluation During the September 2017 Geomagnetic Storm: MA.I.G.I.C. Model. *Space Weather*, *17*(8), 1241-1256. <https://doi.org/10.1029/2019SW002202>
- Pilinski, M., Crowley, G., Seaton, M., & Sutton, E. (2019). Dragster: An Assimilative Tool for Satellite Drag Specification. In S. Ryan (Ed.), *Advanced Maui Optical and Space Surveillance Technologies Conference*. Maui, Hawaii.
- Pilipenko, V. A., Bravo, M., Romanova, N. V., Kozyreva, O. V., Samsonov, S. N., & Ya. A. Sakharov. (2018). Geomagnetic and ionospheric responses to the interplanetary shock wave of march 17, 2015. *Izvestiya, Physics of the Solid Earth*, *54*(5), 721-740. <https://doi.org/10.1134/S1069351318050129>
- Pilipenko, V. A., Fedorov, E. N., Xu, Z., Hartinger, M. D., Engebretson, M. J., & Edwards, T. R. (2020). Incidence of Alfvénic SC Pulse Onto the Conjugate Ionospheres. *Journal of Geophysical Research: Space Physics*, *125*(2), e2019JA027397. <https://doi.org/10.1029/2019JA027397>
- Pinzon-Cortes, S., Gómez-Pérez, N., & Domínguez, S. V. (2024). Ring Current Local Time Dependence during geomagnetic storms using equatorial Dst - proxies. *Preprint Research Square*. <https://doi.org/10.21203/rs.3.rs-3900907/v1>
- Pirjola, R. (1982). Electromagnetic induction in the Earth by a plane wave or by fields of line currents harmonic in time and space. *Geophysica*, *18*(1-2), 1-161.
- Pirjola, R. (2000). Geomagnetically induced currents during magnetic storms. *IEEE Trans. Plasma Sci.*, *28*(6), 1867-1873. <https://doi.org/10.1109/27.902215>
- Pirjola, R. (2002). Review on the calculation of surface electric and magnetic fields and of

- geomagnetically induced currents in ground-based technological systems. *Surveys in Geophysics*, 23(1), 71–90. <https://doi.org/10.1023/A:1014816009303>
- Pirjola, R. (2012). Geomagnetically induced currents as ground effects of space weather. In H. J. M. Cuesta (Ed.), *Space science* (p. 27-44). Rijeka, Croatia: InTech. <https://doi.org/10.5772/29840>
- Pitout, F., Marchaudon, A., Blelly, P.-L., Bai, X., Forme, F., Buchert, S. C., & Lorentzen, D. A. (2015). Swarm and ESR observations of the ionospheric response to a field-aligned current system in the high-latitude midnight sector. *Geophysical Research Letters*, 42(11), 4270-4279. <https://doi.org/10.1002/2015GL064231>
- Pizzo, V. (1978). A three-dimensional model of corotating streams in the solar wind, 1. Theoretical foundations. *Journal of Geophysical Research*, 83(A12), 5563-5572. <https://doi.org/10.1029/JA083iA12p05563>
- Pizzo, V. J. (1985). Interplanetary shocks on the large scale: A retrospective on the last decade's theoretical efforts. In R. G. Stone & B. T. Tsurutani (Eds.), *Collisionless shocks in the heliosphere: Reviews of current research*, Geophysical Monograph Series (Vol. 35, p. 51-68). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0051>
- Pizzo, V. J. (1991). The evolution of corotating stream fronts near the ecliptic plane in the inner solar system: 2. Three-dimensional tilted-dipole fronts. *Journal of Geophysical Research*, 96(A4), 5405-5420. <https://doi.org/10.1029/91JA00155>
- Plakidis, F., Anastasiadis, M. A., & Chrysanthis, A. (1940). ΦΑΙΟΜΕΝΑ ΒΟΡΕΙΟΥ ΣΕΔΑΟΣ ΕΝ ΕΔΔΑΔΙ ΤΗ 24 η ΚΑΙ 29 η ΜΑΡΤΙΟΥ 1940. ΠΑΚΤΙΚΑ ΤΗΣ ΑΚΑΔΗΜΙΑΣ ΑΘΗΝΩΝ, 15, 417-421.
- Pollock, C., Moore, T., Jacques, A., Burch, J., Gliese, U., Saito, Y., Omoto, T., Avanov, L., Barrie, A., Coffey, V., Dorelli, J., Gershman, D., Giles, B., Rosnack, T., Salo, C., Yokota, S., Adrian, M., Aoustin, C., Auletta, C., Aung, S., Bigio, V., Cao, N., Chandler, M., Chornay, D., Christian, K., Clark, G., Collinson, G., Corris, T., De Los Santos, A., Devlin, R., Diaz, T., Dickerson, T., Dickson, C., Diekmann, F., A. and Diggs, Duncan, C., Figueroa-Viñas, A., Firman, C., Freeman, M., Galassi, N., Garcia, K., Goodhart, G., Guererro, D., Hageman, J., Hanley, J., Hemminger, E., Holland, M., Hutchins, M., James, T., Jones, W., Kreisler, S., Kujawski, J., Lavu, V., Lobell, J., LeCompte, E., Lukemire, A., MacDonald, E., Mariano, A., Mukai, T., Narayanan, K., Nguyen, Q., Onizuka, M., Paterson, W., Persyn, S., Piepgrass, B., Cheney, F., Rager, A., Raghuram, T., Ramil, A., Reichenthal, L., Rodriguez, H., Rouzaud, J., Rucker, A., Saito, Y., Samara, M., Sauvaud, J.-A., Schuster, D., Shappirio, M., Shelton, K., Sher, D., Smith, D., Smith, K., Smith, S., Steinfeld, D., Szymkiewicz, R., Tanimoto, K., Taylor, J., Tucker, C., Tull, K., Uhl, A., Vloet, J., Walpole, P., Weidner, S., White, D., Winkert, G., Yeh, P.-S., & Zeuch, M. (2016). Fast Plasma Investigation for Magnetospheric Multiscale. *Space Science Reviews*, 199(1-4), 331-406. <https://doi.org/10.1007/s11214-016-0245-4>
- Polyanin, A. D., & Manzhurov, A. V. (2007). *Handbook of Mathematics for Engineers and Scientists*. Boca Raton, Florida: Chapman & Hall/CRC.
- Potemra, T. A. (Ed.). (1984). *Magnetospheric Currents*, Geophysical Monograph Series (Vol. 28). Washington, D.C.: American Geophysical Union.

<https://doi.org/10.1029/GM028>

- Powell, K. G., Roe, P. L., Linde, T. J., Gombosi, T. I., & De Zeeuw, D. L. (1999). A solution-adaptive upwind scheme for ideal magnetohydrodynamics. *Journal of Computational Physics*, *154*(2), 284–309. <https://doi.org/10.1006/jcph.1999.6299>
- Poynting, J. H. (1884). On the transfer of energy in the electromagnetic field. *Philosophical Transactions of the Royal Society of London*, *175*, 343–361. <https://doi.org/10.1098/rstl.1884.0016>
- Prangé, R., Pauller, L., Hansen, K. C., Howard, R., Vourlidis, A., Courtin, R., & Parkinson, C. (2004). An interplanetary shock traced by planetary auroral storms from the Sun to Saturn. *Nature*, *432*, 78–81. <https://doi.org/10.1038/nature02986>
- Price, P. R. (2002). Geomagnetically induced current effects on transformers. *IEEE Power Engineering Review*, *22*(6), 62–62. <https://doi.org/10.1109/MPER.2002.4312311>
- Priest, E. F. (1981). *Solar Magnetohydrodynamics*. Dordrecht, Holland: D. Reidel Publishing.
- Priest, E. R., & Forbes, T. G. (2000). *Magnetic reconnection: Mhd theory and applications*. Cambridge, United Kingdom: Cambridge University Press.
- Prieto, D. M., Graziano, B. P., & Roberts, P. C. E. (2014). Spacecraft drag modelling. *Progress in Aerospace Sciences*, *64*, 56–65. <https://doi.org/10.1016/j.paerosci.2013.09.001>
- Prölss, G. (2011). Density perturbations in the upper atmosphere caused by the dissipation of solar wind energy. *Surveys in Geophysics*, *32*(2), 101–195. <https://doi.org/10.1007/s10712-010-9104-0>
- Prölss, G. W. (1980). Magnetic storm associated perturbations of the upper atmosphere: Recent results obtained by satellite-borne gas analyzers. *Reviews of Geophysics*, *18*(1), 183–202. <https://doi.org/10.1029/RG018i001p00183>
- Prölss, G. W. (1987). Storm-induced changes in the thermospheric composition at middle latitudes. *Planetary and Space Science*, *35*(6), 807–811. [https://doi.org/10.1016/0032-0633\(87\)90041-9](https://doi.org/10.1016/0032-0633(87)90041-9)
- Prölss, G. W. (1993). Common origin of positive ionospheric storms at middle latitudes and the geomagnetic activity effect at low latitudes. *Journal of Geophysical Research*, *98*(A4), 5981–5991. <https://doi.org/10.1029/92JA02777>
- Prölss, G. W. (1997). Magnetic storm associated perturbations of the upper atmosphere. In B. T. Tsurutani, W. D. Gonzalez, Y. Kamide, & J. K. Arballo (Eds.), *Magnetic Storms*, Geophysical Monograph Series (Vol. 98, p. 227–241). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM098p0227>
- Prölss, G. W., & Bird, M. K. (2004). *Physics of the earth's space environment*. Berlin, Germany: Springer. <https://doi.org/10.1007/978-3-642-97123-5>
- Pudovkin, M. (1991). Physics of magnetospheric substorms: A review. In J. R. Kan, S. K. T. A. Potemr and, & T. Iijima (Eds.), *Magnetospheric Substorms*, Geophysical Monograph Series (Vol. 64, p. 17–27). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM064p0017>
- Pudovkin, M. I., Zaitseva, S. A., & Besser, B. P. (1997). The magnetopause erosion and the

- magnetosheath magnetic field penetration into the dayside magnetosphere. *Advances in Space Research*, 19(12), 1909-1912. [https://doi.org/10.1016/S0273-1177\(97\)00099-9](https://doi.org/10.1016/S0273-1177(97)00099-9)
- Pulkkinen, A. (2003). *Geomagnetic induction during highly disturbed space weather conditions: Studies of ground effects* (Ph.D thesis). University of Helsinki, Helsinki, Finland.
- Pulkkinen, A. (2015). Geomagnetically Induced Currents Modeling and Forecasting. *Space Weather*, 13(11), 734-736. <https://doi.org/10.1002/2015SW001316>
- Pulkkinen, A., Bernabeu, E., Eichner, J., Beggan, C., & Thomson, A. W. P. (2012). Generation of 100-year geomagnetically induced current scenarios. *Space Weather*, 10(4). <https://doi.org/10.1029/2011SW000750>
- Pulkkinen, A., Bernabeu, E., Eichner, J., Viljanen, A., & Ngwira, C. (2015). Regional-scale high-latitude extreme geoelectric fields pertaining to geomagnetically induced currents. *Earth, Planets and Space*, 58(93). <https://doi.org/10.1186/s40623-015-0255-6>
- Pulkkinen, A., Bernabeu, E., Thomson, A., Viljanen, A., Pirjola, R., Boteler, D., Eichner, J., Cilliers, P. J., Welling, D., Savani, N. P., Weigel, R. S., Love, J. J., Balch, C., Ngwira, C. M., Crowley, G., Schultz, A., Kataoka, R., Anderson, B., Fugate, D., Simpson, J. J., & MacAlester, M. (2017). Geomagnetically induced currents: Science, engineering, and applications readiness. *Space Weather*, 15(7), 828-856. <https://doi.org/10.1002/2016SW001501>
- Pulkkinen, A., Hesse, M., Van der Zel, S. H. L., Damsky, B., Policelli, F., Fugate, D., Jacobs, W., & Creamer, E. (2010). Solar shield: forecasting and mitigating space weather effects on high-voltage power transmission systems. *Natural Hazards*, 53(2), 333-345. <https://doi.org/10.1007/s11069-009-9432-x>
- Pulkkinen, A., Kuznetsova, K., Ridley, A., Raeder, J., Vapirev, A., Weimer, D., Weigel, R. S., Wiltberger, M., Millward, G., Rastätter, L., Hesse, M., Singer, H. J., & Chulaki, A. (2011). Geospace environment modeling 2008-2009 challenge: Ground magnetic field perturbations. *Space Weather*, 9(2). <https://doi.org/10.1029/2010SW000600>
- Pulkkinen, A., Lindahl, S., Viljanen, A., & Pirjola, R. (2005). Geomagnetic storm of 29-31 October 2003: Geomagnetically induced currents and their relation to problems in the Swedish high-voltage power transmission system. *Space Weather*, 3(8). <https://doi.org/10.1029/2004SW000123>
- Pulkkinen, A., Pirjola, R., Boteler, D., Viljanen, A., & Yegorov, I. (2001). Modelling of space weather effects on pipelines. *Journal of Applied Geophysics*, 48(4), 233-256. [https://doi.org/10.1016/S0926-9851\(01\)00109-4](https://doi.org/10.1016/S0926-9851(01)00109-4)
- Pulkkinen, A., Pirjola, R., & Viljanen, A. (2007). Determination of ground conductivity and system parameters for optimal modeling of geomagnetically induced current flow in technological systems. *Earth, Planets and Space*, 59, 999-1006. <https://doi.org/10.1186/BF03352040>
- Pulkkinen, A., Rastatter, L., Kuznetsova, M., Singer, H., Balch, C., Weimer, D., Tóth, G., Ridley, A., Gombosi, T., Wiltberger, M., Raeder, J., & Weigel, R. (2013). Community-wide validation of geospace model ground magnetic field perturbation predictions to support model transition to operations. *Space Weather*, 11(6), 369-385. <https://doi.org/10.1002/swe.20056>

- Pulkkinen, A., Viljanen, A., Pajunpää, K., & Pirjola, R. (2001). Recordings and occurrence of geomagnetically induced currents in the Finnish natural gas pipeline network. *Journal of Applied Geophysics*, *48*(4), 219-231. [https://doi.org/10.1016/S0926-9851\(01\)00108-2](https://doi.org/10.1016/S0926-9851(01)00108-2)
- Pulkkinen, T. (2007). Space Weather: Terrestrial Perspective. *Living Reviews in Solar Physics*, *4*(1), 1-60. <https://doi.org/10.12942/lrsp-2007-1>
- Pulkkinen, T. I., Baker, D. N., Wiltberger, M., Goodrich, C., Lopez, R. E., & Lyon, J. G. (1998). Pseudobreakup and substorm onset: Observations and MHD simulations compared. *Journal of Geophysical Research*, *103*(A7), 14847-14854. <https://doi.org/10.1029/97JA03244>
- Přech, L., Němeček, Z., & Šafránková, J. (2008). Response of magnetospheric boundaries to the interplanetary shock: THEMIS contribution. *Geophysical Research Letters*, *35*(17). <https://doi.org/10.1029/2008GL033593>
- Pytte, T., McPherron, R. L., & Kokubun, S. (1976). The ground signatures of the expansion phase during multiple onset substorms. *Planetary and Space Science*, *24*, 1115-1132. [https://doi.org/10.1016/0032-0633\(76\)90149-5](https://doi.org/10.1016/0032-0633(76)90149-5)
- Qian, L., Burns, A. G., Emery, B. A., Foster, B., Lu, G., Maute, A., Richmond, A. D., Roble, R. G., Solomon, S. C., & Wang, W. (2013). The NCAR TIE-GCM: A Community Model of the Coupled Thermosphere/Ionosphere System. In J. Huba, R. Schunk, & G. Khazanov (Eds.), *Modeling the ionosphere-thermosphere system*, Geophysical Monograph Series (Vol. 201). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118704417.ch7>
- Qian, L., & Solomon, S. C. (2012). Thermospheric density: An overview of temporal and spatial variations. *Space Science Reviews*, *168*(1-4), 147-173. <https://doi.org/10.1007/s11214-011-9810-z>
- Rae, I. J., Donovan, E. F., Mann, I. R., Fenrich, F. R., Watt, C. E. J., Milling, D. K., Lester, M., Lavraud, B., Wild, J. A., Singer, H. J., Rème, H., & Balogh, A. (2005). Evolution and characteristics of global Pc5 ULF waves during a high solar wind speed interval. *Journal of Geophysical Research*, *110*(A12). <https://doi.org/10.1029/2005JA011007>
- Raeder, J. (1999). Modeling the magnetosphere for northward interplanetary magnetic field: Effects of electrical resistivity. *Journal of Geophysical Research*, *104*(A8), 17,357-17,367. <https://doi.org/10.1029/1999JA900159>
- Raeder, J. (2003). Global Magnetohydrodynamics: A Tutorial Review. In J. Buchner, C. T. Dum, & M. Scholer (Eds.), *Space Plasma Simulation* (pp. 1-20). Springer Verlag, Berlin Heidelberg, New York. https://doi.org/10.1007/3-540-36530-3_11
- Raeder, J., Berchem, J., & Ashour-Abdalla, M. (1998). The Geospace Environment Modeling Grand Challenge: Results from a Global Geospace Circulation Model. *Journal of Geophysical Research*, *103*(A7), 14787-14797. <https://doi.org/10.1029/98JA00014>
- Raeder, J., Cramer, W. D., Germaschewski, K., & Jensen, J. (2016). Using OpenG-GCM to compute and separate magnetosphere magnetic perturbations measured on board low Earth orbiting satellites. *Space Science Reviews*, *206*(1-4), 601-620. <https://doi.org/10.1007/s11214-016-0304-x>

- Raeder, J., Cramer, W. D., Jensen, J., Fuller-Rowell, T., Maruyama, N., Toffoletto, F., & Vo, H. (2016). Sub-Auroral Polarization Streams: A complex interaction between the magnetosphere, ionosphere, and thermosphere. *Journal of Physics: Conference Series*, *767*(1), 1–10. <https://doi.org/10.1088/1742-6596/767/1/012021>
- Raeder, J., Larson, D., Li, W., Kepko, E. L., & Fuller-Rowell, T. (2008). OpenG-GCM simulations for the THEMIS mission. *Space Science Reviews*, *141*, 535-555. <https://doi.org/10.1007/978-0-387-89820-9-22>
- Raeder, J., & Lu, G. (2005). Polar cap potential saturation during large geomagnetic storms. *Advances in Space Research*, *36*(10), 1804-1808. <https://doi.org/10.1016/j.asr.2004.05.010>
- Raeder, J., McPherron, R. L., Frank, L. A., Kokubun, S., Lu, G., Mukai, T., Paterson, W. R., Sigwarth, J. B., Singer, H. J., & Slavin, J. A. (2001). Global simulation of the Geospace Environment Modeling substorm challenge event. *Journal of Geophysical Research*, *106*(A1), 381-395. <https://doi.org/10.1029/2000JA000605>
- Raeder, J., Wang, Y., Fuller-Rowell, T., & Singer, H. (2001). Global simulation of magnetospheric space weather effects of the Bastille Day storm. *Solar Physics*, *204*(1), 323-337. <https://doi.org/10.1023/A:1014228230714>
- Raeder, J., Wang, Y., & Fuller-Rowell, T. J. (2001). Geomagnetic storm simulation with a Coupled Magnetosphere-Ionosphere-Thermosphere model. In P. Song & H. J. Siscoe (Eds.), *Space Weather*, Geophysical Monograph Series (Vol. 125, p. 377-384). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM125p0377>
- Raeder, J., Zhu, P., Ge, Y., & Siscoe, G. (2012). Auroral signatures of ballooning mode near substorm onset: OpenGGCM simulations. In A. Keiling, E. Donovan, & T. Karlson (Eds.), *Auroral phenomenology and magnetospheric processes: Earth and other planets*, Geophysical Monograph Series (Vol. 197, p. 389-396). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/2011GM001200>
- Raghav, A. N., Choraghe, K., & Shaikh, Z. I. (2019). The cause of an extended recovery from an ICME-induced extreme geomagnetic storm: a case study. *Monthly Notices of the Royal Astronomical Society*, *488*(1), 910-917. <https://doi.org/10.1093/mnras/stz1608>
- Raghav, A. N., Kule, A., Bhaskar, A., Mishra, W., Vichare, G., & Surve, S. (2018). Torsional Alfvén Wave Embedded ICME Magnetic Cloud and Corresponding Geomagnetic Storm. *The Astrophysical Journal*, *860*(1). <https://doi.org/10.3847/1538-4357/aabba3>
- Ramesh, K. B. (2010). Coronal mass ejections and sunspots – A perspective. *The Astrophysical Journal Letters*, *712*(1), L77–L80. <https://doi.org/10.1088/2041-8205/712/1/L77>
- Rangaswami, M. R. (1940). Alibag Magnetic Observatory January to March, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, *45*(3), 382-383. <https://doi.org/10.1029/TE045i003p00382>
- Rankine, W. J. M. (1870). XV. On the thermodynamic theory of waves of finite longitudinal disturbance. *Philosophical Transactions of the Royal Society of London*, *160*, 277-288.

<https://doi.org/10.1098/rstl.1870.0015>

- Rao, P. V. S. R., Krishna, S. G., Prasad, J. V., Prasad, S. N. V. S., Prasad, D. S. V. V. D., & Niranjana, K. (2009). Geomagnetic storm effects on GPS based navigation. *Annales Geophysicae*, *27*, 2101–2110. <https://doi.org/10.5194/angeo-27-2101-2009>
- Rasio, F. A., & Ford, E. B. (1996). Dynamical instabilities and the formation of extrasolar planetary systems. *Science*, *274*(5289), 954–956. <https://doi.org/10.1126/science.274.5289.954>
- Rastätter, L., Kuznetsova, M. M., Glocer, A., Welling, D., Meng, X., Raeder, J., Wiltberger, M., Jordanova, V. K., Yu, Y., Zaharia, S., Weigel, R. S., Sazykin, S., Boynton, R., Wei, H., Eccles, V., Horton, W., Mays, M. L., & Gannon, J. (2013). Geospace Environment Modeling 2008-2009 challenge: Dst index. *Space Weather*, *11*(4), 187–205. <https://doi.org/10.1002/swe.20036>
- Rastätter, L., Shim, J. S., Kuznetsova, M. M., Kilcommons, L. M., Knipp, D. J., Codrescu, M., Fuller-Rowell, T., Emery, B., Weimer, D. R., Cosgrove, R., Wiltberger, M., Raeder, J., Li, W., Tóth, G., & Welling, D. (2016). GEM-CEDAR challenge: Poynting flux at DMSP and modeled Joule heat. *Space Weather*, *14*(2), 113–135. <https://doi.org/10.1002/2015SW001238>
- Rastätter, L., Tóth, G., Kuznetsova, M. M., & Pulkkinen, A. A. (2014). CalcDeltaB: An efficient postprocessing tool to calculate ground-level magnetic perturbations from global magnetosphere simulations. *Space Weather*, *12*(9), 553–565. <https://doi.org/10.1002/2014SW001083>
- Rastogi, R. G. (1999). Signatures of storm sudden commencements in geomagnetic H, Y and Z fields at Indian observatories during 1958-1992. *Advances in Space Research*, *17*, 1426–1438. <https://doi.org/10.1007/s00585-999-1426-1>
- Ravishankar, A., & Michałek, G. (2019). Estimation of Arrival Time of Coronal Mass Ejections in the Vicinity of the Earth Using Solar and Heliospheric Observatory and Solar TERrestrial RELations Observatory Observations. *Solar Physics*, *294*(9), 125. <https://doi.org/10.1007/s11207-019-1470-2>
- Reames, D. V. (1999). Particle acceleration at the sun and in the heliosphere. *Space Science Reviews*, *9*(3), 413–491. <https://doi.org/10.1023/A:1005105831781>
- Reber, C. A., & Nicolet, M. (1965). Investigation of the major constituents of the April–May 1963 heterosphere by the Explorer XVII satellite. *Planetary and Space Science*, *13*(7), 617–646. [https://doi.org/10.1016/0032-0633\(65\)90043-7](https://doi.org/10.1016/0032-0633(65)90043-7)
- Rebhan, H., Aguirre, M., & Johannessen, J. (2000). The Gravity Field and Steady-State Ocean Circulation Explorer Mission - GOCE. *ESA Earth Observation Quarterly*, *66*, 6–11.
- Reddy, C. A. (1989). The equatorial electrojet. *Pure Appl. Geophys.*, *132*(3), 485–508. <https://doi.org/10.1007/BF00876841>
- Redmon, R. J., Denig, W. F., Kilcommons, L. M., & Knipp, D. J. (2017). New DMSP database of precipitating auroral electrons and ions. *Journal of Geophysical Research: Space Physics*, *122*(8), 9056–9067. <https://doi.org/10.1002/2016JA023339>
- Rees, M. H. (1963). Auroral ionization and excitation by incident energetic electrons. *Planetary and Space Science*, *11*(10), 1209–1218. <https://doi.org/10.1016/0032->

- Rees, M. H. (1989). *Physics and chemistry of the upper atmosphere*. New York, NY: Cambridge University Press.
- Reeves, G. D., & Henderson, M. G. (2001). The storm-substorm relationship: Ion injections in geosynchronous measurements and composite energetic neutral atom images. *Journal of Geophysical Research*, *106*(A4), 5833-5844. <https://doi.org/10.1029/2000JA003017>
- Reeves, G. D., McAdams, K. L., Friedel, R. H. W., & O'Brien, T. P. (2003). Acceleration and loss of relativistic electrons during geomagnetic storms. *Geophysical Research Letters*, *30*(10). <https://doi.org/10.1029/2002GL016513>
- Reif, F. (2009). *Fundamentals of statistical and thermal physics*. Long Grove, IL: Waveland Press, Inc., Illinois.
- Reiff, P. H. (1984). Models of auroral-zone conductances. In T. A. Potemra (Ed.), *Magnetospheric Currents*, Geophysical Monograph Series (Vol. 28, pp. 180–191). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM028p0180>
- Reiff, P. H., Daou, A. G., Sazykin, S. Y., Nakamura, R., Hairston, M. R., Coffey, V., Chandler, M. O., Anderson, B. J., Russell, C. T., Welling, D., Fuselier, S. A., & Genestreti, K. J. (2016). Multispacecraft observations and modeling of the 22/23 June 2015 geomagnetic storm. *Geophysical Research Letters*, *43*, 7311-7318. <https://doi.org/10.1002/2016GL069154>
- Reigber, C., Balmino, G., Schwintzer, P., Biancale, R., Bode, A., Lemoine, J.-M., König, R., Loyer, S., Neumayer, H., Marty, J.-C., Barthelmes, F., Perosanz, F., & Zhu, S. Y. (2002). A high-quality global gravity field model from CHAMP GPS tracking data and accelerometry (EIGEN-1S). *Geophysical Research Letters*, *29*(14), 37-1-37-4. <https://doi.org/10.1029/2002GL015064>
- Reigber, C., Lühr, H., & Schwintzer, P. (2002). CHAMP mission status. *Advances in Space Research*, *30*(2), 129-134. [https://doi.org/10.1016/S0273-1177\(02\)00276-4](https://doi.org/10.1016/S0273-1177(02)00276-4)
- Rentz, S., & Lühr, H. (2008). Climatology of the cusp-related thermospheric mass density anomaly, as derived from CHAMP observations. *Annales Geophysicae*, *26*, 2807–2823. <https://doi.org/10.5194/angeo-26-2807-2008>
- Reyes, P. I., Pinto, V. A., & Moya, P. S. (2021). Geomagnetic Storm Occurrence and Their Relation With Solar Cycle Phases. *Space Weather*, *19*(9), e2021SW002766. <https://doi.org/10.1029/2021SW002766>
- Ribeiro, P., Vaquero, J. M., Gallego, M. C., & Trigo, R. M. (2016). The First Documented Space Weather Event That Perturbed the Communication Networks in Iberia. *Space Weather*, *14*(7), 464-468. <https://doi.org/10.1002/2016SW001424>
- Ribeiro, P., Vaquero, J. M., & Trigo, R. M. (2011). Geomagnetic records of Carrington's storm from Guatemala. *Journal of Atmospheric and Solar-Terrestrial Physics*, *73*(2-3), 308-315. <https://doi.org/10.1016/j.jastp.2009.12.017>
- Rice, D., & Sojka, J. J. (2015). Historical comparisons of IRI and early ionograms. *Advances in Space Research*, *55*(8), 2003-2011. <https://doi.org/10.1016/j.asr.2014.05.035>
- Rich, F. J. (1994). *Users' Guide for the Topside Ionospheric Plasma Monitor (SSIIES,*

- SSIES-2 and SSIES-3) on Spacecraft of the Defense Meteorological Satellite Program* (Tech. Rep.). Vol. 1, Hanscom Air Force Base, MA: Air Force Phillips Laboratory.
- Rich, F. J., Bono, J. M., Burke, W. J., & Gentile, L. C. (2007). A space-based proxy for the dst index. *Journal of Geophysical Research*, *112*(A5). <https://doi.org/10.1029/2005JA011586>
- Rich, F. J., & Denig, W. F. (1992). The major magnetic storm of March 13-14, 1989 and associated ionosphere effects. *Canadian Journal of Physics*, *70*(7), 510-525. <https://doi.org/10.1139/p92-086>
- Rich, F. J., & Hairston, M. (1994). Large-scale convection patterns observed by DMSP. *Journal of Geophysical Research*, *99*(A3), 3827-3844. <https://doi.org/10.1029/93JA03296>
- Richards, P. G. (2013). Reevaluation of thermosphere heating by auroral electrons. *Advances in Space Research*, *51*(4), 610-619. <https://doi.org/10.1016/j.asr.2011.09.004>
- Richardson, I., & Cane, H. (2010). Near-Earth interplanetary coronal mass ejections during solar cycle 23 (1996–2009): Catalog and summary of properties. *Solar Physics*, *264*(1), 189–237. <https://doi.org/10.1007/s11207-010-9568-6>
- Richardson, I. G. (2013). Geomagnetic activity during the rising phase of solar cycle 24. *Journal of Space Weather and Space Climate*, *3*(A08), 1-11. <https://doi.org/10.1051/swsc/2013031>
- Richardson, I. G., & Cane, H. V. (2010). Interplanetary circumstances of quasi-perpendicular interplanetary shocks in 1996-2005. *Journal of Geophysical Research*, *115*(A7). <https://doi.org/10.1029/2009JA015039>
- Richardson, I. G., & Cane, H. V. (2011a). Galactic Cosmic Ray Intensity Response to Interplanetary Coronal Mass Ejections/Magnetic Clouds in 1955-2009. *Solar Physics*, *270*, 609–627. <https://doi.org/10.1007/s11207-011-9774-x>
- Richardson, I. G., & Cane, H. V. (2011b). Geoeffectiveness (dst and kp) of interplanetary coronal mass ejections during 1995–2009 and implications for storm forecasting. *Space Weather*, *9*(7). <https://doi.org/10.1029/2011SW000670>
- Richardson, I. G., Webb, D. F., Zhang, J., Berdichevsky, D. B., Biesecker, D. A., Kasper, J. C., Kataoka, R., Steinberg, J. T., Thompson, B. J., Wu, C.-C., & Zhukov, A. N. (2006). Major geomagnetic storms ($Dst \leq -100$ nT) generated by corotating interaction regions. *Journal of Geophysical Research*, *111*(A7). <https://doi.org/10.1029/2005JA011476>
- Richardson, J. D., & Paulena, K. I. (1998). The orientation of plasma structure in the solar wind. *Geophysical Research Letters*, *25*(12), 2,097–2,100. <https://doi.org/10.1029/98GL01520>
- Richardson, J. D., & Wang, C. (2005). Voyager observations of interplanetary shocks. In G. Li, G. P. Zank, & C. T. Russell (Eds.), *4th annual igpp international astrophysics conference on the physics of collisionless shocks* (Vol. 781, p. 278-282). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.2032709>
- Richmond, A., & Lu, G. (2000). Upper-atmospheric effects of magnetic storms: A brief tutorial. *Journal of Atmospheric and Solar-Terrestrial Physics*, *62*(12), 1115-1127. [https://doi.org/10.1016/S1364-6826\(00\)00094-8](https://doi.org/10.1016/S1364-6826(00)00094-8)

- Richmond, A. D. (1978). Gravity wave generation, propagation, and dissipation in the thermosphere. *Journal of Geophysical Research*, 83(A9), 4131-4145. <https://doi.org/10.1029/JA083iA09p04131>
- Richmond, A. D. (1995a). Ionospheric electrodynamics. In H. Volland (Ed.), *Handbook of atmospheric electrodynamics* (p. 149-290). Boca Raton, FL: CRC Press.
- Richmond, A. D. (1995b). Ionospheric electrodynamics using magnetic Apex coordinates. *Journal of Geomagnetism and Geoelectricity*, 47(2). <https://doi.org/10.5636/jgg.47.191>
- Richmond, A. D. (2010). On the ionospheric application of Poynting's theorem. *Journal of Geophysical Research*, 115(A10), 201-207. <https://doi.org/10.1029/2010JA015768>
- Richmond, A. D. (2016). Ionospheric Electrodynamics. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 245-260). Boca Raton, FL: CRC Press.
- Richmond, A. D., & Kamide, Y. (1988). Mapping electrodynamic features of the high-latitude ionosphere from localized observations: Technique. *Journal of Geophysical Research*, 93(A6), 5741-5759. <https://doi.org/10.1029/JA093iA06p05741>
- Richmond, A. D., & Matsushita, S. (1975). Thermospheric response to a magnetic substorm. *Journal of Geophysical Research*, 80(19), 2839-2850. <https://doi.org/10.1029/JA080i019p02839>
- Richmond, A. D., Ridley, E. C., & Roble, R. G. (1992a). A thermosphere/ionosphere general circulation model with coupled electrodynamics. *Geophysical Research Letters*, 19(6), 601-604. <https://doi.org/10.1029/92GL00401>
- Richmond, A. D., Ridley, E. C., & Roble, R. G. (1992b). A thermosphere/ionosphere general circulation model with coupled electrodynamics. *Geophysical Research Letters*, 19(6), 601-604. <https://doi.org/10.1029/92GL00401>
- Richter, A. K., Hsieh, K. C., Luttrell, A. H., Marsch, E., & Schwenn, R. (1985). Review of interplanetary shock phenomena near and within 1 AU. In B. T. Tsurutani & R. G. Stone (Eds.), *Collisionless shocks in the heliosphere: Reviews of current research*, Geophysical Monograph Series (Vol. 35, p. 33-50). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0033>
- Rideout, W., & Coster, A. (2006). Automated GPS processing for global total electron content data. *GPS Solutions*, 10(3), 219-228. <https://doi.org/10.1007/s10291-006-0029-5>
- Ridley, A. J., De Zeeuw, D. L., Manchester, W. B., & Hansen, K. C. (2006). The magnetospheric and ionospheric response to a very strong interplanetary shock and coronal mass ejection. *Advances in Space Research*, 38(2), 263-272. <https://doi.org/10.1016/j.asr.2006.06.010>
- Ridley, A. J., Deng, Y., & Tóth, G. (2006). The global ionosphere-thermosphere model. *Journal of Atmospheric and Solar-Terrestrial Physics*, 68(8), 839-864. <https://doi.org/10.1016/j.jastp.2006.01.008>
- Ridley, A. J., Gombosi, T. I., & DeZeeuw, D. L. (2004). Ionospheric control of the magnetosphere: conductance. *Annales Geophysicae*, 22(2), 567-584. <https://doi.org/10.5194/angeo-22-567-2004>

- Ridley, A. J., & Kihn, E. A. (2004). Polar cap index comparisons with AMIE cross polar cap potential, electric field, and polar cap area. *Geophysical Research Letters*, *31*(7). <https://doi.org/10.1029/2003GL019113>
- Ridley, A. J., Richmond, A. D., Gombosi, T. I., De Zeeuw, D. L., & Clauer, C. R. (2003). Ionospheric control of the magnetospheric configuration: Thermospheric neutral winds. *Journal of Geophysical Research*, *108*(A8). <https://doi.org/10.1029/2002JA009464>
- Riley, P. (2018). Statistics of Extreme Space Weather Events. In N. Buzulukova (Ed.), *Extreme Events in Geospace - Origins, Predictability, and Consequences* (1st ed., p. 15-138). Amsterdam, The Netherlands: Elsevier. <https://doi.org/10.1016/B978-0-12-812700-1.00005-4>
- Riley, P., Baker, D., Liu, Y. D., Verronen, P., Singer, H., & Güdel, M. (2018). Extreme Space Weather Events: From Cradle to Grave. *Space Science Reviews*, *214*(21). <https://doi.org/10.1007/s11214-017-0456-3>
- Riley, P., Kaplan, R. M., Giacalone, J., Lario, D., & Liu, Y. (2016). Properties of the fast forward shock driven by the 2012 July 23 extreme coronal mass ejection. *The Astrophysical Journal*, *819*(1), 1–11. <https://doi.org/10.3847/0004-637X/819/1/57>
- Riley, P., & Love, J. J. (2017). Extreme geomagnetic storms: Probabilistic forecasts and their uncertainties. *Space Weather*, *15*(1), 53-64. <https://doi.org/10.1002/2016SW001470>
- Rishbeth, H. (1975). *F*-region storms and thermospheric circulations. *Journal of Atmospheric and Solar-Terrestrial Physics*, *37*(6-7), 1055–1064. [https://doi.org/10.1016/0021-9169\(75\)90013-6](https://doi.org/10.1016/0021-9169(75)90013-6)
- Roach, F. E., Moore, J. G., Bruner Jr., E. C., Cronin, H., & Silverman, S. M. (1960). The height of maximum luminosity in an auroral arc. *Journal of Geophysical Research*, *65*(11), 3575-3580. <https://doi.org/10.1029/JZ065i011p03575>
- Robinson, R. M., Vondrak, R. R., Miller, K., Dabbs, T., & Hardy, D. (1987). On calculating ionospheric conductances from the flux and energy of precipitating electrons. *Journal of Geophysical Research*, *92*(A3), 2565–2569. <https://doi.org/10.1029/JA092iA03p02565>
- Rodger, C. J., Mac Manus, D. H., Dalzell, M., Thomson, A. W. P., Clarke, E., Petersen, T., Clilverd, M. A., & Divett, T. (2017). Long-Term Geomagnetically Induced Current Observations From New Zealand: Peak Current Estimates for Extreme Geomagnetic Storms. *Space Weather*, *15*(11), 1447-1460. <https://doi.org/10.1002/2017SW001691>
- Rodríguez Gómez, J. M., Carlesso, F., Vieira, L. E., & Da Silva, L. (2018). A irradiância solar: conceitos básicos. *Revista Brasileira de Ensino de Física*, *40*(3), e3312. <https://doi.org/10.1590/1806-9126-rbef-2017-0342>
- Rodríguez-Zuluaga, J., Stolle, C., Hysell, D., & Knudsen, D. J. (2022). Topside equatorial spread F-related field-aligned Poynting flux: observations and simulations. *Earth, Planets and Space*, *74*(119). <https://doi.org/10.1186/s40623-022-01679-2>
- Romer, M. (1972). Recent observational results on the thermosphere and exosphere. In A. C. Stickland (Ed.), *Cira 1972* (pp. 341–396). New York, NY: Springer.

- Romer, R. H. (1982). Alternatives to the Poynting vector for describing the flow of electromagnetic energy. *American Journal of Physics*, 50(12), 1166–116. <https://doi.org/10.1119/1.12903>
- Rong, S., & Bao-wen, Z. (2018). The research of regression model in machine learning field. *MATEC Web Conf.*, 176, 01033. <https://doi.org/10.1051/mateconf/201817601033>
- Rostoker, G. (1972). Geomagnetic indices. *Reviews of Geophysics*, 10(4), 935-950. <https://doi.org/10.1029/RG010i004p00935>
- Rostoker, G., Akasofu, S.-I., Foster, J., Greenwald, R., Kamide, Y., Kawasaki, K., Lui, A., McPherron, R., & Russell, C. (1980). Magnetospheric substorms - definition and signatures. *Journal of Geophysical Research*, 85(A4), 1663-1668. <https://doi.org/10.1029/JA085iA04p01663>
- Rostoker, G., Friedrich, E., & Dobbs, M. (1997). Physics of magnetic storms. In B. T. Tsurutani, W. D. Gonzalez, Y. Kamide, & J. K. Arballo (Eds.), *Magnetic Storms*, Geophysical Monograph Series (Vol. 98, pp. 149–160). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM098p0149>
- Rout, D., Chakrabarty, D., Janardhan, P., Sekar, R., Maniya, V., & Pandey, K. (2017). Solar wind flow angle and geo-effectiveness of corotating interaction regions: First results. *Geophysical Research Letters*, 44(10), 4532-4539. <https://doi.org/10.1002/2017GL073038>
- Rowland, D., Halford, A., Klenzing, J., Pfaff, R., Oliveira, D., Paxton, L., Turner, D., Verkhoglyadova, O., & Zou, S. (2023). Cross-Scale and Cross-Regime Coupling in the ITM: Studying Weather, not just Climate, in the Middle and Upper Atmosphere. *Bulletin of the AAS*, 55(3). <https://doi.org/10.3847/25c2cf041166a2>
- Rubtsov, A. V., Nos, M., Matsuoka, A., Shinohara, I., & Miyoshi, Y. (2023). Polarization and Spatial Distribution Features of Pc4 and Pc5 Waves in the Magnetosphere. *Journal of Geophysical Research: Space Physics*, 128(10), e2023JA031674. <https://doi.org/10.1029/2023JA031674>
- Rudd, J. T., Oliveira, D. M., Bhaskar, A., & Halford, A. J. (2019). How do interplanetary shock impact angles control the size of the geoeffective magnetosphere? *Advances in Space Research*, 63(1), 317-326. <https://doi.org/10.1016/j.asr.2018.09.013>
- Rufenach, C. L., McPherron, R. L., & Schaper, J. (1992). The quiet geomagnetic field at geosynchronous orbit and its dependence on solar wind dynamic pressure. *Journal of Geophysical Research*, 97(A1), 25–42. <https://doi.org/10.1029/91JA02135>
- Russell, C. (2000). The solar wind interaction with the Earth's magnetosphere: A tutorial. *IEEE Trans. Plasma Sci.*, 28(6), 1818-1830. <https://doi.org/10.1109/27.902211>
- Russell, C. T. (1982). Overshoots in planetary bow shocks. *Nature*, 296(5852), 45-48. <https://doi.org/10.1038/296045a0>
- Russell, C. T. (1984). Reconnection at the Earth's magnetopause: Magnetic field observations and flux transfer events. In E. W. Hones Jr. (Ed.), *Magnetic Reconnection in Space and Laboratory Plasmas*, Geophysical Monograph Series (Vol. 30, p. 124-138). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM030p0124>
- Russell, C. T. (1985). Planetary bow shocks. In B. T. Tsurutani & R. G. Stone

- (Eds.), *Collisionless shocks in the heliosphere: Reviews of current research*, Geophysical Monograph Series (Vol. 35). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0109>
- Russell, C. T. (2000). The polar cusp. *Advances in Space Research*, 25(7/8), 1413–1424. [https://doi.org/10.1016/S0273-1177\(99\)00653-5](https://doi.org/10.1016/S0273-1177(99)00653-5)
- Russell, C. T. (2001a). The dynamics of planetary magnetospheres. *Planetary and Space Science*, 49(10-11), 1005-1030. [https://doi.org/10.1016/S0032-0633\(01\)00017-4](https://doi.org/10.1016/S0032-0633(01)00017-4)
- Russell, C. T. (2001b). Solar wind and interplanetary magnetic field: A tutorial. In P. Song, H. J. Singer, & G. L. Siscoe (Eds.), *Space weather* (p. 73-89). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM125p0073>
- Russell, C. T. (2004). Outer planet magnetospheres: A tutorial. *Advances in Space Research*, 33(11), 2004-2020. <https://doi.org/10.1016/j.asr.2003.04.049>
- Russell, C. T. (2005). An introduction to the physics of collisionless shocks. In G. Li, G. P. Zank, & C. T. Russell (Eds.), *4th annual igpp international astrophysics conference on the physics of collisionless shocks* (Vol. 781, p. 3-16). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.2032667>
- Russell, C. T., & Alexander, C. J. (1984). Multiple spacecraft observations of interplanetary shocks: Shock-normal oscillations and their effects. *Advances in Space Research*, 4(2-3), 277-282. [https://doi.org/10.1016/0273-1177\(84\)90321-1](https://doi.org/10.1016/0273-1177(84)90321-1)
- Russell, C. T., Anderson, B. J., Baumjohann, W., Bromund, K. R., Dearborn, D., Fischer, D., Le, G., Leinweber, H. K., Leneman, D., Magnes, W., Means, J. D., Moldwin, M. B., Nakamura, R., Pierce, D., Plaschke, F., K. M. Rowe, ., Slavin, J. A., Strangeway, R. J., Torbert, R., Hagen, C., Jernej, I., Valavanoglou, A., & Richter, I. (2014). The Magnetospheric Multiscale Magnetometers. *Space Science Reviews*, 199, 189-256. <https://doi.org/10.1007/s11214-014-0057-3>
- Russell, C. T., Anderson, B. J., Baumjohann, W., Bromund, K. R., Dearborn, D., Fischer, D., Le, G., Leinweber, H. K., Leneman, D., Magnes, W., Means, J. D., Moldwin, M. B., Nakamura, R., Pierce, D., Plaschke, F., Rowe, K. M., Slavin, J. A., Strangeway, R. J., Torbert, R., Hagen, C., Jernej, I., Valavanoglou, A., & Richter, I. (2016). The Magnetospheric Multiscale Magnetometers. *Space Science Reviews*, 199(1-4), 189-256. <https://doi.org/10.1007/s11214-014-0057-3>
- Russell, C. T., Blanco-Cano, X., Omid, N., Raeder, J., & Wang, Y. L. (2005). The solar wind interaction with planetary magnetospheres. In J.-A. Sauvaud & Z. Němeček (Eds.), *Multiscale processes in the earth's magnetosphere: From interball to cluster* (Vol. 178). Springer Netherlands. https://doi.org/10.1007/1-4020-2768-0_2
- Russell, C. T., Chi, P. J., Dearborn, D. J., Ge, Y. S., Kuo-Tiong, B., Means, J. D., Pierce, D. R., Rowe, K. M., & Snare, R. C. (2008). THEMIS Ground-Based Magnetometers. *Space Science Reviews*, 141, 389-412. <https://doi.org/10.1007/s11214-008-9337-0>
- Russell, C. T., Childers, D. D., & Coleman Jr., P. J. (1971). Ogo 5 observations of upstream waves in the interplanetary medium: Discrete wave packets. *Journal of Geophysical Research*, 76(4), 845-861. <https://doi.org/10.1029/JA076i004p00845>
- Russell, C. T., Ginskey, M., & Petrinec, S. M. (1994a). Sudden impulses at low-latitude stations: Steady state response for northward interplanetary magnetic field. *Journal*

- of *Geophysical Research*, 99(A1), 253–261. <https://doi.org/10.1029/93JA02288>
- Russell, C. T., Ginskey, M., & Petrinec, S. M. (1994b). Sudden impulses at low-latitude stations: Steady state response for southward interplanetary magnetic field. *Journal of Geophysical Research*, 99(A7), 13,403–13,408. <https://doi.org/10.1029/94JA00549>
- Russell, C. T., Ginskey, M., Petrinec, S. M., & Le, G. (1992). The effect of solar wind dynamic pressure on low and mid latitude magnetic records. *Geophysical Research Letters*, 19(12), 1227–1230. <https://doi.org/10.1029/92GL01161>
- Russell, C. T., Gosling, J. T., Zwickl, R. D., & Smith, E. J. (1983). Multiple spacecraft observations of interplanetary shocks: ISEE three-dimensional plasma measurements. *Journal of Geophysical Research*, 88(A12), 9941–9947. <https://doi.org/10.1029/JA088iA12p09941>
- Russell, C. T., Holzer, R. E., & Smith, E. J. (1969). OGO 3 observations of ELF noise in the magnetosphere: 1. Spatial extent and frequency of occurrence. *Journal of Geophysical Research*, 74(3), 755–777. <https://doi.org/10.1029/JA074i003p00755>
- Russell, C. T., & Jian, L. (2008). Flows and obstacles in the solar wind. *Advances in Space Research*, 41(8), 1177–1187. <https://doi.org/10.1016/j.asr.2007.06.024>
- Russell, C. T., Jian, L. K., Blanco-Cano, X., & Luhmann, J. G. (2009). STEREO observations of upstream and downstream waves at low mach number shocks. *Geophysical Research Letters*, 36(3). <https://doi.org/10.1029/2008GL036991>
- Russell, C. T., Jian, L. K., Blanco-Cano, X., Luhmann, J. G., & Zhang, T. L. (2009). STEREO observations of shock formation in the solar wind. *Geophysical Research Letters*, 36(2). <https://doi.org/10.1029/2008GL036337>
- Russell, C. T., Luhmann, J. G., & Jian, L. K. (2010). How unprecedented a solar minimum? *Reviews of Geophysics*, 48(2). <https://doi.org/10.1029/2009RG000316>
- Russell, C. T., Luhmann, J. G., & Strangeway, R. J. (2016). *Space physics: An introduction*. Cambridge, United Kingdom: Cambridge University Press.
- Russell, C. T., & McPherron, R. L. (1973). Semiannual variation of geomagnetic activity. *Journal of Geophysical Research*, 78(1), 92–108. <https://doi.org/10.1029/JA078i001p00092>
- Russell, C. T., McPherron, R. L., & Burton, R. K. (1974). On the cause of geomagnetic storms. *Journal of Geophysical Research*, 79(7), 1105–1109. <https://doi.org/10.1029/JA079i007p01105>
- Russell, C. T., Mellott, M. M., Smith, E. J., & King, J. H. (1983). Multiple spacecraft observations of interplanetary shocks: Four spacecraft determination of shock normals. *Journal of Geophysical Research*, 88(A6), 4739–4748. <https://doi.org/10.1029/JA088iA06p04739>
- Russell, C. T., Mewaldt, R. A., Luhmann, J. G., Mason, G. M., von Rosenvinge, T. T., Leske, C. M. S. C. R. A., Gomez-Herrero, R., Klassen, A., & Galvin, A. B. (2013). The very unusual interplanetary coronal mass ejection of 2012 July 23: A blast wave mediated by solar energetic particles. *The Astrophysical Journal*, 770(1), 1–5. <https://doi.org/10.1088/0004-637X/770/1/38>

- Russell, C. T., & MvPherron, R. L. (1973). The magnetotail and substorms. *Space Science Reviews*, 15(2-3), 205-266. <https://doi.org/10.1007/BF00169321>
- Russell, C. T., Strangeway, R. J., Zhao, C., Anderson, B. J., Baumjohann, W., Bromund, K. R., Fischer, D., Kepko, L., Le, G., Magnes, W., Nakamura, R., Plaschke, F., Slavin, J. A., Torbert, R. B., Moore, T. E., Paterson, W. R., Pollock, C. J., & Burch, J. L. (2017). Structure, force balance, and topology of Earth's magnetopause. *Science*, 356(6341), 960-963. <https://doi.org/10.1126/science.aag3112>
- Russell, C. T., Wang, Y. L., Raeder, J., Tokar, R. L., Smith, C. W., Ogvie, K. W., Lazarus, A. J., Lepping, R. P., Szabo, A., Kawano, H., Mukai, T., Savin, S., Yermolaev, Y. L., Zhou, X., & Tsurutani, B. T. (2000). The interplanetary shock of September 24, 1998: Arrival at Earth. *Journal of Geophysical Research*, 105(A1), 25,143-25,154. <https://doi.org/10.1029/2000JA900070>
- Russell III, J. M., Mlynczak, M. G., Gordley, L. L., Tansock Jr., J. J., & Esplin, R. W. (1999). Overview of the SABER experiment and preliminary calibration results. In *Proc. SPIE* (Vol. 3756). Denver, CO: Optical Spectroscopic Techniques and Instrumentation for Atmospheric and Space Research III. <https://doi.org/10.1117/12.366382>
- Russo, L. (2004). *The Forgotten Revolution*. Berlin, Germany: Springer Berlin Heidelberg.
- Ryckehorsel, V., & Engelenburg, E. (1890). *Magnetic survey of the eastern part of Brazil*. Amsterdam, The Netherlands: Royal Academy of Sciences at Amsterdam.
- S. 366 - 40th Congress. (1859 - 1961). - *A Bill To provide for a temporary government for the Territory of Colorado*. Retrieved from <https://www.congress.gov/bill/36th-congress/senate-bill/366/text?s=5&r=844>
- Sabine, E. (1852). On periodical laws discoverable in the mean effects of the larger magnetic disturbances. *Philosophical Transactions of the Royal Society of London*, 142(2), 103-125. <https://doi.org/10.1098/rstl.1852.0009>
- Šafránková, J., Němeček, Z., Přeč, L., Samsonov, A., Koval, A., & Andréovaá, K. (2007). Interaction of interplanetary shocks with the bow shock. *Planetary and Space Science*, 55(15), 2324-2329. <https://doi.org/10.1016/j.pss.2007.05.012>
- Šafránková, J., Němeček, Z., Přeč, L., Samsonov, A. A., & Koval, K., A. and Andréovaá. (2007). Modification of interplanetary shocks near the bow shock and through the magnetosheath. *Journal of Geophysical Research*, 112(A8). <https://doi.org/10.1029/2007JA012503>
- Sagan, C. (1977). *The dragons of eden - speculations on the evolution of human intelligence*. New York, NY: Random House, Ballantine Books.
- Sagan, C. (1994). *Pale blue dot - a vision of the human future in space*. New York, NY: Random House, Ballantine Books.
- Sagan, C. (1995). *The demon-haunted world - science as a candle in the dark*. New York, NY: Random House, Ballantine Books.
- Sagdeev, R. Z. (1979a). The 1976 Oppenheimer lectures: Critical problems in plasma astrophysics. II. Singular layers and reconnection. *Reviews of Modern Physics*, 51(1), 11-20. <https://doi.org/10.1103/RevModPhys.51.11>
- Sagdeev, R. Z. (1979b). The 1976 Oppenheimer lectures: Critical problems in plasma

- astrophysics. I. Turbulence and nonlinear waves. *Reviews of Modern Physics*, 51(1), 1-9. <https://doi.org/10.1103/RevModPhys.51.1>
- Sagdeev, R. Z., & Kennel, C. F. (1991). Collisionless Shock Waves. *Science Advances*, 264, 106-113. <https://doi.org/10.1038/scientificamerican0491-106>
- Saha, K. (2008). *The earth's atmosphere - its physics and dynamics*. Berlin, Germany: Springer Berlin Heidelberg.
- Saito, H., Hirahara, M., Mizuno, T., Fukuda, S., Fukushima, Y., Asamura, K., Nagamatsu, H., Tanaka, K., Sone, Y., Okuizumi, N., Mita, M., Uno, M., Yanagawa, Y., Takahara, T., Kaneda, R., Honma, T., Sakanoi, T., Miura, A., Ikenaga, T., Ogawa, K., & Masumoto, Y. (2011). Small satellite REIMEI for auroral observations. *Acta Astronautica*, 69(7-8), 499-513. <https://doi.org/10.1016/j.actaastro.2011.05.007>
- Sakurai, J. J. (1994). *Modern quantum mechanics*. New York, NY: Addison Wesley Longman.
- Salinas, S. R. A. (2005). *Introdução à física estatística*. São Paulo, Brazil: Edusp.
- Salman, T. M., Winslow, R. M., & Lugaz, N. (2020). Radial Evolution of Coronal Mass Ejections Between MESSENGER, Venus Express, STEREO, and L1: Catalog and Analysis. *Journal of Geophysical Research: Space Physics*, 125(1), e2019JA027084. <https://doi.org/10.1029/2019JA027084>
- Samir, U., Gordon, R., Brace, L., & Theis, R. (1979). The near-wake structure of the Atmosphere Explorer C (AE-C) Satellite: A parametric investigation. *Journal of Geophysical Research*, 84(A2), 513-525. <https://doi.org/10.1029/JA084iA02p00513>
- Samson, J. C., Wallis, D. D., Hughes, T. J., Creutzberg, F., Ruohoniemi, J. M., & Greenwald, R. A. (1992). Substorm intensifications and field line resonances in the nightside magnetosphere. *Journal of Geophysical Research*, 97(A6), 8495-8518. <https://doi.org/10.1029/91JA03156>
- Samsonov, A. A. (2006). Numerical MHD modeling of the Earth's magnetosheath for different IMF orientations. *Advances in Space Research*, 36(1), 1652-1656. <https://doi.org/10.1016/j.bbr.2011.03.031>
- Samsonov, A. A. (2011). Propagation of inclined interplanetary shock through the magnetosheath. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(1), 1-9. <https://doi.org/10.1016/j.jastp.2009.10.014>
- Samsonov, A. A., Gordeev, E., Tsyganenko, N. A., Šafránková, J., Němeček, Z., Šimůnek, J., Sibeck, D. G., Tóth, G., Merkin, V. G., & Raeder, J. (2016). Do we know the actual magnetopause position for typical solar wind conditions? *Journal of Geophysical Research: Space Physics*, 121(7), 6493-6508. <https://doi.org/10.1002/2016JA022471>
- Samsonov, A. A., Němeček, Z., & Šafránková, J. (2006). Numerical MHD modeling of propagation of interplanetary shock through the magnetosheath. *Journal of Geophysical Research*, 111(A8). <https://doi.org/10.1029/2005JA011537>
- Samsonov, A. A., Sergeev, V. A., Kuznetsova, M. M., & Sibeck, D. G. (2015). Asymmetric magnetospheric compressions and expansions in response to impact of inclined interplanetary shock. *Geophysical Research Letters*, 42(12), 4716-4722. <https://doi.org/10.1002/2015GL064294>

- Samsonov, A. A., & Sibeck, D. G. (2013). Large-scale flow vortices following a magnetospheric sudden impulse. *Journal of Geophysical Research*, *118*(6), 3055–3064. <https://doi.org/10.1002/jgra.50329>
- Samsonov, A. A., Sibeck, D. G., & Imber, J. (2007). MHD simulation for the interaction of an interplanetary shock with the Earth's magnetosphere. *Journal of Geophysical Research*, *112*(A12220), 1-9. <https://doi.org/10.1029/2007JA012627>
- Samsonov, A. A., Sibeck, D. G., Walsh, B. M., & Zolotova, N. V. (2014). Sudden impulse observations in the dayside magnetosphere by THEMIS. *Journal of Geophysical Research: Space Physics*, *119*(12), 9476-9496. <https://doi.org/10.1002/2014JA020012>
- Samsonov, A. A., Sibeck, D. G., & Yu, Y. (2010). Transient changes in magnetospheric-ionospheric current caused by the passage of an interplanetary shock: Northward interplanetary magnetic field case. *Journal of Geophysical Research*, *115*(A05207). <https://doi.org/doi:10.1029/2009JA014751>
- Samsonov, A. A., Sibeck, D. G., Zolotova, N. V., Biernat, H. K., Chen, S.-H., Rastätter, L., Singer, H. J., & Baumjohann, W. (2011). Propagation of a sudden impulse through the magnetosphere initiating magnetospheric Pc5 pulsations. *Journal of Geophysical Research*, *116*(A10). <https://doi.org/10.1029/2011JA016706>
- Sanny, J., Tapia, J. A., Sibeck, D. G., & Moldwin, M. B. (2002). Quiet time variability of the geosynchronous magnetic field and its response to the solar wind. *Journal of Geophysical Research*, *107*(A12), SMP 16-1–SMP 16-10. <https://doi.org/10.1029/2002JA009448>
- Santos, L. S. (2009). *Quebra da simetria de Lorentz e o termo de Chern-Simons em (3+1) dimensões* (Master's thesis). University of São Paulo, São Paulo, Brazil.
- Santos, W. C., & Amorim, R. G. G. (2017). Descobertas de exoplanetas pelo método do trânsito. *Revista Brasileira de Ensino de Física*, *39*(2), e2308. <https://doi.org/10.1590/1806-9126-rbef-2016-0217>
- Sarp, V., Kilcik, A., Yurchyshyn, V., Rozelot, J. P., & Ozguc, A. (2018). Prediction of solar cycle 25: a non-linear approach. *Monthly Notices of the Royal Astronomical Society*, *481*(3), 2981-2985. <https://doi.org/10.1093/mnras/sty2470>
- Sato, H., Jakowski, N., Berdermann, J., Jiricka, K., Heßelbarth, A., Banyś, D., & Wilken, V. (2019). Solar Radio Burst Events on 6 September 2017 and Its Impact on GNSS Signal Frequencies. *Space Weather*, *17*(6), 816-826. <https://doi.org/10.1029/2019SW002198>
- Sauer, K., Dubinin, E., Baumgärtel, K., & Bogdanov, A. (1995). Deimos: An obstacle to the solar wind. *Science*, *269*(5227), 1075-1078. <https://doi.org/10.1126/science.269.5227.1075>
- Sauvaud, J. A., Beutier, T., & Delcourt, D. (1996). On the origin of flux dropouts near geosynchronous orbit during the growth phase of substorms: 1. Betatron effects. *Journal of Geophysical Research*, *101*(A9), 19911-19919. <https://doi.org/10.1029/96JA01632>
- Saviski, S. O. F. (2014). *Uma abordagem didática com enfoque na história da física do plasma por meio da aprendizagem significativa* (Master's thesis). Universidade Estadual de

Londrina, Londrina, Brazil.

- Savitzky, A., & Golay, M. J. E. (1964). Smoothing and differentiation of data by simplified least squares procedures. *Analytical Chemistry*, *36*(8), 1627–1639. <https://doi.org/10.1021/ac60214a047>
- Sazykin, S. (2016). Magnetospheric Electric Fields and Current Systems. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 115-130). Boca Raton, FL: CRC Press.
- Schaefer, R. K., Paxton, L. J., Selby, C., Ogorzalek, B., Romeo, G., Wolven, B., & Hsieh, S.-Y. (2016). Observation and modeling of the South Atlantic Anomaly in low Earth orbit using photometric instrument data. *Space Weather*, *14*(5), 330-342. <https://doi.org/10.1002/2016SW001371>
- Schildge, J. P., & Siscoe, G. L. (1970). A correlation of the occurrence of simultaneous sudden magnetospheric compressions and geomagnetic bay onsets with selected geophysical indices. *Journal of Atmospheric and Solar-Terrestrial Physics*, *32*(11), 1819–1830. [https://doi.org/10.1016/0021-9169\(70\)90139-X](https://doi.org/10.1016/0021-9169(70)90139-X)
- Schiller, Q., Kanekal, S. G., Jian, L. K., Li, X., Jones, A., Baker, D. N., Jaynes, A., & Spence, H. E. (2016). Prompt injections of highly relativistic electrons induced by interplanetary shocks: A statistical study of Van Allen Probes observations. *Geophysical Research Letters*, *43*(24), 12,317-12,324. <https://doi.org/10.1002/2016GL071628>
- Schlegel, B., & Schlegel, K. (2011). *Polarlichter zwischen wunder und wirklichkeit*. Heidelberg, Germany: Spektrum Akademischer Verlag. <https://doi.org/10.1007/978-3-8274-2881-3>
- Schrijver, C. J. (2015). Socio-Economic Hazards and Impacts of Space Weather: The Important Range Between Mild and Extreme. *Space Weather*, *13*(9), 524-528. <https://doi.org/10.1002/2015SW001252>
- Schrijver, C. J., Bagenal, F., & Sojka, J. J. (2016). *Heliophysics - active stars, their atmospheres, and impacts on planetary environments*. New York, NY: Cambridge University Press.
- Schrijver, C. J., Dobbins, R., Murtagh, W., & Petrinec, S. M. (2014). Assessing the impact of space weather on the electric power grid based on insurance claims for industrial electrical equipment. *Space Weather*, *12*(7), 487-498. <https://doi.org/10.1002/2014SW001066>
- Schrijver, C. J., Kauristie, K., Aylward, A. D., Denardini, C. M., Gibson, S. E., Glover, A., Gopalswamy, N., Grande, M., Hapgood, M., Heyndericx, D., Jakowski, N., Kalegaev, V. V., Lapenta, G., Linker, J. A., Liu, S., Mandrini, C. H., Mann, I. R., Nagatsuma, T., Nandy, D., Obara, T., O'Brien, T. P., Onsager, T., Opgenoorth, H. J., Terkildsen, M., Valladares, C. E., & Vilmer, N. (2015). Understanding space weather to shield society: A global road map for 2015–2025 commissioned by COSPAR and ILWS. *Advances in Space Research*, *55*(12), 2745-2807. <https://doi.org/10.1016/j.asr.2015.03.023>
- Schrijver, C. J., & Siscoe, G. L. (2009). *Heliophysics - plasma physics of the local cosmos*. New York, NY: Cambridge University Press.
- Schrijver, C. J., & Siscoe, G. L. (2010a). *Heliophysics - evolving solar activity and the climates of space and earth*. New York, NY: Cambridge University Press.

- Schrijver, C. J., & Siscoe, G. L. (2010b). *Heliophysics - space storms and radiation: Causes and effects*. New York, NY: Cambridge University Press.
- Schröder, W. (1997). Some aspects of the earlier history of solar-terrestrial physics. *Planetary and Space Science*, *45*(3), 395–400. [https://doi.org/10.1016/S0032-0633\(96\)00119-5](https://doi.org/10.1016/S0032-0633(96)00119-5)
- Schrödinger, E. (1944). *What is Life? The Physical Aspect of the Living Cell*. Cambridge, U.K.: Cambridge University Press.
- Schulte in den Bäumen, H., Moran, D., Lenzen, M., Cairns, I., & Steenge, A. (2014). How severe space weather can disrupt global supply chains. *Natural Hazards and Earth System Sciences*, *14*(10), 2749–2759. <https://doi.org/10.5194/nhess-14-2749-2014>
- Schulz, L., Heinisch, P., & Richter, I. (2019). Calibration of Off-the-Shelf Anisotropic Magnetoresistance Magnetometers. *Sensors*, *19*(8), 1850. <https://doi.org/10.3390/s19081850>
- Schulz, M. (1996). Eigenfrequencies of geomagnetic field lines and implications for plasma-density modeling. *Journal of Geophysical Research*, *101*(A8), 17,385–17,398. <https://doi.org/10.1029/95JA03727>
- Schunk, R. W. (2016). Polar Wind. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 199–212). Boca Raton, FL: CRC Press.
- Schwabe, S. H. (1844). Solar observations during 1843. *Astronomische Nachrichten*, *21*(495), 233.
- Schwartz, S. J. (1998). Shock and discontinuity normals, Mach numbers, and related parameters. In G. Paschmann & P. W. Daly (Eds.), *Analysis Methods for Multi-Spacecraft Data* (p. 249–270). Noordwijk, The Netherlands: ESA Publications Division.
- Schwenn, R. (1986). Relationship of coronal transients to interplanetary shocks: 3D aspects. *Space Science Reviews*, *44*(1–2), 139–168. <https://doi.org/10.1007/BF00227230>
- Schwinger, J. (1951). The Theory of Quantized Fields. I. *Phys. Rev.*, *82*, 914–927. <https://doi.org/10.1103/PhysRev.82.914>
- Sckopke, N. (1966). A general relation between the energy of trapped particles and the disturbance field near the Earth. *Journal of Geophysical Research*, *71*(13), 3125–3130. <https://doi.org/10.1029/JZ071i013p03125>
- Scott, C. J., & Major, P. (2018). The ionospheric response over the UK to major bombing raids during World War II. *Annales Geophysicae*, *36*(5), 1243–1254. <https://doi.org/10.5194/angeo-36-1243-2018>
- Seagar, S. (2013). Exoplanet habitability. *Science*, *340*(6132), 577–581. <https://doi.org/10.1126/science.1232226>
- Seifer, M. J. (1996). *Wizard: The Life and Times of Nikola Tesla - Biography of a Genius*. New York, NY: Citadel Press.
- Sellers, B., Hanser, F. A., Stroschio, M. A., & Yates, G. K. (1977). The night and day relationships between polar cap riometer absorption and solar protons. *Radio Science*, *12*(5), 779–789. <https://doi.org/10.1029/RS012i005p00779>
- Selvakumaran, R., Veenadhari, B., Ebihara, Y., Kumar, S., & Prasad, D. S. V. V. D.

- (2017). The role of interplanetary shock orientation on SC/SI rise time and geoeffectiveness. *Advances in Space Research*, 59(5), 1425–1434. <https://doi.org/10.1016/j.asr.2016.12.010>
- Semeter, J., Butler, T., Heinselman, C., Nicolls, M., Kelly, J., & Hampton, D. (2009). Volumetric imaging of the auroral ionosphere: Initial results from PFISR. *Journal of Atmospheric and Solar-Terrestrial Physics*, 71(6-7), 738-743. <https://doi.org/10.1016/j.jastp.2008.08.014>
- Sentman, L. H. (1961). *Free molecule flow theory and its application to the determination of aerodynamic forces* (Tech. Rep.). Arlington, VA: Armed Services Technical Information Agency.
- Sharma, A. S., Bunde, A., Dimri, V. P., & Baker, D. N. (Eds.). (2012). *Extreme Events and Natural Hazards: The Complexity Perspective*, Geophysical Monograph Series (Vol. 196). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM196>
- Shea, M. A., & Smart, D. F. (1990). A summary of major solar proton events. *Solar Physics*, 127, 297–320. <https://doi.org/10.1007/BF00152170>
- Shea, M. A., & Smart, D. F. (2000). Fifty Years of Cosmic Radiation Data. *Space Science Reviews*, 93, 229–262. <https://doi.org/10.1023/A:1026500713452>
- Shea, M. A., & Smart, D. F. (2012). Space Weather and the Ground-Level Solar Proton Events of the 23rd Solar Cycle. *Space Science Reviews*, 171, 161–188. <https://doi.org/10.1007/s11214-012-9923-z>
- Shea, M. A., & Smart, D. F. (2019). *Re-examination of the First Five Ground-Level Events*. International Cosmic Ray Conference (ICRC2019, Madison), 36, 1149.
- Sheeley Jr., N. R., Asbridge, J. R., Bame, S. J., & Harvey, J. W. (1977). A pictorial comparison of interplanetary magnetic field polarity, solar wind speed, and geomagnetic disturbance index during the sunspot cycle. *Solar Physics*, 52(2), 485-495. <https://doi.org/10.1007/BF00149663>
- Sheeley Jr., N. R., Harvey, J. W., & Feldman, W. C. (1976). Coronal holes, solar wind streams, and recurrent geomagnetic disturbances: 1973-1976. *Solar Physics*, 49(2), 271-278. <https://doi.org/10.1007/BF00162451>
- Shen, C., Chi, Y., Wang, Y., Xu, M., & Wang, S. (2017). Statistical comparison of the ICME's geoeffectiveness of different types and different solar phases from 1995 to 2014. *Journal of Geophysical Research: Space Physics*, 122(6), 5931-5938. <https://doi.org/10.1002/2016JA023768>
- Shen, C., Li, X., Dunlop, M., Liu, Z. X., Balogh, A., Baker, D. N., Hapgood, M., & Wang, X. (2003). Analyses on the geometrical structure of magnetic field in the current sheet based on cluster measurements. *Journal of Geophysical Research*, 108(A5). <https://doi.org/10.1029/2002JA009612>
- Shen, W.-W. (1973). Interaction of interplanetary MHD shock waves with the magnetopause. *Astrophysics and Space Science*, 24(1), 51–64. <https://doi.org/10.1007/BF00648674>
- Shen, W.-W., & Dryer, M. (1972). Magnetohydrodynamic theory for the interaction of an interplanetary double-shock ensemble with the earth's bow shock. *Journal of Geo-*

- physical Research*, 77(25), 4627–4644. <https://doi.org/10.1029/JA077i025p04627>
- Shen, X. C., Zong, Q.-G., Shi, Q. Q., Tian, A. M., Sun, W. J., Wang, Y. F., Zhou, X. Z., Fu, S. Y., Hartinger, M. D., & Angelopoulos, V. (2015). Magnetospheric ULF waves with increasing amplitude related to solar wind dynamic pressure changes: The Time History of Events and Macroscale Interactions during Substorms (THEMIS) observations. *Journal of Geophysical Research: Space Physics*, 120(9), 7179–7190. <https://doi.org/10.1002/2014JA020913>
- Shepherd, G. G., & Cho, Y.-M. (2017). WINDII airglow observations of wave superposition and the possible association with historical “bright nights”. *Geophysical Research Letters*, 44(13), 7036–7043. <https://doi.org/10.1002/2017GL074014>
- Shepherd, S. G. (2007). Polar cap potential saturation: Observations, theory, and modeling. *Journal of Atmospheric and Solar-Terrestrial Physics*, 69(3), 234–248. <https://doi.org/10.1016/j.jastp.2006.07.022>
- Shepherd, S. G. (2014). Altitude-adjusted corrected geomagnetic coordinates: Definition and functional approximations. *Journal of Geophysical Research: Space Physics*, 119(9), 7501–7521. <https://doi.org/10.1002/2014JA020264>
- Shepherd, S. G., Ruohoniemi, J. M., & Greenwald, R. A. (2003). Testing the Hill model of transpolar potential with Super Dual Auroral Radar Network observations. *Geophysical Research Letters*, 30(1), 2-1–2-4. <https://doi.org/10.1029/2002GL015426>
- Shi, Q. Q., Hartinger, M., Angelopoulos, V., Zong, Q.-G., Zhou, X.-Z., Zhou, X.-Y., Kellerman, A., Tian, A. M., Weygand, J., Fu, S. Y., Pu, Z. Y., Raeder, J., Ge, Y. S., Wang, Y. F., Zhang, H., & Yao, Z. H. (2013). THEMIS observations of ULF wave excitation in the nightside plasma sheet during sudden impulse events. *Journal of Geophysical Research*, 118(1), 284–298. <https://doi.org/10.1029/2012JA017984>
- Shi, Q. Q., Shen, C., Pu, Z. Y., Dunlop, M. W., Zong, Q.-G., Zhang, H., Xiao, C. J., Liu, Z. X., & Balogh, A. (2005). Dimensional analysis of observed structures using multipoint magnetic field measurements: Application to Cluster. *Geophysical Research Letters*, 32(12). <https://doi.org/10.1029/2005GL022454>
- Shi, Q. Q., Zong, Q.-G., Fu, S. Y., Dunlop, M. W., Pu, Z. Y., Parks, G. K., Wei, Y., Li, W. H., Zhang, H., Nowada, M., Wang, Y. B., Sun, W. J., Xiao, T., Reme, H., Carr, C., Fazakerley, A. N., & Lucek, E. (2013). Solar wind entry into the high-latitude terrestrial magnetosphere during geomagnetically quiet times. *Nature Communications*, 4(1466), 1–6. <https://doi.org/10.1038/ncomms2476>
- Shi, Y. (2019). *High-latitude Ionospheric Field-aligned Currents (FACs) Derived with Inverse and Assimilative Analysis of Iridium Magnetic Perturbation Data: New Insights Gained* (Ph.D. thesis). University of Colorado Boulder, Boulder, Colorado.
- Shi, Y., Knipp, D. J., Matsuo, T., Oliveira, D. M., & Anderson, B. J. (2019). Effects of Frontal and Inclined Interplanetary Shocks on High-latitude Field-aligned Currents Response. In *2019 agu chapman conference on scientific challenges pertaining to space weather forecasting including extremes*. Pasadena, CA, 11-15 February.
- Shi, Y., Oliveira, D. M., Knipp, D. J., Zesta, E., Matsuo, T., & Anderson, B. (2019). Effects of Nearly Frontal and Highly Inclined Interplanetary Shocks on High-latitude Field-aligned Currents (FACs). *Space Weather*, 17(12), 1659–1673.

<https://doi.org/10.1029/2019SW002367>

- Shi, Y., Zesta, E., Connor, H., Sutton, E. K., Wise, J. O., Su, Y., & Delay, S. H. (2012). Effect of solar wind dynamic pressure enhancements on thermosphere neutral density. In *Sa33a-2172*. AGU Fall Meeting, San Francisco, CA.
- Shi, Y., Zesta, E., Connor, H. K., Su, Y.-J., Sutton, E. K., Huang, C. Y., Ober, D. M., Christodoulo, C., Delay, S., & Oliveira, D. M. (2017). High-latitude thermosphere neutral density response to solar wind dynamic pressure enhancement. *Journal of Geophysical Research: Space Physics*, *122*(11), 11,559-11,578. <https://doi.org/10.1002/2017JA023889>
- Shi, Y., Zesta, E., Lyons, L. R., Boudouridis, A., Yumoto, K., & Kitamura, K. (2005). Effect of solar wind pressure enhancements on storm time ring current asymmetry. *Journal of Geophysical Research*, *110*(A10). <https://doi.org/10.1029/2005JA011019>
- Shi, Y., Zesta, E., Lyons, L. R., Yumoto, K., & Kitamura, K. (2006). Statistical study of effect of solar wind dynamic pressure enhancements on dawn-to-dusk ring current asymmetry. *Journal of Geophysical Research*, *111*(A10). <https://doi.org/10.1029/2005JA011532>
- Shinbori, A., Tsuji, Y., Kikuchi, T., Araki, T., & Watari, S. (2009). Magnetic latitude and local time dependence of the amplitude of geomagnetic sudden commencements. *Journal of Geophysical Research*, *114*(A4). <https://doi.org/10.1029/2008JA013871>
- Shiokawa, K., Ogawa, T., & Kamide, Y. (2005). Low-latitude auroras observed in Japan: 1999–2004. *Journal of Geophysical Research*, *110*(A5). <https://doi.org/10.1029/2004JA010706>
- Shiota, D., & Kataoka, R. (2016). Magnetohydrodynamic simulation of interplanetary propagation of multiple coronal mass ejections with internal magnetic flux rope (SUSANOO-CME). *Space Weather*, *14*(2), 56-75. <https://doi.org/10.1002/2015SW001308>
- Shue, J.-H., Chao, J. K., Fu, H. C., Russell, C. T., Song, P., Khurana, K. K., & Singer, H. J. (1997). A new functional form to study the solar wind control of the magnetopause size and shape. *Journal of Geophysical Research*, *102*(A5), 9497–9511. <https://doi.org/10.1029/97JA00196>
- Shue, J.-H., Newell, P. T., Liou, K., & Meng, C.-I. (2002). Solar wind density and velocity control of auroral brightness under normal interplanetary magnetic field conditions. *Journal of Geophysical Research*, *107*(A12), SMP 9-1-SMP 9-6. <https://doi.org/10.1029/2001JA009138>
- Shue, J.-H., Song, P., Russell, C. T., Steinberg, J. T., Chao, J. K., Zastenker, G., Vaisberg, O. L., Kokubun, S., Singer, H. J., Detman, T. R., & Kawano, H. (1998). Magnetopause location under extreme solar wind conditions. *Journal of Geophysical Research*, *103*(A8), 17,691-17,700. <https://doi.org/10.1029/98JA01103>
- Sibeck, D. G. (1991). The magnetospheric and ionospheric response to solar wind dynamic pressure variations. In *Modeling Magnetospheric Plasma Processes*, Geophysical Monograph Series (Vol. 62, p. 1-8). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM062p0001>

- Sibeck, D. G. (2016). The magnetosheath and its boundaries. In G. V. Khazanov (Ed.), *Space weather fundamentals* (p. 75-94). Boca Raton, FL: CRC Press.
- Sibeck, D. G., & Angelopoulos, V. (2008). THEMIS science objectives and mission phase. *Space Science Reviews*, *141*, 35-59. <https://doi.org/10.1007/s11214-008-9393-5>
- Sibeck, D. G., Borodkova, N. L., & Zastenker, G. N. (1996). Solar wind variations as a source of short-term magnetic field disturbances in the dayside magnetosphere. *Cosmic Research*, *34*, 228-242.
- Sibeck, D. G., Lopez, R. E., & Roelof, E. C. (1991). Solar wind control of the magnetopause shape, location, and motion. *Journal of Geophysical Research*, *96*(A4), 5489-5495. <https://doi.org/10.1029/90JA02464>
- Siemes, C., de Teixeira da Encarnação, J., Doornbos, E., van den IJssel, J., Kraus, J., Perešty, R., Grunwaldt, L., Apelbaum, G., Flury, J., & Olsen, P. E. H. (2016). Swarm accelerometer data processing from raw accelerations to thermospheric neutral densities. *Earth, Planets and Space*, *68*(92), 1-16. <https://doi.org/10.1186/s40623-016-0474-5>
- Sillanpää, I., Ganushkina, N. Y., Dubyagin, S., & Rodriguez, J. V. (2017). Electron Fluxes at Geostationary Orbit From GOES MAGED Data. *Space Weather*, *15*(12), 1602-1614. <https://doi.org/10.1002/2017SW001698>
- Silveira, M. V. D. (2015). *Flux Transfer Events observed at the Earth's magnetopause by THEMIS satellites* (Ph.D thesis). Instituto Nacional de Pesquisas Espaciais, São José dos Campos, Brazil.
- Silverman, S. M. (1992). Secular variation of the aurora for the past 500 years. *Reviews of Geophysics*, *30*(4), 333-351. <https://doi.org/10.1029/92RG01571>
- Silverman, S. M. (1995). Low latitude auroras: the storm of 25 September 1909. *Journal of Atmospheric and Solar-Terrestrial Physics*, *57*(6), 673-685. [https://doi.org/10.1016/0021-9169\(94\)E0012-C](https://doi.org/10.1016/0021-9169(94)E0012-C)
- Silverman, S. M. (1998). Early auroral observations. *Journal of Atmospheric and Solar-Terrestrial Physics*, *60*(10), 997-1006. [https://doi.org/10.1016/S1364-6826\(98\)00040-6](https://doi.org/10.1016/S1364-6826(98)00040-6)
- Silverman, S. M. (2003). Sporadic auroras. *Journal of Geophysical Research*, *108*(A4). <https://doi.org/10.1029/2002JA009335>
- Silverman, S. M. (2006). Comparison of the aurora of September 1/2, 1859 with other great auroras. *Advances in Space Research*, *38*(2), 136-144. <https://doi.org/10.1016/j.asr.2005.03.157>
- Silverman, S. M. (2008). Low-latitude auroras: The great aurora of 4 February 1872. *Journal of Atmospheric and Solar-Terrestrial Physics*, *70*(10), 1301-1308. <https://doi.org/10.1016/j.jastp.2008.03.012>
- Silverman, S. M., & Cliver, E. W. (2001). Low-latitude auroras: the magnetic storm of 14-15 May 1921. *Journal of Atmospheric and Solar-Terrestrial Physics*, *63*(5), 523-535. [https://doi.org/10.1016/S1364-6826\(00\)00174-7](https://doi.org/10.1016/S1364-6826(00)00174-7)
- Singer, H. J., Matheson, L., Grubb, R., Newman, A., & Bouwer, S. D. (1996). Monitoring space weather with the GOES magnetometers. In E. R. Washwell (Ed.),

SPIE Conference Proceedings, GOES-8 and Beyond (Vol. 2812, p. 299-308).
<https://doi.org/10.1117/12.254077>

- Singer, H. J., Southwood, D. J., Walker, R. J., & Kivelson, M. G. (1981). Alfvén wave resonances in a realistic magnetosphere magnetic field geometry. *Journal of Geophysical Research*, *86*(A6), 4589-4596. <https://doi.org/10.1029/JA086iA06p04589>
- Singh, A., Rathore, V. S., Singh, R. P., & Singh, A. K. (2017). Source identification of moderate ($-100 \text{ nT} < \text{Dst} < -50 \text{ nT}$) and intense geomagnetic storms ($\text{Dst} < -100 \text{ nT}$) during ascending phase of solar cycle 24. *Advances in Space Research*, *59*(1), 1209-1222. <https://doi.org/10.1016/j.asr.2016.12.006>
- Singh, Y. P., & Badruddin. (2006). Statistical considerations in superposed epoch analysis and its applications in space research. *Journal of Atmospheric and Solar-Terrestrial Physics*, *68*(7), 803-813. <https://doi.org/10.1016/j.jastp.2006.01.007>
- Siscoe, G., Crooker, N. U., & Clauer, C. R. (2006). Dst of the Carrington storm of 1859. *Advances in Space Research*, *38*(2), 173-179. <https://doi.org/10.1016/j.asr.2005.02.102>
- Siscoe, G., Raeder, J., & Ridley, A. J. (2004). Transpolar potential saturation models compared. *Journal of Geophysical Research*, *109*(A9). <https://doi.org/10.1029/2003JA010318>
- Siscoe, G. L. (1976). Three-dimensional aspects of interplanetary shock waves. *Journal of Geophysical Research*, *81*(34), 6235-6241. <https://doi.org/10.1029/JA081i034p06235>
- Siscoe, G. L. (1978). An historical footnote on the origin of “aurora borealis”. *Eos Transactions AGU*, *59*(12), 994-997. <https://doi.org/10.1029/EO059i012p00994>
- Siscoe, G. L., Erickson, G. M., Sonnerup, B. U. Ö., Maynard, N. C., Schoendorf, J. A., Siebert, K. D., Weimer, D. R., White, W. W., & Wilson, G. R. (2002). Hill model of transpolar potential saturation: Comparisons with MHD simulations. *Journal of Geophysical Research*, *107*(A6). <https://doi.org/10.1029/2001JA000109>
- Siscoe, G. L., Formisano, V., & Lazarus, A. J. (1968). Relation between geomagnetic sudden impulses and solar wind pressure changes - An experimental investigation. *Journal of Geophysical Research*, *73*(15), 4869-4874. <https://doi.org/10.1029/JA073i015p04869>
- Siscoe, G. L., Turner, J. M., & Lazarus, A. J. (1969). Simultaneous plasma and magnetic-field measurements of probable tangential discontinuities in the solar wind. *Solar Physics*, *6*(3), 456-464. <https://doi.org/10.1007/BF00146479>
- Siskind, D. E., Barth, C. A., & Roble, R. G. (1989). The response of thermospheric nitric oxide to an auroral storm: 1. Low and middle latitudes. *Journal of Geophysical Research*, *94*(A12), 16885-16898. <https://doi.org/10.1029/JA094iA12p16885>
- Siskind, D. E., Coy, L., & Espy, P. (2005). Observations of stratospheric warmings and mesospheric coolings by the TIMED SABER instrument. *Geophysical Research Letters*, *32*(9). <https://doi.org/10.1029/2005GL022399>
- Sitnov, M., Birn, J., Ferdousi, B., Gordeev, E., Khotyaintsev, Y., Merkin, V., Motoba, T., Otto, A., Panov, E., Pritchett, P., Pucci, F., Raeder, J., Runov, A., Sergeev, V., Velli, M., & Zhou, X.-Z. (2019). Explosive Magnetotail Activity. *Space Science Reviews*,

215(31). <https://doi.org/10.1007/s11214-019-0599-5>

- Sivadas, N., Semeter, J., Nishimura, Y., & Kero, A. (2017). Simultaneous Measurements of Substorm-Related Electron Energization in the Ionosphere and the Plasma Sheet. *Journal of Geophysical Research: Space Physics*, 122(10), 10,528-10,547. <https://doi.org/10.1002/2017JA023995>
- Skjaeveland, A. S., Carlson, H. C., & Moen, J. I. (2017). A statistical survey of heat input parameters into the cusp thermosphere. *Journal of Geophysical Research: Space Physics*, 122(9), 9622-9651. <https://doi.org/10.1002/2016JA023594>
- Skoug, R. M., Gosling, J. T., Steinberg, J. T., McComas, D. J., Smith, C. W., Ness, N. F., Hu, Q., & Burlaga, L. F. (2004). Extremely high speed solar wind: 29-30 October 2003. *Journal of Geophysical Research*, 109(A9). <https://doi.org/10.1029/2004JA010494>
- Slinker, S. P., Fedder, J. A., Hughes, W. J., & Lyon, J. G. (1999). Response of the ionosphere to a density pulse in the solar wind: Simulation of traveling convection vortices. *Geophysical Research Letters*, 26(23), 3549-3552. <https://doi.org/10.1029/1999GL010688>
- Smart, D. F., & Shea, M. A. (1979). PPS76 - A Computerized "Event Mode" Solar Proton Forecasting Technique. In R. F. Donnelly (Ed.), *Solar-terrestrial predictions proceedings* (Vol. 1: Prediction Group Reports, p. 406-427). Boulder, CO: Environment Research Laboratories, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.
- Smith, A. R., Ozturk, D. S., Delamere, P., Lu, G., & Kim, H. (2023). Investigating the Interhemispheric Asymmetry in Joule Heating During the 2013 St. Patrick's Day Geomagnetic Storm. *Space Weather*, 21(9), e2023SW003523. <https://doi.org/10.1029/2023SW003523>
- Smith, A. W., Rae, J., Forsyth, C., Oliveira, D. M., Freeman, M. P., & Jackson, D. (2020b). Probabilistic Forecasts of Storm Sudden Commencements from Interplanetary Shocks Using Machine Learning. In *Final paper abstract number: SM015-02*. Presented at the 2020 AGU Fall Meeting (virtual), 1-17 Dec.
- Smith, A. W., Rae, J., Forsyth, C., Oliveira, D. M., Freeman, M. P., & Jackson, D. (2020a). Probabilistic Forecasts of Storm Sudden Commencements from Interplanetary Shocks using Machine Learning. *Space Weather*, 18(11), e2020SW002603. <https://doi.org/10.1029/2020SW002603>
- Smith, A. W., Rodger, C. J., Mac Manus, D. H., Forsyth, C., Rae, I. J., Freeman, M. P., Clilverd, M. A., Petersen, T., & Dalzell, M. (2022). The Correspondence Between Sudden Commencements and Geomagnetically Induced Currents: Insights From New Zealand. *Space Weather*, 20(8), e2021SW002983. <https://doi.org/10.1029/2021SW002983>
- Smith, A. W., Rodger, C. J., Mac Manus, D. H., Rae, I. J., Fogg, A. R., Forsyth, C., Fisher, P., Petersen, T., & Dalzell, M. (2024). Sudden Commencements and Geomagnetically Induced Currents in New Zealand: Correlations and Dependence. *Space Weather*, 22(1), e2023SW003731. <https://doi.org/10.1029/2023SW003731>
- Smith, C. W., L'Heureux, J., Ness, N. F., Acuña, M. H., Burlaga, L. F., & Scheifele, J. (1998). The ACE magnetic fields experiment. *Space Science Reviews*, 86(1-4), 613-632. <https://doi.org/10.1023/A:1005092216668>

- Smith, C. W., McCracken, K. G., Schwadron, N. A., & Goelzer, M. L. (2014). The heliospheric magnetic flux, solar wind proton flux, and cosmic ray intensity during the coming solar minimum. *Space Weather*, *12*(7), 499–507. <https://doi.org/10.1002/2014SW001067>
- Smith, E. J. (1973). Identification of interplanetary tangential and rotational discontinuities. *Journal of Geophysical Research*, *78*(13), 2054–2063. <https://doi.org/10.1029/JA078i013p02054>
- Smith, E. J. (1983). Observations of interplanetary shocks: Recent progress. *Space Science Reviews*, *34*(1), 101–110. <https://doi.org/10.1007/BF00221200>
- Smith, E. J. (1985). Interplanetary shock phenomena beyond 1 AU. In B. T. Tsurutani & R. G. Stone (Eds.), *Collisionless shocks in the heliosphere: Reviews of current research*, Geophysical Monograph Series (Vol. 35, p. 69–83). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035p0069>
- Smith, E. J., Slavin, J. A., Tsurutani, B. T., Feldman, W. C., & Bame, S. J. (1984). Slow mode shocks in the Earth's magnetotail: ISEE-3. *Geophysical Research Letters*, *11*(10), 1054–1057. <https://doi.org/10.1029/GL011i010p01054>
- Smith, E. J., Slavin, J. A., Zwickl, R. D., & Bame, S. J. (1986). Shocks and storm sudden commencements. In Y. Kamide & J. A. Slavin (Eds.), *Solar wind and magnetosphere coupling* (p. 345). Tokyo, Japan: Terra Scientific.
- Smith, E. J., & Wolfe, J. H. (1976). Observations of interaction regions and corotating shocks between one and five AU: Pioneers 10 and 11. *Geophysical Research Letters*, *3*(3), 137–140. <https://doi.org/10.1029/GL003i003p00137>
- Smith, R. W., Rees, D., & Stewart, R. D. (1988). Southern hemisphere thermospheric dynamics: A review. *Reviews of Geophysics*, *26*(3), 591–622. <https://doi.org/10.1029/RG026i003p00591>
- Smith, Z. K., Dryer, M., & Steinolfson, R. S. (1985). A study of the formation, evolution, and decay of shocks in the heliosphere between 0.5 and 30.0 AU. *Journal of Geophysical Research*, *90*(A1), 217–220. <https://doi.org/10.1029/JA090iA01p00217>
- Snyder, J. P. (1993). *Flattening the Earth: Two Thousand Years of Map Projections*. Chicago, Illinois: The University of Chicago Press.
- Sobel, D. (1999). *Galileo's Daughter*. New York, NY: Bloomsbury.
- Solomon, S. C. (1989). Auroral excitation of the N₂ 2P(0,0) and VK(0,9) bands. *Journal of Geophysical Research*, *94*(A12), 17215–17222. <https://doi.org/10.1029/JA094iA12p17215>
- Solomon, S. C. (2001). Auroral particle transport using Monte Carlo and hybrid methods. *Journal of Geophysical Research*, *106*(A1), 107–116. <https://doi.org/10.1029/2000JA002011>
- Solomon, S. C., & Abreu, V. J. (1989). The 630 nm dayglow. *Journal of Geophysical Research*, *94*(A6), 6817–6824. <https://doi.org/10.1029/JA094iA06p06817>
- Solomon, S. C., Bailey, S. M., & Woods, T. N. (2001). Effect of solar soft x-rays on the lower ionosphere. *Geophysical Research Letters*, *28*(11), 2149–2152. <https://doi.org/10.1029/2001GL012866>

- Solomon, S. C., Burns, A. G., Emery, B. A., Mlynczak, M. G., Qian, L., Wang, W., Weimer, D. R., & Wiltberger, M. (2012). Modeling studies of the impact of high-speed streams and co-rotating interaction regions on the thermosphere-ionosphere. *Journal of Geophysical Research*, *117*(A00L11). <https://doi.org/10.1029/2011JA017417>
- Solomon, S. C., Hays, P. B., & Abreu, V. J. (1988). The auroral 6300 Å emission: Observations and modeling. *Journal of Geophysical Research*, *93*(A9), 9867–9882. <https://doi.org/10.1029/JA093iA09p09867>
- Somasundaram, S., & Megala, S. (2017). Aditya-L1 mission. *Current Science*, *11*(4), 610-613. <https://doi.org/10.18520/cs/v113/i04/610-612>
- Somov, B. (2013). The Bastille Day flare and similar solar flares. In *Plasma astrophysics, part ii* (Vol. 392, pp. 109–141). New York, NY: Springer. <https://doi.org/10.1007/978-1-4614-4295-06>
- Sonett, C. P., & Abrams, I. J. (1963). The distant geomagnetic field: 3. Disorder and shocks in the magnetopause. *Journal of Geophysical Research*, *68*(5), 1233-1263. <https://doi.org/10.1029/JZ068i005p01233>
- Sonett, C. P., Colburn, D. S., Davis, L., Smith, E. J., & Coleman, P. J. (1964). Evidence for a collision-free magnetohydrodynamic shock in interplanetary space. *Phys. Rev. Lett.*, *13*(5), 153-156. <https://doi.org/10.1103/PhysRevLett.13.153>
- Sonett, C. P., Smith, E. J., & Sims, A. R. (1960). Surveys of the distant magnetic field: Pioneer I and Explorer IV. In H. K. Bijl (Ed.), *Proceedings of the first international space sciences symposium*. Amsterdam, The Netherlands: North Holland Publishing Co. <https://doi.org/10.1002/qj.49708737327>
- Song, H. Q., Zhang, J., Cheng, X., Li, G., Hu, Q., Li, L. P., Chen, S. J., Zheng, R. S., & Chen, Y. (2020). Do All Interplanetary Coronal Mass Ejections Have a Magnetic Flux Rope Structure Near 1 au? *The Astrophysical Journal Letters*, *901*(2). <https://doi.org/10.3847/2041-8213/abb6ec>
- Song, P., Singer, H. J., & Siscoe, G. L. (Eds.). (2001). *Space Weather*, Geophysical Monograph Series (Vol. 125). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118668351>
- Sonnerup, B. U. Ö. (1969). Acceleration of particles reflected at a shock front. *Journal of Geophysical Research*, *74*(5), 1301-1304. <https://doi.org/10.1029/JA074i005p01301>
- Sonnerup, B. U. Ö., & Cahill, L. J. (1967). Magnetopause structure and attitude from Explorer 12 observations. *Journal of Geophysical Research*, *72*(1), 171-183. <https://doi.org/10.1029/JZ072i001p00171>
- Sonnerup, B. U. Ö., & Cahill, L. J. (1968). Explorer 12 observations of the magnetopause current layer. *Journal of Geophysical Research*, *73*(5), 1757-1770. <https://doi.org/10.1029/JA073i005p01757>
- Sonnerup, B. U. Ö., & Scheible, M. (1998). Minimum and Maximum Variance Analysis. In G. Paschmann & P. W. Daly (Eds.), *Analysis Methods for Multi-Spacecraft Data* (p. 185-220). Noordwijk, The Netherlands: ESA Publications Division.
- Southwood, D. J., & Hughes, W. J. (1983). Theory of hydromagnetic waves in the magnetosphere. *Space Science Reviews*, *35*(4), 301–366. <https://doi.org/10.1007/BF00169231>

- Souza, V. M., Koga, D., Gonzalez, W. D., & Cardoso, F. R. (2017). Observational aspects of magnetic reconnection at the Earth's magnetosphere. *Brazilian Journal of Physics*, *47*(4), 447-459. <https://doi.org/10.1007/s13538-017-0514-z>
- Souza, V. M., Silveira, M. V. D., Koga, D., & Jauer, P. R. (2016). Bases teóricas da reconexão magnética. *Revista Brasileira de Ensino de Física*, *38*(2), e2301. <https://doi.org/10.1590/S1806-11173812132>
- Space Exploration Holdings. (2016). *SpaceX Non-geostationary Satellite System* (Tech. Rep.). Washington, D.C.: Attachment to FCC Application SAT-LOA-20161115-00118. Retrieved from <https://fcc.report/IBFS/SAT-MOD-20181108-00083/1569860.pdf>
- Spencer, N. W., Carignan, G. R., Mayr, H. G., Niemann, H. B., Theis, R. F., & Wharton, L. E. (1979). The midnight temperature maximum in the Earth's equatorial thermosphere. *Geophysical Research Letters*, *6*(6), 444-446. <https://doi.org/10.1029/GL006i006p00444>
- Spreiter, J. R., Summers, A. L., & Alksne, A. Y. (1966). Hydromagnetic flow around the magnetosphere. *Planetary and Space Science*, *14*(3), 223-253. [https://doi.org/10.1016/0032-0633\(66\)90124-3](https://doi.org/10.1016/0032-0633(66)90124-3)
- St. Cyr, O. C., Howard, R. A., Sheeley, N. R., Plunkett, S. P., Michels, D. J., Paswaters, S. E., Koomen, M. J., Simnett, G. M., Thompson, B. J., Gurman, J. B., Schwenn, R., Webb, D. F., Hildner, E., & Lamy, P. L. (2000). Properties of coronal mass ejections: SOHO LASCO observations from January 1996 to June 1998. *Journal of Geophysical Research*, *105*(A8), 18169-18185. <https://doi.org/10.1029/1999JA000381>
- Stacey, F. D., & Davis, P. M. (2008). *Physics of the earth*. Cambridge, United Kingdom: Cambridge University Press.
- Stanley, M. (2016). Why should physicists study history? *Physics Today*, *69*(7), 38-44. <https://doi.org/10.1063/PT.3.3235>
- Stauning, P. (2013). Power grid disturbances and polar cap index during geomagnetic storms. *Journal of Space Weather and Space Climate*, *3*(A2). <https://doi.org/10.1051/swsc/2013044>
- Stepanov, N. A., Sergeev, V. A., Shukhtina, M. A., Ogawa, Y., Chu, X., & Rogov, D. D. (2021). Ionospheric Electron Density and Conductance Changes in the Auroral Zone During Substorms. *Journal of Geophysical Research: Space Physics*, *126*(7), e2021JA029572. <https://doi.org/10.1029/2021JA029572>
- Stephenson, F. R., Willis, D. M., Hayakawa, H., Ebihara, Y., Scott, C. J., Wilkinson, J., & Wild, M. N. (2019). Do the Chinese Astronomical Records Dated AD 776 January 12/13 Describe an Auroral Display or a Lunar Halo? A Critical Re-examination. *Solar Physics*, *294*(4), 1-24. <https://doi.org/10.1007/s11207-019-1425-7>
- Stern, D. P. (1989). A brief history of magnetospheric physics before the spaceflight era. *Reviews of Geophysics*, *27*(1), 103-114. <https://doi.org/10.1029/RG027i001p00103>
- Stern, D. P. (1996). A brief history of magnetospheric physics during the space age. *Reviews of Geophysics*, *31*(1), 1-31. <https://doi.org/10.1029/95RG03508>
- Stern, D. P. (2002). A millennium of geomagnetism. *Reviews of Geophysics*, *40*(3), 1-1-1-30. <https://doi.org/10.1029/2000RG000097>

- Stewart, B. (1861). On the great magnetic disturbance which extended from August 28 to September 7, 1859, as recorded by photography at the Kew Observatory. *Philosophical Transactions of the Royal Society of London*, 151, 423-433. <https://doi.org/10.1098/rstl.1861.0023>
- Stober, G., Kuchar, A., Pokhotelov, D., Liu, H., Liu, H.-L., Schmidt, H., Jacobi, C., Baumgarten, K., Brown, P., Janches, D., Murphy, D., Kozlovsky, A., Lester, M., Belova, E., Kero, J., & Mitchell, N. (2021). Interhemispheric differences of mesosphere–lower thermosphere winds and tides investigated from three whole-atmosphere models and meteor radar observations. *Annales Geophysicae*, 21(18), 13855-13902. <https://doi.org/10.5194/acp-21-13855-2021>
- Stolle, C., & Liu, H. (2014). Low-latitude ionosphere and thermosphere: Decadal observations from the CHAMP mission. In J. Huba, R. Schunk, & G. Khazanov (Eds.), *Modeling the Ionosphere-Thermosphere System*, Geophysical Monograph Series (Vol. 201, p. 259-272). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118704417.ch21>
- Stolle, C., Michaelis, I., Xiong, C., Rother, M., Usbeck, T., Yamazaki, Y., Rauberg, J., & Styp-Rekowski, K. (2021). Observing Earth's magnetic environment with the GRACE-FO mission. *Earth, Planets and Space*, 73(51). <https://doi.org/10.1186/s40623-021-01364-w>
- Stone, E. C., Frandsen, A. M., Mewaldt, R. A., Christian, E. R., Margolies, D., Ormes, J. F., & Snow, F. (1998). The Advanced Composition Explorer. *Space Science Reviews*, 86(1-4), 1-22. <https://doi.org/10.1023/A:1005082526237>
- Stone, R. G., & Tsurutani, B. T. (Eds.). (1985). *Collisionless shocks in the heliosphere: A Tutorial Review*, Geophysical Monograph Series (Vol. 34). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM034>
- Storz, M. F. (2002). HASDM Validation Tool Using Energy Dissipation Rates. In *AIAA/AAS Astrodynamics Specialist Conference, AIAA 2002-4886*. Monterey, CA.
- Storz, M. F., Bowman, B. R., Branson, J. I., Casalic, S. J., & Tobiska, W. K. (2005). High accuracy satellite drag model (HASDM). *Advances in Space Research*, 36(12), 2497-2505. <https://doi.org/10.1016/j.asr.2004.02.020>
- Storz, M. F., Bowman, B. R., & Branson, J. L. (2002). High Accuracy Satellite Drag Model (HASDM). In *AIAA/AAS Astrodynamics Specialist Conference, AIAA 2002-4886*. Monterey, CA.
- Strangeway, R. J., Ergun, R. E., Su, Y.-J., Carlson, C. W., & Elphic, R. C. (2005). Factors controlling ionospheric outflows as observed at intermediate altitudes. *Journal of Geophysical Research*, 110(A3). <https://doi.org/10.1029/2004JA010829>
- Strutt, R. J. (1931). On a night sky of exceptional brightness, and on the distinction between the polar aurora and the night sky. *Proceedings of the Royal Society of London. Series A*, 131(817), 376-381. <https://doi.org/10.1098/rspa.1931.0059>
- Stubbs, T. J., Vondrak, R. R., Østgaard, N., Sigwarth, J. B., & Frank, L. A. (2005). Simultaneous observations of the auroral ovals in both hemispheres under varying conditions. *Geophysical Research Letters*, 32(3). <https://doi.org/10.1029/2004GL021199>
- Su, Y.-J., Ergun, R. E., Peterson, W. K., Onsager, T. G., Pfaff, R., Carlson, C. W.,

- & Strangeway, R. J. (2001). Fast auroral snapshot observations of cusp electron and ion structures. *Journal of Geophysical Research*, *106*(A11), 25,595-25,600. <https://doi.org/10.1029/2001JA000093>
- Su, Z., Zhu, H., Xiao, F., Zheng, H., Wang, Y., Shen, C., Zhang, M., Wang, S., Kletzing, C. A., Kurth, W. S., Hospodarsky, G. B., Spence, H. E., Reeves, G. D., Funsten, H. O., Blake, J. B., Baker, D. N., & Wygant, J. R. (2015). Disappearance of plasmaspheric hiss following interplanetary shock. *Geophysical Research Letters*, *42*(9), 3129–3140. <https://doi.org/10.1002/2015GL063906>
- Su, Z.-P., Xiong, M., Zheng, H.-N., & Wang, S. (2009). Propagation of interplanetary shock and its consequent geoeffectiveness. *Chinese Journal of Geophysics*, *52*(2), 292-300. <https://doi.org/10.1002/cjg2.1351>
- Subbotin, D. A., & Shprits, Y. Y. (2009). Three-dimensional modeling of the radiation belts using the Versatile Electron Radiation Belt (VERB) code. *Space Weather*, *7*(10). <https://doi.org/10.1029/2008SW000452>
- Subedi, A., Adhikari, B., & Mishra, R. K. (2017). Variation of solar wind parameters during intense geomagnetic storms. *The Himalayan Physics*, *6 & 7*, 80-85. <https://doi.org/10.3126/hj.v6i0.18366>
- Sugiura, M. (1964). Hourly values of equatorial Dst for the IGY. *Ann. Int. Geophys. Year*, *35*(5).
- Sugiura, M., & Kamei, T. (1991). Equatorial Dst index 1957-1986. *IAGA Bull.*, *40*, IUGG, Paris.
- Sugiura, M., Skillman, T. L., Ledley, B. G., & Heppner, J. P. (1968). Propagation of the sudden commencement of July 8, 1966, to the magnetotail. *Journal of Geophysical Research*, *73*(21), 6699–6709. <https://doi.org/10.1029/JA073i021p06699>
- Sugiura, M., & Wilson, C. R. (1964). Oscillation of the geomagnetic field lines and associated magnetic perturbations at conjugate points. *Journal of Geophysical Research*, *69*(7), 1211-1216. <https://doi.org/10.1029/JZ069i007p01211>
- Suiro Yoran. (1940). *Miscellaneous Reports*. 211, 219. [in Japanese].
- Sun, T. R., Wang, C., Li, H., & Guo, X. C. (2011). Nightside geosynchronous magnetic field response to interplanetary shocks: Model results. *Journal of Geophysical Research*, *116*(A4). <https://doi.org/10.1029/2010JA016074>
- Sun, T. R., Wang, C., & Wang, Y. (2012). Different B_z response regions in the nightside magnetosphere after the arrival of an interplanetary shock: Multipoint observations compared with MHD simulations. *Journal of Geophysical Research*, *117*(A05227). <https://doi.org/10.1029/2011JA017303>
- Sun, T. R., Wang, C., Zhang, J. J., Pilipenko, V. A., Wang, Y., & Wang, J. Y. (2014). The chain response of the magnetospheric–and–ground magnetic field to interplanetary shocks. *Journal of Geophysical Research: Space Physics*, *120*(1), 157-165. <https://doi.org/10.1002/2014JA020754>
- Suplee, C. (2009). *The plasma universe*. Cambridge, United Kingdom: Cambridge University Press.
- Suresh, P. (2016). *Global thermosphere response to geomagnetic storms* (Ph.D thesis). Utah

State University, Logan, Utah.

- Sutton, E. K. (2008). *Effects of solar disturbances on the thermosphere densities and winds from CHAMP and GRACE satellite accelerometer data* (Ph.D thesis). University of Colorado, Boulder, Colorado.
- Sutton, E. K. (2009). Normalized force coefficients for satellites with elongated shapes. *Journal of Spacecraft and Rockets*, 46(1), 112–116. <https://doi.org/10.2514/1.40940>
- Sutton, E. K. (2018). A new method of physics-based data assimilation for the quiet and disturbed thermosphere. *Space Weather*, 16(6), 736-753. <https://doi.org/10.1002/2017SW001785>
- Sutton, E. K., Forbes, J. M., & Knipp, D. J. (2009). Rapid response of the thermosphere to variations in Joule heating. *Journal of Geophysical Research*, 114(A4). <https://doi.org/10.1029/2008JA013667>
- Sutton, E. K., Forbes, J. M., & Nerem, R. S. (2005). Global thermospheric neutral density and wind response to the severe 2003 geomagnetic storms from CHAMP accelerometer data. *Journal of Geophysical Research*, 110(A9), 1–10. <https://doi.org/10.1029/2004JA010985>
- Sutton, E. K., Forbes, J. M., Nerem, R. S., & Woods, T. N. (2006). Neutral density response to the solar flares of October and November, 2003. *Geophysical Research Letters*, 33(22). <https://doi.org/10.1029/2006GL027737>
- Sutton, E. K., Nerem, R. S., & Forbes, J. M. (2007). Density and winds in the thermosphere deduced from accelerometer data. *Journal of Spacecraft and Rockets*, 44(6), 1210–1219. <https://doi.org/10.2514/1.28641>
- Sutton, E. K., Thayer, J. P., Pilinski, M. D., Mutschler, S. M., Berger, T. E., Nguyen, V., & Masters, D. (2021). Toward Accurate Physics-Based Specifications of Neutral Density Using GNSS-Enabled Small Satellites. *Space Weather*, 19(6), e2021SW002736. <https://doi.org/10.1029/2021SW002736>
- Svalgaard, L. (1977). Geomagnetic activity: Dependence on solar wind parameters. In J. B. Zirker (Ed.), *Coronal Holes and High-Speed Streams* (p. 391). Boulder, CO: Colorado Associated University Press.
- Svalgaard, L. (2011). Geomagnetic semiannual variation is not overestimated and is not an artifact of systematic solar hemispheric asymmetry. *Geophysical Research Letters*, 38(16). <https://doi.org/10.1029/2011GL048616>
- Szabo, A. (1994). An improved solution to the “Rankine-Hugoniot” problem. *Journal of Geophysical Research*, 99(A8), 14,737-14,746. <https://doi.org/10.1029/94JA00782>
- Szabo, A. (2005). Multi-spacecraft observations of interplanetary shocks. In G. Li, G. Zank, & C. T. Russell (Eds.), *4th annual igpp international astrophysics conference on the physics of collisionless shocks* (p. 37-41). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.2032672>
- Szabo, A., Lepping, R. P., Merka, J., Smith, C. W., & Skoug, R. M. (2001). The evolution of interplanetary shocks driven by magnetic clouds. In B. Battrock & H. Sawaya-Lacoste (Eds.), *Solar encounter: Proceedings of the first solar orbiter workshop* (pp. 383–387). Noordwijk, Holland: ESA Publications Division.

- Szabo, A., Smith, C. W., & Skoug, R. M. (2003). The transition of interplanetary shocks through the magnetosheath. In M. Velli, R. Bruno, & F. Malara (Eds.), *Solar wind ten: Proceedings of the tenth international solar wind conference* (Vol. 679, p. 782-785). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.1618709>
- Taeusch, D. R., Carignan, G. R., & Reber, C. A. (1971). Neutral composition variation above 400 kilometers during a magnetic storm. *Journal of Geophysical Research*, *76*(34), 8,318–8,325. <https://doi.org/10.1029/JA076i034p08318>
- Takahashi, K., Denton, R. E., Kurth, W., Kletzing, C., Wygant, J., Bonnell, J., Dai, L., Min, K., Smith, C. W., & MacDowall, R. (2015). Externally driven plasmaspheric ULF waves observed by the Van Allen Probes. *Journal of Geophysical Research: Space Physics*, *120*(1), 526-552. <https://doi.org/10.1002/2014JA020373>
- Takahashi, K., Elsdén, T., Wright, A. N., & Degeling, A. W. (2023). Polarization of Magnetospheric ULF Waves Excited by an Interplanetary Shock on 27 February 2014. *Journal of Geophysical Research: Space Physics*, *128*, e2023JA031608. <https://doi.org/10.1029/2023JA031608>
- Takahashi, K., Higbie, P. R., Fennell, J. F., & Amata, E. (1987). Field-aligned structure of the storm time Pc 5 wave of November 14-15, 1979. *Journal of Geophysical Research*, *92*(A6), 5,857-5,864. <https://doi.org/10.1029/JA092iA06p05857>
- Takahashi, K., Lysak, R., Vellante, M., Kletzing, C. A., Hartinger, M. D., & Smith, C. W. (2018). Observation and Numerical Simulation of Cavity Mode Oscillations Excited by an Interplanetary Shock. *Journal of Geophysical Research: Space Physics*, *123*(3), 1969-1988. <https://doi.org/10.1002/2017JA024639>
- Takahashi, N., Seki, K., Teramoto, M., Fok, M.-C., Zheng, Y., Matsuoka, A., Higashio, N., Shiokawa, K., Baishev, D., Yoshikawa, A., & Nagatsuma, T. (2018). Global Distribution of ULF Waves During Magnetic Storms: Comparison of Arase, Ground Observations, and BATSUS + CRCM Simulation. *Geophysical Research Letters*, *45*(18), 9390-9397. <https://doi.org/10.1029/2018GL078857>
- Takao, S., & Matsushita, S. (1967). Geomagnetic pulsations associated with sudden commencements and sudden impulses. *Planetary and Space Science*, *15*(3), 573-587. [https://doi.org/10.1016/0032-0633\(67\)90163-8](https://doi.org/10.1016/0032-0633(67)90163-8)
- Takeuchi, T., Araki, T., & Viljanen, A. (2002). Geomagnetic negative sudden impulses: Interplanetary causes and polarization distribution. *Journal of Geophysical Research*, *107*(A7), 1096. <https://doi.org/10.1029/20001JA900152>
- Takeuchi, T., Russell, C. T., & Araki, T. (2002). Effect of the orientation of interplanetary shock on the geomagnetic sudden commencement. *Journal of Geophysical Research*, *107*(A12), SMP 6-1-SMP 6-10. <https://doi.org/10.1029/2002JA009597>
- Taleb, N. N. (2007). *The Black Swan: The Impact of the Highly Improbable*. New York, NY: Random House.
- Tamao, T. (1964a). A hydromagnetic interpretation of geomagnetic SSC*. *Rept. Ionosphere Space Res. Japan*, *18*, 16-31.
- Tamao, T. (1964b). The structure of three-dimensional hydromagnetic waves in a uniform cold plasma. *Journal of Geomagnetism and Geoelectricity*, *18*, 89-114.

<https://doi.org/10.5636/jgg.16.89>

- Tanaka, T. (1994). Finite volume TVD scheme on an unstructured grid system for three-dimensional MHD simulation of inhomogeneous systems including strong background potential fields. *Journal of Computational Physics*, *111*(2), 381–389. <https://doi.org/10.1006/jcph.1994.1071>
- Tanaka, T. (2001). Interplanetary magnetic field b_y and auroral conductance effects on high-latitude ionospheric convection patterns. *Journal of Geophysical Research*, *106*(A11), 24505–24516. <https://doi.org/10.1029/2001JA900061>
- Tanaka, T., Nakamizo, A., Yoshikawa, A., Fujita, S., Shinagawa, H., Shimazu, H., Kikuchi, T., & Hashimoto, K. K. (2010). Substorm convection and current system deduced from the global simulation. *Journal of Geophysical Research*, *115*(A5). <https://doi.org/10.1029/2009JA014676>
- Tang, B. B., Wang, C., Hu, Y. Q., & Kan, J. R. (2011). Intensification of the Cowling current in the global MHD simulation model. *Journal of Geophysical Research*, *116*(A6). <https://doi.org/10.1029/2010JA016320>
- Tanskanen, E. I. (2009). A comprehensive high-throughput analysis of substorms observed by IMAGE magnetometer network: Years 1993–2003 examined. *Journal of Geophysical Research*, *114*(A5). <https://doi.org/10.1029/2008JA013682>
- Tapley, B. D., Bettadpur, S., Ries, J. C., Thompson, P. F., & Watkins, M. M. (2004). GRACE measurements of mass variability in the Earth system. *Science*, *205*(5683). <https://doi.org/10.1126/science.1099192>
- Tapley, B. D., Bettadpur, S., Watkins, M., & Reigber, C. (2004). The gravity recovery and climate experiment: Mission overview and early results. *Geophysical Research Letters*, *31*(9). <https://doi.org/10.1029/2004GL019920>
- Tapley, B. D., & Reigber, C. (2001). The GRACE Mission: Status and future plans. In *G41c-02*. AGU Fall Meeting, San Francisco, CA.
- Tapping, K., & Morgan, C. (2017). Changing Relationships Between Sunspot Number, Total Sunspot Area and $F_{10.7}$ in Cycles 23 and 24. *Solar Physics*, *292*(73), 1-14. <https://doi.org/10.1007/s11207-017-1111-6>
- Tapping, K. F. (2013). The 10.7 cm solar radio flux ($F_{10.7}$). *Space Weather*, *11*(7), 394-406. <https://doi.org/10.1002/swe.20064>
- Tascione, T. F. (1994). *Introduction to the space environment*. Malabar, FL: Orbit Book Company.
- Temmer, M. (2016). Kinematical properties of coronal mass ejections. *Astronomische Nachrichten*, *337*(10), 1010–1015. <https://doi.org/10.1002/asna.201612425>
- Thaduri, A., Galar, D., & Kumar, U. (2020). Space weather climate impacts on railway infrastructure. *International Journal of System Assurance Engineering and Management*, *11*(Suppl 2), 267-281. <https://doi.org/10.1007/s13198-020-01003-9>
- Thayer, J. P., Liu, X., Lei, J., Pilinski, M., & Burns, A. G. (2012). The impact of helium on thermosphere mass density response to geomagnetic activity during the recent solar minimum. *Journal of Geophysical Research*, *117*(A7). <https://doi.org/10.1029/2012JA017832>

- Thayer, J. P., & Semeter, J. (2004). The convergence of magnetospheric energy flux in the polar atmosphere. *Journal of Atmospheric and Solar-Terrestrial Physics*, *66*(10), 807–824. <https://doi.org/10.1016/j.jastp.2004.01.035>
- The SunPy Community, Barnes, W. T., Bobra, M. G., Christe, S. D., Freij, N., Hayes, L. A., Ireland, J., Mumford, S., Perez-Suarez, D., Ryan, D. F., Shih, A. Y., (Primary Paper Contributors), Chanda, P., Glogowski, K., Hewett, R., Hughitt, V. K., Hill, A., Hiware, K., Inglis, A., Kirk, M. S. F., Konge, S., Mason, J. P., Maloney, S. A., Murray, S. A., Panda, A., Park, J., Pereira, T. M. D., Reardon, K., Savage, S., Sipöcz, B. M., Stansby, D., Jain, Y., Taylor, G., Yadav, T., Rajul, Dang, T. K., & (Sunpy Contributors). (2020). The SunPy Project: Open Source Development and Status of the Version 1.0 Core Package. *The Astrophysical Journal*, *890*(1), 68. <https://doi.org/10.3847/1538-4357/ab4f7a>
- Thébault, E., Finlay, C. C., Beggan, C. D., Alken, P., Aubert, J., Barrois, O., Bertrand, F., Bondar, T., Boness, A., Brocco, L., Canet, E., Colodut, A., Chulliat, A., Coisson, P., Civet, F., Du, A., Fournier, A., Fratter, I., Gillet, N., Hamilton, B., Hamoudi, M., Hulot, G., Jager, T., Korte, M., Kuang, W., Lalanne, X., Langlais, B., Léger, J.-M., Lesur, V., Lowes, F. J., Macmillan, S., Manda, M., Manoj, C., Maus, S., Olsen, N., Petrov, V., Ridley, V., Rother, M., Sabaka, T. J., Saturnino, D., Schachtschneider, R., Sirol, O., Tangborn, A., Thomson, A., T, L., Vigneron, P., Wardinski, I., & Zvereva, T. (2015). International Geomagnetic Reference Field: the 12th generation. *Earth, Planets and Space*, *67*(1), 1–19. <https://doi.org/10.1186/s40623-015-0228-9>
- Theodoridis, G. C., & Paolini, F. R. (1968). Charged Particle Transmission through Cylindrical Plate Electrostatic Analyzers. *Review of Scientific Instruments*, *39*(3), 326-330. <https://doi.org/10.1063/1.1683362>
- Thomsen, M. F. (1988). Multi-spacecraft observations of collisionless shocks. *Advances in Space Research*, *8*(9–10), 157–166. [https://doi.org/10.1016/0273-1177\(88\)90126-3](https://doi.org/10.1016/0273-1177(88)90126-3)
- Thomsen, M. F., Birn, J., Borovsky, J. E., Morzinski, K., McComas, D. J., & Reeves, G. D. (2001). Two-satellite observations of substorm injections at geosynchronous orbit. *Journal of Geophysical Research*, *106*(A5), 8405-8416. <https://doi.org/10.1029/2000JA000080>
- Thomsen, M. F., Noveroske, E., Borovsky, J. E., & McComas, D. J. (1999). *Calculation of Moments from Measurements by the Los Alamos Magnetospheric Plasma Analyzer* (Tech. Rep. No. LA-13566-MS). Los Alamos, New Mexico: Los Alamos National Laboratory.
- Thomson, A. W. P., McKay, A. J., Clarke, E., & Reay, S. J. (2005). Surface electric fields and geomagnetically induced currents in the Scottish Power grid during the 30 October 2003 geomagnetic storm. *Space Weather*, *3*(11). <https://doi.org/10.1029/2005SW000156>
- Thorne, R. M. (2010). Radiation belt dynamics: The importance of wave-particle interactions. *Geophysical Research Letters*, *37*(22). <https://doi.org/10.1029/2010GL044990>
- Thorne, R. M., Li, W., Ni, B., Ma, Q., Bortnik, J., Chen, L., Baker, D. N., Spence, H. E., Reeves, G. D., Henderson, M. G., Kletzing, C. A., Kurth, W. S., Hospodarsky, G. B., Blake, J. B., Fennell, J. F., Claudepierre, S. G., & Kanekal, S. G. (2013). Rapid local

- acceleration of relativistic radiation-belt electrons by magnetospheric chorus. *Nature*, *504*, 411-414. <https://doi.org/10.1038/nature12889>
- Thornton, S. T., & Marion, J. B. (2004). *Classical Dynamics of Particles and Systems* (5th ed.). Belmont, CA: Thomson Brooks/Cole.
- Tidman, D. A., & Krall, N. (1971). *Shock waves in collisionless plasmas*. New York, N.Y.: Wiley.
- Tinsley, B. A., Rohrbaugh, R. P., Rassoul, H., Barker, E. S., Cochran, A. L., Cochran, W. D., Wills, B. J., Wills, D. W., & Slater, D. (1984). Spectral characteristics of two types of low latitude aurorae. *Geophysical Research Letters*, *11*(6), 572-575. <https://doi.org/10.1029/GL011i006p00572>
- Titheridge, J. E., & Andrews, M. K. (1967). Changes in the topside ionosphere during a large magnetic storm. *Planetary and Space Science*, *15*(7), 1157-1167. [https://doi.org/10.1016/0032-0633\(67\)90100-6](https://doi.org/10.1016/0032-0633(67)90100-6)
- Tobiska, W. K., Bouwer, D., & R.Bowman, B. (2008). The development of new solar indices for use in thermospheric density modeling. *Journal of Atmospheric and Solar-Terrestrial Physics*, *70*(5), 803-819. <https://doi.org/10.1016/j.jastp.2007.11.001>
- Tobiska, W. K., Bowman, B. R., Bouwer, D., Cruz, A., Wahl, K., Pilinski, M., Mehta, P. M., & Licata, R. J. (2021). The SET HASDM density database. *Space Weather*, *19*(19), e2020SW002682. <https://doi.org/10.1029/2020SW002682>
- Toffoletto, F., Sazykin, S., Spiro, R., & Wolf, R. (2003). Inner magnetospheric modeling with the Rice Convection Model. *Space Science Reviews*, *107*(1-2), 175-196. <https://doi.org/10.1023/A:1025532008047>
- Toptyghin, I. N. (1980). Acceleration of particles by shocks in a cosmic plasma. *Space Science Reviews*, *26*(2), 157-213. <https://doi.org/10.1007/BF00167370>
- Torbert, R. B., Russell, C. T., Magnes, W., Ergun, R. E., Lindqvist, P.-A., LeContel, O., Vaith, H., Macri, J., Myers, S., Rau, D., Needell, J., King, B., Granoff, M., Chutter, M., Dors, I., Olsson, G., Khotyaintsev, Y. V., Eriksson, A., Kletzing, C. A., Bounds, S., Anderson, B., Baumjohann, W., Steller, M., Bromund, K., Le, G., Nakamura, R., Strangeway, R. J., Leinweber, H. K., Tucker, S., Westfall, J., Fischer, D., Plaschke, F., Porter, J., & Lappalainen, K. (2014). The FIELDS Instrument Suite on MMS: Scientific Objectives, Measurements, and Data Products. *Space Science Reviews*, *199*, 105-135. <https://doi.org/10.1007/s11214-014-0109-8>
- Torge, W. (1980). *Geodesy*. Berlin, Germany: de Gruyter.
- Torr, M. R., Torr, D. G., Zukic, M., Johnson, R. B., Ajello, J., Banks, P., Clark, K., Cole, K., Keffer, C., Parks, G., Tsurutani, B., & Spann, J. (1995). A far ultraviolet imager for the International Solar-Terrestrial Physics Mission. *Space Science Reviews*, *71*, 329-383. <https://doi.org/10.1007/BF00751335>
- Torta, J. M., Marcuello, A., Campaña, J., Marsal, S., Queralt, P., & Ledo, J. (2017). Improving the modeling of geomagnetically induced currents in Spain. *Space Weather*, *15*(5), 691-703. <https://doi.org/10.1002/2017SW001628>
- Tóth, G. (2000). The $\nabla \cdot \mathbf{B}$ constraint in shock-capturing magnetohydrodynamics codes. *Journal of Computational Physics*, *161*(2), 605-652. <https://doi.org/10.1006/jcph.2000.6519>

- Tóth, G., De Zeeuw, D. L., Gombosi, T. I., Manchester, W. B., Ridley, A. J., Sokolov, I. V., & Roussev, I. I. (2007). Sun-to-thermosphere simulation of the 28–30 October 2003 storm with the Space Weather Modeling Framework. *Space Weather*, *5*(6), 1–16. <https://doi.org/10.1029/2006SW000272>
- Tóth, G., Meng, X., Gombosi, T. I., & Rastätter, L. (2014). Predicting the time derivative of local magnetic perturbations. *Journal of Geophysical Research: Space Physics*, *119*(1), 310–321. <https://doi.org/10.1002/2013JA019456>
- Tóth, G., Sokolov, I. V., Gombosi, T. I., Chesney, D. R., Clauer, C. R., De Zeeuw, D. L., Hansen, K. C., Kane, K. J., Manchester, W. B., Oehmke, R. C., Powell, K. G., Ridley, A. J., Roussev, I. I., Stout, Q. F., Volberg, O., Wolf, R. A., Sazykin, S., Chan, A., Yu, B., & Kóta, J. (2005). Space Weather Modeling Framework: A new tool for the space science community. *Journal of Geophysical Research*, *110*(A12). <https://doi.org/10.1029/2005JA011126>
- Tóth, G., van der Holst, B., Sokolov, I. V., De Zeeuw, D. L., Gombosi, T. I., Fang, F., Manchester, W. B., Meng, X., Najib, D., Powell, K. G., Stout, Q. F., Glocer, A., Ma, Y.-J., & Opher, M. (2011). Adaptive numerical algorithms in space weather modeling. *Journal of Computational Physics*, *231*(3), 870–903. <https://doi.org/10.1016/j.jcp.2011.02.006>
- Tóth, G., van der Holst, B., Sokolov, I. V., De Zeeuw, D. L., Gombosi, T. I., Fang, F., Manchester, W. B., Meng, X., Najibi, D., Najib, Powell, K. G., Stout, Q. F., Ma, A. G. Y.-J., & Opher, M. (2012). Adaptive numerical algorithms in space weather modeling. *Journal of Atmospheric and Solar-Terrestrial Physics*, *231*(3), 870–903. <https://doi.org/10.1016/j.jcp.2011.02.006>
- Tousey, R. (1973). The solar corona. *Space Research*, *13*, 713–730.
- Tozzi, R., De Michelis, P., Coco, I., & Giannattasio, F. (2019). A Preliminary Risk Assessment of Geomagnetically Induced Currents over the Italian Territory. *Space Weather*, *17*(1), 46–58. <https://doi.org/10.1029/2018SW002065>
- Trattner, K. J., Burch, J. L., Fuselier, S. A., Petrinec, S. M., & Vines, S. K. (2020). The 18 November 2015 Magnetopause Crossing: The GEM Dayside Kinetic Challenge Event Observed by MMS/HPCA. *Journal of Geophysical Research: Space Physics*, *125*(7), e2019JA027617. <https://doi.org/10.1029/2019JA027617>
- Treumann, R. A., & Baumjohann, W. (2001). *Advanced plasma physics*. London, United Kingdom: Imperial College Press.
- Trindade, R. I. F., Jaqueto, P., Terra-Nova, F., Brandt, D., Hartmann, G. A., Feinberg, J. M., Strauss, B. E., Novello, V. F., Cruz, F. W., Karmann, I., Cheng, H., & Edwards, R. L. (2018). Speleothem record of geomagnetic South Atlantic Anomaly recurrence. *Proceedings of the National Academy of Sciences*, *115*(52), 13198–13203. <https://doi.org/10.1073/pnas.1809197115>
- Tripathi, D., Chakrabarty, D., Nandi, A., Prasad, B. R., Ramaprakash, A. N., Shaji, N., Sankarasubramanian, K., Thampi, R. S., & Yadav, V. K. (2023). The Aditya-L1 mission of ISRO. In G. Cauzzi & A. Tritschler (Eds.), *The era of multi-messenger solar physics* (Vol. 18). Cambridge University Press. <https://doi.org/10.1017/S1743921323001230>

- Trivedi, N. B., Ícaro Vitorello, Kabata, W., Dutra, S. L. G., Padilha, A. L., Bologna, M. S., de Pádua, M. B., Soares, A. P., Luz, G. S., de A. Pinto, F., Pirjola, R., & Viljanen, A. (2007). Geomagnetically induced currents in an electric power transmission system at low latitudes in Brazil: A case study. *Space Weather*, 5(4). <https://doi.org/10.1029/2006SW000282>
- Troitskaya, V. A., & Guglielmi, A. V. (1969). Geomagnetic pulsations and diagnostics of the magnetosphere. *Soviet Physics Uspekhi*, 12, 195-218. <https://doi.org/10.1070/PU1969v012n02ABEH003933>
- Troshichev, O., Hayakawa, H., Matsuoka, A., Mukai, T., & Tsuruda, K. (1996). Cross polar cap diameter and voltage as a function of PC index and interplanetary quantities. *Journal of Geophysical Research*, 101(A6), 13429-13435. <https://doi.org/10.1029/95JA03672>
- Troshichev, O., Janzhura, A., & Stauning, P. (2006). Unified PCN and PCS indices: Method of calculation, physical sense, and dependence on the IMF azimuthal and northward components. *Journal of Geophysical Research*, 111(A5). <https://doi.org/10.1029/2005JA011402>
- Troshichev, O. A., Andrezen, V. G., Vennerstrøm, S., & Friis-Christensen, E. (1988). Magnetic activity in the polar cap - A new index. *Advances in Space Research*, 36(11), 1095-1102. [https://doi.org/10.1016/0032-0633\(88\)90063-3](https://doi.org/10.1016/0032-0633(88)90063-3)
- Troshichev, O. A., Lukianova, R. Y., Papitashvili, V. O., Rich, F. J., & Rasmussen, O. (2000). Polar cap index (PC) as a proxy for ionospheric electric field in the near-pole region. *Geophysical Research Letters*, 27(23), 3809-3812. <https://doi.org/10.1029/2000GL003756>
- Trotta, D., Hietala, H., Horbury, T., Dresing, N., Vainio, R., Wilson III, L., Plotnikov, I., & Kilpua, E. (2023). Multi-spacecraft observations of shocklets at an interplanetary shock. *Monthly Notices of the Royal Astronomical Society*, 520(1). <https://doi.org/10.1093/mnras/stad104>
- Trotta, D., Vuorinen, L., Hietala, H., Horbury, T., Dresing, N., Gieseler, J., Kouloumvakos, A., Price, D., Valentini, F., Kilpua, E., & Vainio, R. (2022). Single-spacecraft techniques for shock parameters estimation: A systematic approach. *Frontiers in Astronomy and Space Science*, 9. <https://doi.org/10.3389/fspas.2022.1005672>
- Tsai, T. C., Lyu, L. H., Chao, J. K., Chen, M. Q., & Tsai, W. H. (2009). A theoretical and simulation study of the contact discontinuities based on a vlasov simulation code. *Journal of Geophysical Research*, 114(A12). <https://doi.org/10.1029/2009JA014121>
- Tsurutani, B., Echer, E., Guarnieri, F. L., & Verkhoglyadova, O. P. (2008). Interplanetary causes of middle latitude ionospheric disturbances. In *Midlatitude ionospheric dynamics and disturbances*, Geophysical Monograph Series (p. 99-119). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM181>
- Tsurutani, B., Mannucci, A., Iijima, B., Abdu, M. A., Sobral, J. H. A., Gonzalez, W., Guarnieri, F., Tsuda, T., Saito, A., Yumoto, K., Fejer, B., Fuller-Rowell, T. J., Kozyra, J., Foster, J. C., Coster, A., & Vasyliunas, V. M. (2004). Global dayside ionospheric uplift and enhancement associated with interplanetary electric fields. *Journal of Geophysical Research*, 109(A8). <https://doi.org/10.1029/2003JA010342>

- Tsurutani, B. T. (2001). The interplanetary causes of magnetic storms, substorms and geomagnetic quiet. In I. A. Daglis (Ed.), *Space storms and space weather hazards*. Dordrecht, Holland: Springer. https://doi.org/10.1007/978-94-010-0983-6_4
- Tsurutani, B. T., Echer, E., & Gonzalez, W. D. (2011). The solar and interplanetary causes of the recent minimum in geomagnetic activity (mga23): a combination of midlatitude small coronal holes, low imf b_z variances, low solar wind speeds and low solar magnetic fields. *Annales Geophysicae*, *29*, 839-849. <https://doi.org/10.5194/angeo-29-839-2011>
- Tsurutani, B. T., Echer, E., Guarnieri, F. L., & Kozyra, J. U. (2008). CAUSES November 7-8, 2004, superstorm: Complex solar and interplanetary features in the post-solar maximum phase. *Geophysical Research Letters*, *35*(6). <https://doi.org/10.1029/2007GL031473>
- Tsurutani, B. T., Echer, E., Shibata, K., Verkhoglyadova, O. P., Mannucci, A. J., Gonzalez, W. D., Kozyra, J. U., & Pätzold, M. (2014). The interplanetary causes of geomagnetic activity during the 7-17 March 2012 interval: A CAUSES II overview. *Journal of Space Weather and Space Climate*, *4*(A02). <https://doi.org/10.1051/swsc/2013056>
- Tsurutani, B. T., Gonzalez, W. D., Gonzalez, A. L. C., Guarnieri, F. L., Gopalswamy, N., Grande, M., Kamide, Y., Kasahara, Y., Lu, G., Mann, I., McPherron, R., So-raas, F., & Vasyliūnas, V. (2006). Corotating solar wind streams and recurrent geomagnetic activity: A review. *Journal of Geophysical Research*, *111*(A7), 1–25. <https://doi.org/10.1029/2005JA011273>
- Tsurutani, B. T., Gonzalez, W. D., Gonzalez, A. L. C., Tang, F., Arballo, J. K., & Okada, M. (1995). Interplanetary origin of geomagnetic activity in the declining phase of the solar cycle. *Journal of Geophysical Research*, *100*(A11), 21717-21733. <https://doi.org/10.1029/95JA01476>
- Tsurutani, B. T., Gonzalez, W. D., Kamide, Y., & Arballo, J. K. (Eds.). (1997). *Magnetic Storms*, Geophysical Monograph Series (Vol. 98). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM098>
- Tsurutani, B. T., Gonzalez, W. D., Lakhina, G. S., & Alex, S. (2003). The extreme magnetic storm of 1–2 September 1859. *Journal of Geophysical Research*, *108*(A7). <https://doi.org/10.1029/2002JA009504>
- Tsurutani, B. T., Gonzalez, W. D., Tang, F., Akasofu, S.-I., & Smith, E. J. (1988). Origin of interplanetary southward magnetic fields responsible for major magnetic storms near solar maximum (1978-1979). *Journal of Geophysical Research*, *93*(A8), 8519–8531. <https://doi.org/10.1029/JA093iA08p08519>
- Tsurutani, B. T., Gonzalez, W. D., Tang, F., & Lee, Y. T. (1992). Great magnetic storms. *Geophysical Research Letters*, *19*(1), 73–76. <https://doi.org/10.1029/91GL02783>
- Tsurutani, B. T., & Hajra, R. (2021). The Interplanetary and Magnetospheric causes of Geomagnetically Induced Currents (GICs) > 10 A in the Mäntsälä Finland Pipeline: 1999 through 2019. *Journal of Space Weather and Space Climate*, *11*(23), 1-23. <https://doi.org/10.1051/swsc/2021001>
- Tsurutani, B. T., & Hajra, R. (2023). Energetics of Shock-triggered Supersubstorms (SML < -2500 nT). *The Astrophysical Journal*, *946*(17). [157](https://doi.org/10.3847/1538-</p>
</div>
<div data-bbox=)

- Tsurutani, B. T., Hajra, R., Echer, E., & Gjerloev, J. W. (2015). Extremely intense (SML ≤ -2500 nT) substorms: isolated events that are externally triggered? *Annales Geophysicae*, *33*, 519-524. <https://doi.org/10.5194/angeo-33-519-2015>
- Tsurutani, B. T., Hajra, R., Tanimori, T., Takada, A., Remya, B., Mannucci, A. J., Lakhina, G. S., Kozyra, J. U., Shiokawa, K., Lee, L. C., Echer, E., Reddy, R. V., & Gonzalez, W. D. (2016). Heliospheric plasma sheet (HPS) impingement onto the magnetosphere as a cause of relativistic electron dropouts (REDs) via coherent EMIC wave scattering with possible consequences for climate change mechanisms. *Journal of Geophysical Research: Space Physics*, *121*(10), 10,130-10,156. <https://doi.org/10.1002/2016JA022499>
- Tsurutani, B. T., & Ho, C. M. (1999). A review of discontinuities and Alfvén waves in interplanetary space: Ulysses results. *Reviews of Geophysics*, *37*(4), 517-541. <https://doi.org/10.1029/1999RG900010>
- Tsurutani, B. T., Judge, D. L., Guarneri, F. L., Gangopadhyay, P., Jones, A. R., Nuttall, J., Zambon, G. A., Didkovsky, L., Mannucci, A. J., Iijima, B., Meier, R. R., Immel, T. J., Woods, T. N., Prasad, S., Floyd, L., Huba, J., Solomon, S. C., Straus, P., & Viereck, R. (2005). The October 28, 2003 extreme EUV solar flare and resultant extreme ionospheric effects: Comparison to other Halloween events and the Bastille Day event. *Geophysical Research Letters*, *32*(3). <https://doi.org/10.1029/2004GL021475>
- Tsurutani, B. T., & Lakhina, G. S. (2014). An extreme coronal mass ejection and consequences for the magnetosphere and Earth. *Geophysical Research Letters*, *41*(2), 287-292. <https://doi.org/10.1002/2013GL058825>
- Tsurutani, B. T., Lakhina, G. S., Echer, E., Hajra, R., Nayak, C., Mannucci, A. J., & Meng, X. (2018). Comment on “Modeling extreme ‘Carrington-type’ space weather events using three-dimensional global MHD simulations” by C. M. Ngwira, A. Pulkkinen, M. M. Kuznetsova and A. Gloer”. *Journal of Geophysical Research: Space Physics*. <https://doi.org/10.1002/2017JA024779>
- Tsurutani, B. T., Lakhina, G. S., & Hajra, R. (2020). The physics of space weather/solar-terrestrial physics (STP): what we know now and what the current and future challenges are. *Nonlinear Processes in Geophysics*, *27*, 75-119. <https://doi.org/10.5194/npg-27-75-2020>
- Tsurutani, B. T., Lakhina, G. S., Pickett, J. S., Guarneri, F. L., Lin, N., & Goldstein, B. E. (2005). Nonlinear Alfvén waves, discontinuities, proton perpendicular acceleration, and magnetic holes/decreases in interplanetary space and the magnetosphere: intermediate shocks? *Nonlinear Processes in Geophysics*, *12*(3), 321-336. <https://doi.org/10.5194/npg-12-321-2005>
- Tsurutani, B. T., Lakhina, G. S., Sen, A., Hellinger, P., Glassmeier, K.-H., & Mannucci, A. J. (2018). A review of Alfvénic turbulence in high-speed solar wind streams: Hints from cometary plasma turbulence. *Journal of Geophysical Research: Space Physics*, *123*. <https://doi.org/10.1002/2017JA024203>
- Tsurutani, B. T., Lakhina, G. S., Verkhoglyadova, O. P., Gonzalez, W. D., Echer, E., & Guarneri, F. L. (2011). A review of interplanetary discontinuities and their geomagnetic effects. *Journal of Atmospheric and Solar-Terrestrial Physics*, *73*(1), 5-19.

<https://doi.org/10.1016/j.jastp.2010.04.001>

- Tsurutani, B. T., & Lin, R. P. (1985). Acceleration of >47 keV ions and >2 keV electrons by interplanetary shocks at 1 AU. *Journal of Geophysical Research*, *90*(A1), 1–11. <https://doi.org/10.1029/JA090iA01p00001>
- Tsurutani, B. T., McPherron, R., Lu, G., & Sobral, J. H. A. (Eds.). (2006). *Recurrent magnetic storms: Corotating solar wind streams*, Geophysical Monograph Series (Vol. 167). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM167>
- Tsurutani, B. T., & Meng, C.-I. (1972). Interplanetary magnetic-field variations and substorm activity. *Journal of Geophysical Research*, *77*(16), 2964–2970. <https://doi.org/10.1029/JA077i016p02964>
- Tsurutani, B. T., & Rodriguez, P. (1981). Upstream waves and particles: An overview of ISEE results. *Journal of Geophysical Research*, *86*(A6), 4317–4324. <https://doi.org/10.1029/JA086iA06p04317>
- Tsurutani, B. T., & Smith, E. J. (1979). Interplanetary discontinuities: Temporal variations and the radial gradient from 1 to 8.5 AU. *Journal of Geophysical Research*, *84*(A6), 2773–2787. <https://doi.org/10.1029/JA084iA06p02773>
- Tsurutani, B. T., Smith, E. J., & Jones, D. E. (1983). Waves observed upstream of interplanetary shocks. *Journal of Geophysical Research*, *88*(A7), 5645–5656. <https://doi.org/10.1029/JA088iA07p05645>
- Tsurutani, B. T., Smith, E. J., Pyle, K. R., & Simpson, J. A. (1982). Energetic protons accelerated at corotating shocks: Pioneer 10 and 11 observations from 1 to 6 AU. *Journal of Geophysical Research*, *87*(A9), 7389–7404. <https://doi.org/10.1029/JA087iA09p07389>
- Tsurutani, B. T., Southwood, D. J., Smith, E. J., & Balogh, A. (1993). A survey of low frequency waves at Jupiter: The Ulysses encounter. *Journal of Geophysical Research*, *98*(A12), 21203–21216. <https://doi.org/10.1029/93JA02586>
- Tsurutani, B. T., & Stone, R. G. (Eds.). (1985). *Collisionless shocks in the heliosphere: Reviews of current research*, Geophysical Monograph Series (Vol. 35). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM035>
- Tsurutani, B. T., Verkhoglyadova, O. P., Mannucci, A. J., Araki, T., Sato, A., Tsuda, T., & Yumoto, K. (2007). Oxygen ion up-lift and satellite drag effects during the 30 October 2003 daytime superfountain event. *Annales Geophysicae*, *25*, 569–574. <https://doi.org/10.5194/angeo-25-569-2007>
- Tsurutani, B. T., Verkhoglyadova, O. P., Mannucci, A. J., Lakhina, G. S., & Huba, J. D. (2012). Extreme changes in the dayside ionosphere during a Carrington-type magnetic storm. *Journal of Space Weather and Space Climate*, *2*(A05). <https://doi.org/10.1051/swsc/2012004>
- Tsurutani, B. T., & Zhou, X. Y. (2003). Interplanetary shock triggering of substorms: Wind and Polar. *Advances in Space Research*, *31*(4), 1063–1067. [https://doi.org/10.1016/S0273-1177\(02\)00796-2](https://doi.org/10.1016/S0273-1177(02)00796-2)
- Tsurutani, B. T., Zhou, X.-Y., Vasyliunas, V. M., Haerendel, G., Arballo, J. K., & Lakhina, G. S. (2001). Interplanetary Shocks, Magnetopause Boundary Layers and Dayside Auroras: The Importance of a Very Small Magnetospheric Region. *Surveys in Geo-*

- physics*, 22(2), 101-130. <https://doi.org/10.1023/A:1012952414384>
- Tsyganenko, N. A., & Sitnov, M. I. (2005). Modeling the dynamics of the inner magnetosphere during strong geomagnetic storms. *Journal of Geophysical Research*, 110(A3).
- Tu, J.-N., Dhar, M., Song, P., Reinisch, B. W., Green, J. L., Benson, R. F., & Coster, A. J. (2007). Extreme polar cap density enhancements along magnetic field lines during an intense geomagnetic storm. *Journal of Geophysical Research*, 112(A5). <https://doi.org/10.1029/2006JA012034>
- Tu, W., Cunningham, G. S., Chen, Y., Morley, S. K., G. D. Reeves, J. B. B., Baker, D. N., & Spence, H. (2014). Event-specific chorus wave and electron seed population models in DREAM3D using the Van Allen Probes. *Journal of Geophysical Research*, 41(5), 1359-1366. <https://doi.org/10.1002/2013GL058819>
- Tucker-Hood, K., Scott, C., Owens, M., Jackson, D., Barnard, L., Davies, J. A., Crothers, S., Lintott, C., Simpson, R., Savani, N. P., Wilkinson, J., Harder, B., Eriksson, G. M., L Baeten, E. M., & Wan Wah, L. L. (2015). Validation of a priori CME arrival predictions made using real-time heliospheric imager observations. *Space Weather*, 13(1), 35-48. <https://doi.org/10.1002/2014SW001106>
- Tung, Y.-K., Carlson, C. W., McFadden, J. P., Klumpar, D. M., Parks, G. K., Peria, W. J., & Liou, K. (2001). Auroral polar cap boundary ion conic outflow observed on fast. *Journal of Geophysical Research*, 106(A3), 3603-3614. <https://doi.org/10.1029/2000JA900115>
- Turing, A. M. (1950). Computing machinery and intelligence. *Mind*, 49(236), 433-460. <https://doi.org/10.1093/mind/LIX.236.433>
- Turner, D. L., Shprits, Y., Hartinger, M., & Angelopoulos, V. (2012). Explaining sudden losses of outer radiation belt electrons during geomagnetic storms. *Nature Physics*, 8(3), 208-212. <https://doi.org/10.1038/nphys2185>
- Turner, N. E., Douglas Cramer, W., Earles, S. K., & Emery, B. A. (2009). Geoefficiency and energy partitioning in CIR-driven and CME-driven storms. *Journal of Atmospheric and Solar-Terrestrial Physics*, 71(10-11), 1023-1031. <https://doi.org/10.1016/j.jastp.2009.02.005>
- Tylka, A. J., & Lee, M. A. (2006). A model for spectral and compositional variability at high energies in large, gradual solar particle events. *The Astrophysical Journal*, 646(2), 1319-1334. <https://doi.org/10.1086/505106>
- Upton, L. A., & Hathaway, D. H. (2023). Solar cycle precursors and the outlook for cycle 25. *Journal of Geophysical Research: Space Physics*, 128(10), e2023JA031681. <https://doi.org/10.1029/2023JA031681>
- Usoskin, I. G. (2013). A History of Solar Activity over Millennia. *Living Reviews in Solar Physics*, 10(1). <https://doi.org/10.12942/lrsp-2013-1>
- Usoskin, I. G. (2017). A history of solar activity over millennia. *Living Reviews in Solar Physics*, 14(3), 1-97. <https://doi.org/10.1007/s41116-017-0006-9>
- Usoskin, I. G., Arlt, R., Asvestari, E., Hawkins, E., Käpylä, M., Kovaltsov, G. A., Krivova, N., Lockwood, M., Mursula, K., O'Reilly, J., Owens, M., Scott, C. J., Sokoloff, D. D., Solanki, S. K., Soon, W., & Vaquero, J. M. (2015). The Maunder minimum (1645-1715) was indeed a grand minimum: A reassessment of multiple datasets. *Astronomy*

- & *Astrophysics*, 581(A95), 1-19. <https://doi.org/0.1051/0004-6361/201526652>
- Usoskin, I. G., Bazilevskaya, G. A., & Kovaltsov, G. A. (2011). Solar modulation parameter for cosmic rays since 1936 reconstructed from ground-based neutron monitors and ionization chambers. *Journal of Geophysical Research*, 116(A2). <https://doi.org/10.1029/2010JA016105>
- Usoskin, I. G., Kovaltsov, G. A., Mishina, L. N., Sokoloff, D. D., & Vaquero, J. (2017). An Optical Atmospheric Phenomenon Observed in 1670 over the City of Astrakhan Was Not a Mid-Latitude Aurora. *Solar Physics*, 292(1). <https://doi.org/10.1007/s11207-016-1035-6>
- Usoskin, I. G., Kromer, B., Ludlow, F., Beer, J., Friedrich, M., Kovaltsov, G. A., Solanki, S. K., & Wacker, L. (2013). The AD775 cosmic event revisited: the Sun is to blame. *Astronomy & Astrophysics*, 552(L3). <https://doi.org/10.1051/0004-6361/201321080>
- Vaisberg, O. L., & Zastenker, G. N. (1976). Solar wind and magnetosheath observations at Earth during August 1972. *Space Science Reviews*, 19, 687-702. <https://doi.org/10.1007/BF00210646>
- Vallado, D. A., & Finkleman, D. (2014). A critical assessment of satellite drag and atmospheric density modeling. *Acta Astronautica*, 95, 141-165. <https://doi.org/10.1016/j.actaastro.2013.10.005>
- Vallance Jones, A. (1992). Historical review of great auroras. *Canadian Journal of Physics*, 70(7), 479-487. <https://doi.org/10.1139/p92-083>
- Van Allen, J. A. (1958). Observation of high intensity radiation by satellites 1958 alpha and gamma. *Journal of Jet Propulsion*, 28(9), 588-592. <https://doi.org/10.2514/8.7396>
- Van Allen, J. A., & Frank, L. A. (1959). Radiation around the Earth to a radial distance of 107,400 km. *Nature*, 183, 430-434. <https://doi.org/10.1038/183430a0>
- van den IJssel, J., Doornbos, E., Iorfida, E., March, G., Siemes, C., & Montenbruck, O. (2020). Thermosphere densities derived from Swarm GPS observations. *Advances in Space Research*, 65(7), 1758-1771. <https://doi.org/10.1016/j.asr.2020.01.004>
- van den IJssel, J., & Visser, P. (2007). Performance of GPS-based accelerometry: CHAMP and GRACE. *Advances in Space Research*, 39(10), 1597-1603. <https://doi.org/10.1016/j.asr.2006.12.027>
- Van Hollebeke, M. A. I., McDonald, F. B., Trainor, J. H., & von Rosenvinge, T. T. (1978). The radial variation of corotating energetic particle streams in the inner and outer solar system. *Journal of Geophysical Research*, 83(A10), 4723-4731. <https://doi.org/10.1029/JA083iA10p04723>
- van Musschenbroek, P. (1762). *Introductio ad philosophiam naturalem*. Leiden, The Netherlands: Apud Sam. et Joh. Luchtmans.
- Vanhamäki, H., Yoshikawa, A., Amm, O., & Fujii, R. (2012). Ionospheric joule heating and poynting flux in quasi-static approximation. *Journal of Geophysical Research*, 117(A8). <https://doi.org/10.1029/2012JA017841>
- VanZandt, T. E., Clark, W. L., & Warnock, J. M. (1972). Magnetic apex coordinates: A magnetic coordinate system for the ionospheric f₂ layer. *Journal of Geophysical*

- Research*, 77(13), 2406–2411. <https://doi.org/10.1029/JA077i013p02406>
- Vaquero, J. M. (2007). Historical sunspot observations: A review. *Advances in Space Research*, 40(7), 929-941. <https://doi.org/10.1016/j.asr.2007.01.087>
- Vaquero, J. M., Gallego, M. C., & Domínguez-Castro, F. (2013). A possible case of Sporadic Aurora in 1843 from Mexico. *Geofísica Internacional*, 52(1), 87-92. [https://doi.org/10.1016/S0016-7169\(13\)71464-8](https://doi.org/10.1016/S0016-7169(13)71464-8)
- Vaquero, J. M., & Trigo, R. M. (2005). Results of the Rio de Janeiro magnetic observations 1781-1788. *Annales Geophysicae*, 23, 1881-1887. <https://doi.org/10.5194/angeo-23-1881-2005>
- Vaquero, J. M., & Trigo, R. M. (2006). Identification of Possible Intense Historical Solar Storms During the Years 1781-1788 Inferred from Aurorae and Geomagnetic Observations in Rio De Janeiro. *Solar Physics*, 235(1-2), 419-432. <https://doi.org/10.1007/s11207-006-0024-6>
- Vaquero, J. M., Trigo, R. M., & Gallego, M. C. (2007). Sporadic aurora from Spain. *Earth, Planets and Space*, 59(11), e49-251. <https://doi.org/10.1186/BF03352061>
- Vaquero, J. M., & Vázquez, M. (2009a). *The Sun Recorded Through History*. Dordrecht, The Netherlands: Springer. <https://doi.org/10.1007/978-0-387-92790-9>
- Vaquero, J. M., & Vázquez, M. (2009b). Terrestrial Aurorae and Solar-Terrestrial Relations. In J. M. Vaquero & M. Vázquez (Eds.), *The Sun Recorded Through History* (p. 279-336). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-0-387-92790-9_6
- Vasyliunas, V. M. (1970). Mathematical models of magnetospheric convection and its coupling to the ionosphere. In B. M. McCormac (Ed.), *Particles and fields in the magnetosphere* (p. 60-71). Norwell, MA: Springer Netherlands. https://doi.org/10.1007/978-94-010-3284-1_6
- Vasyliūnas, V. M., & Song, P. (2005). Meaning of ionospheric Joule heating. *Journal of Geophysical Research*, 110(A2). <https://doi.org/10.1029/2004JA010615>
- Vázquez, M., & Vaquero, J. M. (2010). Aurorae Observed at the Canary Islands. *Solar Physics*, 267(2), 431-444. <https://doi.org/10.1007/s11207-010-9650-0>
- Vázquez, M., Vaquero, J. M., Gallego, M. C., Roca Cortés, T., & Pallé, R. L. (2016). Long-Term Trends and Gleissberg Cycles in Aurora Borealis Records (1600 – 2015). *Solar Physics*, 291(2), 613-642. <https://doi.org/10.1007/s11207-016-0849-6>
- Vecchiato, A. (2017). *Variational Approach to Gravity Field Theories – From Newton to Einstein and Beyond*. Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-319-51211-2>
- Veenadhari, B., Selvakumaran, R., Singh, R., Maurya, A. K., Gopalswamy, N., Kumar, S., & Kikuchi, T. (2012). Coronal mass ejection-driven shocks and the associated sudden commencements/sudden impulses. *Journal of Geophysical Research*, 117(A4). <https://doi.org/10.1029/2011JA017216>
- Vennerstrøm, S., Lefèvre, L., Dumbović, M., Crosby, N., Malandraki, O., Patsou, I., Clette, F., Veronig, A., Vršnak, B., Leer, K., & Moretto, T. (2016). Extreme geomagnetix storms - 1868 - 2010. *Solar Physics*, 291(5), 1447-1481.

<https://doi.org/10.1007/s11207-016-0897-y>

- Verbanac, G., Živković, S., Vršnak, B., Bandić, M., & Hojsak, T. (2013). Comparison of geoeffectiveness of coronal mass ejections and corotating interaction regions. *Astronomy & Astrophysics*, *558*(A85), 1-10. <https://doi.org/10.1051/0004-6361/201220417>
- Verbanac, G., Vršnak, B., Veronig, A., & Temmer, M. (2011). Equatorial coronal holes, solar wind high-speed streams, and their geoeffectiveness. *Astronomy & Astrophysics*, *526*(A20), 1-13. <https://doi.org/10.1051/0004-6361/201014617>
- Verbanac, G., Vršnak, B., Živković, S., Hojsak, T., Veronig, A. M., & Temmer, M. (2011). Solar wind high-speed streams and related geomagnetic activity in the declining phase of solar cycle 23. *Astronomy & Astrophysics*, *533*(A49), 1-6. <https://doi.org/10.1051/0004-6361/201116615>
- Verkhoglyadova, O., Meng, X., Mannucci, A. J., Tsurutani, B. T., Hunt, L. A., Mlynczak, M. G., Hajra, R., & Emery, B. A. (2016). Estimation of energy budget of ionosphere–thermosphere system during two CIR–HSS events: observations and modeling. *Journal of Space Weather and Space Climate*, *6*(A20), 10. <https://doi.org/10.1051/swsc/2016013>
- Verkhoglyadova, O. P., Tsurutani, B. T., & Mannucci, A. J. (2007). Temporal Development of Dayside TEC Variations During the October 30, 2003 Superstorm: Matching Modeling to Observations. In M. Duldig (Ed.), *Advances in geosciences* (Vol. 8, p. 69-77). Hackensack, NJ: World Scientific. https://doi.org/10.1142/9789812708939_0004
- Verkhoglyadova, O. P., Tsurutani, B. T., Mannucci, A. J., Mlynczak, M. G., Hunt, L. A., Paxton, L. J., & Komjathy, A. (2016). Solar wind driving of ionosphere–thermosphere responses in three storms near St. Patrick’s Day in 2012, 2013, and 2015. *Journal of Geophysical Research: Space Physics*, *121*(9), 8900–8923. <https://doi.org/10.1002/2016JA022883>
- Vernov, S. N., Gorchakov, E. V., Shavrin, P. I., & Sharvina, K. N. (1967). Radiation belts in the region of the South-Atlantic magnetic anomaly. *Space Science Reviews*, *7*(4), 490-533. <https://doi.org/10.1007/BF00182684>
- Vette, J. I. (1991). *The AE-8 trapped electron model environment* (Tech. Rep. No. NSSDC/WDC-A-R&S 91-24). Greenbelt, MD: NASA Goddard Space Flight Center.
- Vichare, G., Rawat, R., Bhaskar, A., & Pathan, B. M. (2014). Ionospheric current contribution to the main impulse of a negative sudden impulse. *Earth, Planets and Space*, *66*(92), 1-21. <https://doi.org/10.1186/1880-5981-66-92>
- Vickrey, J. F., Vondrak, R. R., & Matthews, S. J. (1981). The diurnal and latitudinal variation of auroral zone ionospheric conductivity. *Journal of Geophysical Research*, *86*(A1), 65–75. <https://doi.org/10.1029/JA086iA01p00065>
- Vidal-Luengo, S. E. (2021). *Global Dynamics of the Earth’s Magnetosphere During Northward IMF Conditions in the Era of the Heliophysics System Observatory* (Ph.D thesis). University of Michigan, Ann Arbor, Michigan.
- Viljanen, A. (1998). Relation of geomagnetically induced currents and local geomagnetic variations. *IEEE Transactions on Power Delivery*, *13*(4), 1285-1290.

<https://doi.org/10.1109/61.714497>

- Viljanen, A., & Häkkinen, L. (1997). IMAGE magnetometer network. In M. Lockwood, M. N. Wild, & H. J. Opgenoorth (Eds.), *Satellite-Ground Based Coordination Sourcebook* (Vol. 1198, p. 111-118). Paris, France: ESA Publications.
- Viljanen, A., Koistinen, A., Pajunpää, K., Pirjola, R., Posio, P., & Pulkkinen, A. (2010). Recordings of Geomagnetically Induced Currents in the Finnish Natural Gas Pipeline – Summary of an 11-year Period. *Geophysica*, 46(1).
- Viljanen, A., & Pirjola, R. (2017). Influence of spatial variations of the geoelectric field on geomagnetically induced currents. *Journal of Space Weather and Space Climate*, 7(A22), 10. <https://doi.org/10.1051/swsc/2017024>
- Viljanen, A., Pirjola, R., Prácsér, E., Katkalov, J., & Wik, M. (2014). Geomagnetically induced currents in Europe. *Journal of Space Weather and Space Climate*, 4(A9). <https://doi.org/10.1051/swsc/2014006>
- Viljanen, A., & Pitjola, R. (1994). Geomagnetically induced currents in the Finnish high-voltage power system. *Surveys in Geophysics*, 15(4), 383-408. <https://doi.org/10.1007/BF00665999>
- Viljanen, A., Pulkkinen, A., Pirjola, R., Pajunpää, K., Posio, P., & Koistinen, A. (2006). Recordings of geomagnetically induced currents and a nowcasting service of the Finnish natural gas pipeline system. *Space Weather*, 4(10). <https://doi.org/10.1029/2006SW000234>
- Viljanen, A., Tanskanen, E. I., & Pulkkinen, A. (2006). Relation between substorm characteristics and rapid temporal variations of the ground magnetic field. *Annales Geophysicae*, 24(2), 725-733. <https://doi.org/10.5194/angeo-24-725-2006>
- Villante, U., & Piersanti, M. (2011). Sudden impulses at geosynchronous orbit and at ground. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(1), 61-76. <https://doi.org/10.1016/j.jastp.2010.01.008>
- Villante, U., & Piersanti, M. (2012). Sudden impulses in the magnetosphere and at ground. In M. Lazar (Ed.), *Exploring the solar wind* (chap. 17). Rijeka, Croatia: InTech. <https://doi.org/10.5772/36770>
- Villante, U., & Regi, M. (2008). Solar flare effect preceding Halloween storm (28 October 2003): Results of a worldwide analysis. *Journal of Geophysical Research*, 113(A3). <https://doi.org/10.1029/2008JA013132>
- Viñas, A. F., & Scudder, J. D. (1986). Fast and optimal solution to the “Rankine-Hugoniot problem”. *Journal of Geophysical Research*, 91(A1), 39-58. <https://doi.org/10.1029/JA091iA01p00039>
- Vines, S., Anderson, B., Waters, C. L., Allen, R. C., Maute, A., Kunduri, B., Paxton, L., Strangeway, R. J., Lin, D., Robinson, R., Le, G., Zhu, Q., Milan, S., Ozturk, D., Korth, H., Laundal, K., Ohtani, S., Chartier, A., Murphy, K., Matsuo, T., Sotirelis, T., Knipp, D., Califf, S., de Mesquita, R. L. A., Connor, H., James, C., & Gang, L. (2023). Beyond ampere-next: Envisioning the next system of global high-latitude electrodynamics. *Bulletin of the AAS*, 55(3). <https://doi.org/10.3847/25c2cfcb.76348bf9>
- Vokhmyanin, M. V., Stepanov, N. A., & Sergeev, V. A. (2019). On the Evaluation of Data Quality in the OMNI Interplanetary Magnetic Field Database. *Space Weather*, 17(3),

476-486. <https://doi.org/10.1029/2018SW002113>

- Volkmer, P. M., & Neubauer, F. M. (1985). Statistical properties of fast magnetoacoustic shock waves in the solar wind between 0.3 AU and 1 AU – Helios-1, 2 observations. *Annales Geophysicae*, 3(1), 1–12.
- Volkmer, P. M., Neubauer, F. M., & Schwenn, R. (1982). Observation of flare-generated shock waves by Helios-2 near the sun. *Space Science Reviews*, 32(1-2), 131-144. <https://doi.org/10.1007/BF00225181>
- Volland, H. (1995). *Handbook of atmospheric electrodynamics* (Vol. II). Boca Raton, FL: CRC Press.
- von Humboldt, A. (1808). Die vollständigste aller bisherigen beobachtungen über den einfluss des nordlichts auf die magnetnadel angestellt. *Annalen der Physik*, 29(8), 425–429. <https://doi.org/10.1002/andp.18080290806>
- von Humboldt, A. (1852). *Cosmos: Sketch of a Physical Description of the Universe, Vol. III*. London, United Kingdom: Wilson and Ogilvy.
- Vorotnikov, V. S., Smith, C. W., Farrugia, C. J., Meredith, C. J., Hu, Q., Szabo, A., Skoug, R. M., Cohen, C. M. S., Davis, A. J., & Yumoto, K. (2011). Use of single-component wind speed in Rankine-Hugoniot analysis of interplanetary shocks. *Space Weather*, 9(4). <https://doi.org/10.1029/2010SW000631>
- Vorotnikov, V. S., Smith, C. W., Hu, Q., Szabo, A., Skoug, R. M., & Cohen, C. M. S. (2008). Automated shock detection and analysis algorithm for space weather application. *Space Weather*, 6(3). <https://doi.org/10.1029/2007SW000358>
- Švestka, Z. (1976). *Solar flares*. Dordrecht, Holland: D. Reidel Publishing.
- Vukovich, G., & Kim, Y. (2019). Satellite orbit decay due to atmospheric drag. *International Journal of Space Science and Engineering*, 5(2), 159-180. <https://doi.org/10.1504/IJSPACESE.2019.097438>
- Walia, N. K., Seki, K., Hoshino, M., Amano, T., Kitamura, N., Saito, Y., Yokota, S., Pollock, C. J., Giles, B. L., Moore, T. E., Torbert, R. B., Russell, C. T., & Burch, J. L. (2018). A Statistical Study of Slow-Mode Shocks Observed by MMS in the Dayside Magnetopause. *Geophysical Research Letters*, 45(10), 4675-4684. <https://doi.org/10.1029/2018GL077580>
- Walker, A. D. M. (1981). The Kelvin-Helmholtz instability in the low-latitude boundary layer. *Planetary and Space Science*, 29(10), 1119-1133. [https://doi.org/10.1016/0032-0633\(81\)90011-8](https://doi.org/10.1016/0032-0633(81)90011-8)
- Wallace, J. M., & Hobbs, P. V. (2006). *Atmospheric science: An introductory survey*. Burlington, MA: Elsevier.
- Wang, C., Guo, X.-C., Peng, Z., Tang, B.-B., Sun, T.-R., Li, W.-Y., & Hu, Y.-Q. (2013). Magnetohydrodynamics (MHD) numerical simulations on the interaction of the solar wind with the magnetosphere: A review. *Science China: Earth Sciences*, 56(7), 1141-1157. <https://doi.org/10.1007/s11430-013-4608-3>
- Wang, C., Han, J. P., Li, H., & Peng, J. D., Z. and Richardson. (2014). Solar wind-magnetosphere energy coupling function fitting: Results from a global MHD simulation. *Journal of Geophysical Research: Space Physics*, 119(8), 6199-6212.

<https://doi.org/10.1002/2014JA019834>

- Wang, C., H. Li, X. G., Ding, K., & Huang, Z. (2012). Numerical study on the response of the Earth's magnetosphere-ionosphere system to a super solar storm. *Science China: Earth Sciences*, 55(6), 1037. <https://doi.org/10.1007/s11430-012-4405-4>
- Wang, C., Huang, Z. H., Hu, Y. Q., & Guo, X. C. (2005). 3D global simulation of the interaction of interplanetary shocks with the magnetosphere. In G. Li, G. Zank, & C. T. Russell (Eds.), *4th annual igpp international astrophysics conference on the physics of collisionless shocks* (Vol. 781, p. 320-324). Washington, D.C.: American Institute of Physics. <https://doi.org/10.1063/1.2032716>
- Wang, C., Li, C. X., Huang, Z. H., & Richardson, J. D. (2006). Effect of interplanetary shock strengths and orientations on storm sudden commencement rise times. *Geophysical Research Letters*, 33(14), 1-3. <https://doi.org/10.1029/2006GL025966>
- Wang, C., Li, H., Richardson, J. D., & Kan, J. R. (2010a). Interplanetary shock characteristics and associated geosynchronous magnetic field variations estimated from sudden impulses observed on the ground. *Journal of Geophysical Research*, 115(A9). <https://doi.org/10.1029/2009JA014833>
- Wang, C., Li, H., Richardson, J. D., & Kan, J. R. (2010b). Interplanetary shock characteristics and associated geosynchronous magnetic field variations estimated from sudden impulses observed on the ground. *Journal of Geophysical Research*, 115(A9). <https://doi.org/10.1029/2009JA014833>
- Wang, C., Liu, J. B., Huang, Z. H., & Richardson, J. D. (2007). Response of the magnetic field in the geosynchronous orbit to solar wind dynamic pressure pulses. *Journal of Geophysical Research*, 112(A12). <https://doi.org/10.1029/2007JA012664>
- Wang, C., Liu, J. B., Li, H., Huang, Z. H., Richardson, J. D., & Kan, J. R. (2009). Geospace magnetic field responses to interplanetary shocks. *Journal of Geophysical Research*, 114(A5). <https://doi.org/10.1029/2008JA013794>
- Wang, C., Sun, T. R., Guo, X. C., & Richardson, J. D. (2010). Case study of nightside magnetospheric magnetic field response to interplanetary shocks. *Journal of Geophysical Research*, 115(A10). <https://doi.org/10.1029/2010JA015451>
- Wang, C.-R., Zong, Q.-G., & Wang, Y.-F. (2010). Propagation of interplanetary shock excited ultra low frequency (ULF) waves in magnetosphere-ionosphere-atmosphere — Multi-spacecraft “Cluster” and ground-based magnetometer observations. *Science China: Technological Sciences*, 53(9), 2528-2534. <https://doi.org/10.1007/s11431-010-4064-7>
- Wang, F. Y., Yu, H., Dai, Z. G., & Cheng, K. S. (2017). A rapid cosmic-ray increase in BC 3372-3371 from ancient buried tree rings in China. *Nature Communications*, 8(1487). <https://doi.org/10.1038/s41467-017-01698-8>
- Wang, H., Lühr, H., Ma, S. Y., Weygand, J., Skoug, R. M., & Yin, F. (2006). Field-aligned currents observed by CHAMP during the intense 2003 geomagnetic storm events. *Annales Geophysicae*, 24, 311–324. <https://doi.org/10.5194/angeo-24-311-2006>
- Wang, J., Zhang, B., Huang, C., Liu, R., Liu, Y., Hu, Z., & Liu, J. (2022). The Dawn–Dusk Asymmetrical Distribution of Earthward Poynting Flux in the Dayside Polar Cap From DMSP. *Journal of Geophysical Research: Space Physics*, 127(11), e2021JA030199.

<https://doi.org/10.1029/2021JA030199>

- Wang, T. (2010). Analysis of Debris from the Collision of the Cosmos 2251 and the Iridium 33 Satellites. *Science & Global Security*, 18(2), 87-118. <https://doi.org/10.1080/08929882.2010.493078>
- Wang, X., Liu, C., & Kang, Z. (2021). Effect of the Earth's lateral conductivity variations on geomagnetically induced currents in power grids. *International Journal of Electrical Power & Energy Systems*, 132, 107148. <https://doi.org/10.1016/j.ijepes.2021.107148>
- Wang, X., Miao, J., Aa, E., Ren, T., Wang, Y., Liu, J., & Liu, S. (2020). Statistical analysis of joule heating and thermosphere response during geomagnetic storms of different magnitudes. *Journal of Geophysical Research: Space Physics*, 125(n/a), e2020JA027966. <https://doi.org/10.1029/2020JA027966>
- Wang, X., Miao, J., Liu, S., & Ren, T. (2020). Characteristics Analysis of Thermospheric Density Response during the Different Intensity of Geomagnetic Storms. *Chinese Journal of Space Science*, 40(1), 28-41. <https://doi.org/10.11728/cjss2020.01.028>
- Wanliss, J. A., & Showalter, K. M. (2006). High-resolution global storm index: Dst versus SYM-H. *Journal of Geophysical Research*, 111(A2). <https://doi.org/10.1029/2005JA011034>
- Waters, C. L., Anderson, B. J., Green, D. L., and R. J. Barnes, H. K., & Vanhamäki, H. (2020). Science Data Products for AMPERE. In M. W. Dunlop & H. Lühr (Eds.), *Ionospheric multi-spacecraft analysis tools: Approaches for deriving ionospheric parameters* (Vol. 17, p. 141-165). New York, NY: Springer International Publishing. https://doi.org/10.1007/978-3-030-26732-2_7
- Webb, D. F., & Howard, T. A. (2012). Coronal mass ejections: Observations. *Living Reviews in Solar Physics*, 9(3), 1-83. <https://doi.org/10.12942/lrsp-2012-3>
- Weibull, W. (1951). A statistical distribution function of wide applicability. *Journal of Applied Mechanics*, 18, 293-296.
- Weimer, D. R. (1996). A flexible, IMF dependent model of high-latitude electric potentials having "Space Weather" applications. *Geophysical Research Letters*, 23(18), 2549-2552. <https://doi.org/10.1029/96GL02255>
- Weimer, D. R. (2001). An improved model of ionospheric electric potentials including substorm perturbations and application to the Geospace Environment Modeling November 24, 1996, event. *Journal of Geophysical Research*, 106(A1), 407-416. <https://doi.org/10.1029/2000JA000604>
- Weimer, D. R. (2005). Improved ionospheric electrodynamic models and application to calculating Joule heating rates. *Journal of Geophysical Research*, 110(A5), 1-21. <https://doi.org/10.1029/2004JA010884>
- Weimer, D. R., Bowman, B. R., Sutton, E. K., & Tobiska, W. K. (2011). Predicting global average thermospheric temperature changes resulting from auroral heating. *Journal of Geophysical Research*, 116(A1). <https://doi.org/10.1029/2010JA015685>
- Weimer, D. R., Sutton, E. K., Mlynczak, M. G., & Hunt, L. A. (2016). Intercalibration of neutral density measurements for mapping the thermosphere. *Journal of Geophysical Research: Space Physics*, 121(6), 5975-5990. <https://doi.org/10.1002/2016JA022691>

- Weir, A. (2014a). *The martian*. New York, NY: Broadway Books. (In English)
- Weir, A. (2014b). *Perdido em marte*. Rio de Janeiro, Brasil: Editora Arqueiro. (Em português)
- Weir, A. (2017). *Artemis*. New York, NY: Crown Publishing Group.
- Welling, D. T., Love, J. J., Joshua Rigler, E., Oliveira, D. M., Komar, C. M., & Morley, S. K. (2021). Numerical simulations of the geospace response to a perfect interplanetary coronal mass ejection. *Space Weather*, *19*(2), e2020SW002489. <https://doi.org/10.1029/2020SW002489>
- Welling, D. T., & Ridley, A. J. (2010). Validation of SWMF magnetic field and plasma. *Space Weather*, *8*(3). <https://doi.org/10.1029/2009SW000494>
- Wells, H. W. (1940). Huancayo magnetic observatory april to june, 1940. *Terrestrial Magnetism and Atmospheric Electricity*, *45*(3), 381-381. <https://doi.org/10.1029/TE045i003p00381-01>
- Weng, L., Lei, J., Sutton, E., Dou, X., & Fang, H. (2017). An exospheric temperature model from CHAMP thermospheric density. *Space Weather*, *15*(2), 343-351. <https://doi.org/10.1002/2016SW001577>
- Weygand, J. M. (2021). The temporal and spatial development of dB/dt for substorms. *AIMS Geosciences*, *7*(1), 74-94. <https://doi.org/10.3934/geosci.2021004>
- Weygand, J. M., Amm, O., Angelopoulos, V., Milan, S. E., Grocott, A., Gleisner, H., & Stolle, C. (2012). Comparison between superdarn flow vectors and equivalent ionospheric currents from ground magnetometer arrays. *Journal of Geophysical Research*, *117*(A5). <https://doi.org/10.1029/2011JA017407>
- Weygand, J. M., Amm, O., Viljanen, A., Angelopoulos, V., Murr, D., Engebretson, M. J., Gleisner, H., & Mann, I. (2011). Application and validation of the spherical elementary currents systems technique for deriving ionospheric equivalent currents with the North American and Greenland ground magnetometer arrays. *Journal of Geophysical Research*, *116*(A3). <https://doi.org/10.1029/2010JA016177>
- Weygand, J. M., Hartinger, M. D., Strangeway, R. J., Welling, D. T., Kim, H., Matzka, J., & Clauer, C. R. (2023). Interhemispheric Asymmetry Due To IMF By Within the Cusp Spherical Elementary Currents. *Journal of Geophysical Research: Space Physics*, *128*(6), e2023JA031430. <https://doi.org/10.1029/2023JA031430>
- Weygand, J. M., & Wing, S. (2016). Comparison of DMSP and SECS region-1 and region-2 ionospheric current boundary. *Journal of Atmospheric and Solar-Terrestrial Physics*, *143-144*, 8-13. <https://doi.org/10.1016/j.jastp.2016.03.002>
- Weygand, J. M., & Zesta, E. (2008). Comparison of auroral electrojet indices in the Northern and Southern Hemispheres. *Journal of Geophysical Research*, *113*(A8), 1-15. <https://doi.org/10.1029/2008JA013055>
- Weygand, J. M., Zesta, E., Kadokura, A., & Oliveira, D. M. (2022). Investigation of the Differences in Onset Times for Hemispherically Conjugate Magnetometers. *Frontiers in Astronomy and Space Science*, *9*(896199). <https://doi.org/10.3389/fspas.2022.896199>

- Weygand, J. M., Zesta, E., & Troshichev, O. (2014). Auroral electrojet indices in the Northern and Southern Hemispheres: A statistical comparison. *Journal of Geophysical Research: Space Physics*, *119*(6), 4816–4840. <https://doi.org/10.1002/2013JA019377>
- WGS84. (1984). *World Geodetic System – 1984 (WGS-84) Manual* (Tech. Rep.). Montreal, Canada: International Civil Aviation Organization. Retrieved from <https://www.icao.int/NACC/Documents/Meetings/2014/ECARAIM/REF08-Doc9674.pdf>
- Whang, Y. C. (1982). Slow shocks around the Sun. *Geophysical Research Letters*, *9*(9), 1081–1084. <https://doi.org/10.1029/GL009i009p01081>
- Whang, Y. C. (1983). Corotating shocks in the inner heliosphere. In *Solar wind five* (p. 719). NASA Conf. Publ., CP 2280.
- Whang, Y. C., Zhou, J., Lepping, R. P., & Ogilvie, K. W. (1996). Interplanetary slow shock observed from WIND. *Geophysical Research Letters*, *23*(10), 1239–1242. <https://doi.org/10.1029/96GL01358>
- Whipple, F. L. (1959). Solid particles in the solar system. *Journal of Geophysical Research*, *64*(11), 1653–1664. <https://doi.org/10.1029/JZ064i011p01653>
- White, C. A. (1983). *A History of the Rectangular Survey System* (Tech. Rep.). Washington, D.C.: United States Department of Interior, Bureau of Land Management.
- Wiens, R. H., Ledvina, B. M., Kintner, P. M., Afewerki, M., & Mulugheta, Z. (2006). Equatorial plasma bubbles in the ionosphere over Eritrea: occurrence and drift speed. *Annales Geophysicae*, *24*(5), 1443–1453. <https://doi.org/10.5194/angeo-24-1443-2006>
- Wik, M., Pirjola, R., Lundstedt, H., Viljanen, A., Wintoft, P., & Pulkkinen, A. (2009). Space weather events in July 1982 and October 2003 and the effects of geomagnetically induced currents on Swedish technical systems. *Annales Geophysicae*, *27*, 1775–1787. <https://doi.org/10.5194/angeo-27-1775-2009>
- Wik, M., Viljanen, A., Pirjola, R., Pulkkinen, A., Wintoft, P., & Lundstedt, H. (2008). Calculation of geomagnetically induced currents in the 400 kV power grid in southern Sweden. *Space Weather*, *6*(7). <https://doi.org/10.1029/2007SW000343>
- Wild, J. A., Yeoman, T. K., & Waters, C. L. (2005). Revised time-of-flight calculations for high-latitude geomagnetic pulsations using a realistic magnetospheric magnetic field model. *Journal of Geophysical Research*, *110*(A11), A11206. <https://doi.org/10.1029/2004JA010964>
- Wilhjelm, J., Friis-Christensen, E., & Potemra, T. A. (1978). The relationship between ionospheric and field-aligned currents in the dayside cusp. *Journal of Geophysical Research*, *83*(A12), 5586–5594. <https://doi.org/10.1029/JA083iA12p05586>
- Wilken, B., Goertz, C. K., Baker, D. N., Higbie, P. R., & Fritz, T. A. (1982). The SSC on July 29, 1977 and its propagation within the magnetosphere. *Journal of Geophysical Research*, *87*(A8), 5901–5910. <https://doi.org/10.1029/JA087iA08p05901>
- Williams, B. D. (1999). The Timed Spacecraft: A Thermal Design Perspective. *SAE Transactions*, *108*, 616–628. <https://doi.org/10.4271/1999-01-2133>
- Willis, D. M., Henwood, R., & Stephenson, F. R. (2006). The presence of large sunspots

- near the central solar meridian at the times of modern Japanese auroral observations. *Annales Geophysicae*, *24*(10), 2743-2758. <https://doi.org/10.5194/angeo-24-2743-2006>
- Willis, D. M., Stephenson, F. R., & Fang, H. (2007). Sporadic aurorae observed in East Asia. *Annales Geophysicae*, *25*, 417-436. <https://doi.org/10.5194/angeo-25-417-2007>
- Willis, D. M., Vaquero, J. M., & Stephenson, F. R. (2009). Early observation of the aurora australis: AD 1640. *Astronomy & Geophysics*, *50*(5), 5.20-5.24. <https://doi.org/10.1111/j.1468-4004.2009.50520.x>
- Wilson, A. (1774). I. Observations on the solar spots. *Philosophical Transactions of the Royal Society of London*, *64*, 1-30. <https://doi.org/0.1098/rstl.1774.0001>
- Wilson, G. R., Weimer, D. R., Wise, J. O., & Marcos, F. A. (2006). Response of the thermosphere to Joule heating and particle precipitation. *Journal of Geophysical Research*, *111*(A10). <https://doi.org/10.1029/2005JA011274>
- Wilson, L. B. (2010). *The microphysics of collisionless shocks* (Ph.D thesis). University of Minnesota, Minneapolis, Minnesota.
- Wilson III, L. B. (2016). Low Frequency Waves at and Upstream of Collisionless Shocks. In A. Keiling, D.-H. Lee, & V. Nakariakov (Eds.), *Low-Frequency Waves in Space Plasmas*, Geophysical Monograph Series (Vol. 216, p. 269-291). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119055006.ch16>
- Wiltberger, M., Lopez, R. E., & Lyon, J. G. (2003). Magnetopause erosion: A global view from mhd simulation. *Journal of Geophysical Research*, *108*(A6). <https://doi.org/10.1029/2002JA009564>
- Wiltberger, M., Merkin, V., Zhang, B., Toffoletto, F., Oppenheim, M., Wang, W., Lyon, J. G., Liu, J., Dimant, Y., Sitnov, M. I., & Stephens, G. K. (2017). Effects of electrojet turbulence on a magnetosphere-ionosphere simulation of a geomagnetic storm. *Journal of Geophysical Research: Space Physics*, *122*(5), 5008-5027. <https://doi.org/10.1002/2016JA023700>
- Wiltberger, M., Pulkkinen, T. I., Lyon, J. G., & Goodrich, C. C. (2000). MHD simulation of the magnetotail during the December 10, 1996, substorm. *Journal of Geophysical Research*, *105*(A12), 27649-27663. <https://doi.org/10.1029/1999JA000251>
- Wiltberger, M., Weigel, R. S., Lotko, W., & Fedder, J. A. (2009). Modeling seasonal variations of auroral particle precipitation in a global-scale magnetosphere-ionosphere simulation. *Journal of Geophysical Research*, *114*(A1). <https://doi.org/10.1029/2008JA013108>
- Wimmer-Schweingruber, R. F., Crooker, N. U., Balogh, A., Bothmer, V., Forsyth, R. J., Gazi, P., Gosling, J. T., Horbury, T., Kilchenmann, A., Richardson, I. G., Richardson, J. D., Riley, P., Rodriguez, L., von Steiger, R., Wurz, P., & Zurbuchen, T. H. (2006). Understanding Interplanetary Coronal Mass Ejection Signatures. *Space Science Reviews*, *123*, 177-216. <https://doi.org/10.1007/s11214-006-9017-x>
- Winch, D. E., Ivers, D. J., Turner, J. P. R., & Stening, R. J. (2005). Geomagnetism and Schmidt quasi-normalization. *Geophysical Journal International*, *160*(2), 487-504. <https://doi.org/10.1111/j.1365-246X.2004.02472.x>

- Wing, S., Johnson, J. R., Chaston, C. C., Echim, M., Escoubet, C. P., Lavraud, B., Lemon, C., Nykyri, K., Otto, A., Raeder, J., & Wang, C.-P. (2014). Review of solar wind entry into and transport within the plasma sheet. *Space Science Reviews*, *184*(1-4), 33-86. <https://doi.org/0.1007/s11214-014-0108-9U2014>
- Wing, S., Khazanov, G. V., Sibeck, D. G., & Zesta, E. (2019). Low energy precipitating electrons in the diffuse aurorae. *Geophysical Research Letters*, *46*. <https://doi.org/10.1029/2019GL082383>
- Wing, S., & Sibeck, D. G. (1997). Effects of interplanetary magnetic field z component and the solar wind dynamic pressure on the geosynchronous magnetic field. *Journal of Geophysical Research*, *102*(A4), 7207–7216. <https://doi.org/10.1029/97JA00150>
- Winslow, R. M., Lugaz, N., Philpott, L. C., Schwadron, N. A., Farrugia, C. J., Anderson, B. J., & Smith, C. W. (2015). Interplanetary coronal mass ejections from MESSENGER orbital observations at Mercury. *Journal of Geophysical Research: Space Physics*, *120*(8), 6101-6118. <https://doi.org/10.1002/2015JA021200>
- Winter, L. M. (2019). Geomagnetically Induced Currents from Extreme Space Weather Events. In J. L. Gannon, A. Swidinsky, & Z. Xu (Eds.), *Geomagnetically induced currents from the sun to the power grid*, Geophysical Monograph Series (Vol. 244, p. 195-203). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781119434412.ch11>
- Wissehr, C., Concannon, J., & Barrow, L. H. (2011). Looking Back at the Sputnik Era and Its Impact on Science Education. *School Science and Mathematics*, *111*(7), 368-375. <https://doi.org/10.1111/j.1949-8594.2011.00099.x>
- Wolfe, R. (1852). Sonnenflecken – Beobachtungen in der ersten Hälfte des Jahres 1852; Entdeckung des Zusammen[hanges zwischen den Declinationsvariationen der Magnetnadel und den Sonnenflecken. In *Mitteilungen der Naturforschenden Gesellschaft in Bern* (p. 179-184). Bern, Switzerland: Naturforschende Gesellschaft in Bern.
- World Data Center for Geomagnetism, Kyoto, Nose, M., Iyemori, T., Sugiura, M., & Kamei, T. (2015a). *Geomagnetic AE index*. [Data Set]. (Version v1). World Data Center. <https://doi.org/10.17593/15031-54800>
- World Data Center for Geomagnetism, Kyoto, Nose, M., Iyemori, T., Sugiura, M., & Kamei, T. (2015b). *Geomagnetic Dst index*. [Data Set]. (Version v1). World Data Center. <https://doi.org/10.17593/14515-74000>
- Wu, C. C. (1988). Effects of dissipation on rotational discontinuities. *Journal of Geophysical Research*, *93*(A5), 3969-3982. <https://doi.org/10.1029/JA093iA05p03969>
- Wu, C. C. (1990). Formation, structure, and stability of MHD intermediate shocks. *Journal of Geophysical Research*, *95*(A6), 8149-8175. <https://doi.org/10.1029/JA095iA06p08149>
- Wu, C.-C., Liou, K., Lepping, R. P., & Hutting, L. (2019). The 04–10 September 2017 Sun–Earth Connection Events: Solar Flares, Coronal Mass Ejections/Magnetic Clouds, and Geomagnetic Storms. *Solar Physics*, *294*(110). <https://doi.org/10.1007/s11207-019-1446-2>
- Wu, C.-C., Wu, S. T., & Dryer, M. (1996). Generation and evolution of interplanetary slow shocks. *Annales Geophysicae*, *14*, 375-382. <https://doi.org/10.1007/s00585-996-0375->

- Xiong, C., Stolle, C., Alken, P., & Rauberg, J. (2020). Relationship between large-scale ionospheric field-aligned currents and electron/ion precipitations: DMSF observations. *Earth, Planets and Space*, *72*(147). <https://doi.org/10.1186/s40623-020-01286-z>
- Xu, S.-G., Yue, C., Zong, Q.-G., Zhou, X.-Z., & Fu, S.-y. (2023). Solar Wind Energy Budget Dilemma During Substorms Induced by Interplanetary Shocks. *Journal of Geophysical Research: Space Physics*, *128*(8), e2022JA031192. <https://doi.org/10.1029/2022JA031192>
- Xu, Z., Hartinger, M., Oliveira, D. M., Pilipenko, V. A., Coyle, S., & Clauer, C. R. (2020). Inter-hemispheric asymmetries in the ground magnetic ULF waves response to interplanetary shocks. In *Final paper abstract number: SM039-0005*. Presented at the 2020 AGU Fall Meeting (virtual), 1-17 Dec.
- Xu, Z., Hartinger, M. D., Clauer, C. R., Peek, T., & Behlke, R. (2017). A comparison of the ground magnetic responses during the 2013 and 2015 St. Patrick's Day geomagnetic storms. *Journal of Geophysical Research: Space Physics*, *122*(4), 4023-4036. <https://doi.org/10.1002/2016JA023338>
- Xu, Z., Hartinger, M. D., Oliveira, D. M., Clauer, C. R., & Coyle, S. (2018). Inter-hemispheric asymmetries in the ground magnetic response to interplanetary shocks: The role of shock impact angle. In *Final paper abstract number, sm11c-1207*. Presented at 2018 AGU Fall Meeting, Washington, D.C., 10-14 Dec..
- Xu, Z., Hartinger, M. D., Oliveira, D. M., Coyle, S., Clauer, C. R., Weimer, D., & Edwards, T. (2020). Inter-hemispheric asymmetries in the ground magnetic response to interplanetary shocks: The role of shock impact angle. *Space Weather*, *18*(3), e2019SW002427. <https://doi.org/10.1029/2019SW002427>
- Xu, Z., Hartinger, M. D., Oliveira, D. M., Coyle, S., Weimer, D. R., & Clauer, C. R. (2021). The correlation study of geomagnetic field variations at interhemispheric conjugate points in high latitude regions. In *Final paper abstract number: SM55B-1784*. Presented at the 2021 AGU Fall Meeting, 12-17 Dec, New Orleans, LA.
- Yadav, V. K. (2020). Alfvén wave Detection at first Lagrangian Point with Magnetic Field Measurements. *IETE Technical Review*, *37*(1). <https://doi.org/10.1080/02564602.2018.1541767>
- Yadav, V. K., Srivastava, N., Ghosh, S. S., Srikar, P. T., & Subhalakshmi, K. (2018). Science objectives of the magnetic field experiment onboard Aditya-L1 spacecraft. *Advances in Space Research*, *61*(2), 749-758. <https://doi.org/10.1016/j.asr.2017.11.008>
- Yagova, N. V., Pilipenko, V. A., Sakharov, Y. A., & Selivanov, V. N. (2021). Spatial scale of geomagnetic Pc5/Pi3 pulsations as a factor of their efficiency in generation of geomagnetically induced currents. *Earth, Planets and Space*, *73*, 88. <https://doi.org/10.1186/s40623-021-01407-2>
- Yamazaki, Y., Kosch, M. J., & Sutton, E. K. (2015a). A model of high-latitude thermospheric density. *Journal of Geophysical Research: Space Physics*, *120*(9), 7903–7917. <https://doi.org/10.1002/2015JA021371>
- Yamazaki, Y., Kosch, M. J., & Sutton, E. K. (2015b). North-south asymmetry of the high-latitude thermospheric density: IMF B_y effect. *Geophysical Research Letters*, *42*(2),

225–232. <https://doi.org/10.1002/2014GL062748>

- Yamazaki, Y., & Maute, A. (2017). Sq and EEJ – A Review on the Daily Variation of the Geomagnetic Field Caused by Ionospheric Dynamo Currents. *Space Science Reviews*, 206(1-4), 209-405. <https://doi.org/10.1007/s11214-016-0282-z>
- Yan, M., & Lee, L. C. (1996). Interaction of interplanetary shocks and rotational discontinuities with the Earth's bow shock. *Journal of Geophysical Research*, 101(A3), 4835-4848. <https://doi.org/10.1029/95JA02976>
- Yashiro, S., Gopalswamy, N., Michalek, G., St. Cyr, O. C., Plunkett, S. P., Rich, N. B., & Howard, R. A. (2004). A catalog of white light coronal mass ejections observed by the SOHO spacecraft. *Journal of Geophysical Research*, 109(A7). <https://doi.org/10.1029/2003JA010282>
- Yermolaev, Y. I., Lodkina, I. G., Nikolaeva, N. S., & Yermolaev, M. Y. (2014). Influence of the interplanetary driver type on the durations of the main and recovery phases of magnetic storms. *Journal of Geophysical Research: Space Physics*, 119(10), 8126–8136. <https://doi.org/10.1002/2014JA019826>
- Yermolaev, Y. I., Nikolaeva, N. S., Lodkina, I. G., & Yermolaev, M. Y. (2009). Catalog of large-scale solar wind phenomena during 1976–2000. *Cosmic Research*, 47(2), 81–94. <https://doi.org/10.1134/S0010952509020014>
- Yermolaev, Y. I., Nikolaeva, N. S., Lodkina, I. G., & Yermolaev, M. Y. (2012). Geoeffectiveness and efficiency of CIR, sheath, and ICME in generation of magnetic storms. *Journal of Geophysical Research*, 117(A9). <https://doi.org/10.1029/2011JA017139>
- Yermolaev, Y. I., & Yermolaev, M. Y. (2002). Statistical relationships between solar, interplanetary, and geomagnetospheric disturbances, 1976-2000. *Cosmic Research*, 40(1), 1-14. <https://doi.org/10.1023/A:1014233732330>
- Yermolaev, Y. I., & Yermolaev, M. Y. (2010). Solar and interplanetary sources of geomagnetic storms: Space weather aspects. *Izvestiya, Atmospheric and Oceanic Physics*, 46, 799–819. <https://doi.org/10.1134/S0001433810070017>
- Yiğit, E., Frey, H. U., Moldwin, M. B., Immel, T. J., & Ridley, A. J. (2016). Hemispheric differences in the response of the upper atmosphere to the August 2011 geomagnetic storm: A simulation study. *Journal of Atmospheric and Solar-Terrestrial Physics*, 141, 13–26. <https://doi.org/10.1016/j.jastp.2015.10.002>
- Yizengaw, E., Zesta, E., Moldwin, M. B., Dantie, B., Mebrahtu, A., Valladares, C. E., & Pfaff, R. F. (2012). Longitudinal differences of ionospheric vertical density distribution and equatorial electrodynamics. *Journal of Geophysical Research*, 117(A7). <https://doi.org/10.1029/2011JA017454>
- Yntema, L. (1909). On the Brightness of the Sky and Total Amount of Starlight. In J. C. Kapteyn (Ed.), *Publications of the Kapteyn Astronomical Laboratory Groningen* (Vol. 22, p. 1-55). Groningen, The Netherlands.
- Yokouchi, Y. (1953). Principal magnetic disturbances at Kakioka, 1924-1951. *Memoirs of the Kakioka Magnetic Observatory*, 204-225.
- Yokoyama, N., Kamide, Y., & Miyaoka, H. (1998). The size of the auroral belt during magnetic storms. *Annales Geophysicae*, 16, 566-573. <https://doi.org/10.1007/s00585-998-0566-z>

- Youssef, M. (2012). On the relation between the CMEs and the solar flares. *Astronomy & Geophysics*, 1(2), 172-178. <https://doi.org/10.1016/j.nrjag.2012.12.014>
- Yu, C., Zhang, X.-X., Wang, W., & He, F. (2021). Longitudinal Dependence of Ionospheric Poynting Flux in the Northern Hemisphere During Quiet Times. *Journal of Geophysical Research: Space Physics*, 126(10), e2021JA029717. <https://doi.org/10.1029/2021JA029717>
- Yu, Y., Jordanova, V. K., Ridley, A. J., Albert, J. M., Horne, R. B., & Jeffery, C. A. (2016). A new ionospheric electron precipitation module coupled with RAM-SCB within the geospace general circulation model. *Journal of Geophysical Research: Space Physics*, 121(9), 8554-8575. <https://doi.org/10.1002/2016JA022585>
- Yu, Y., Ridley, A. J., Welling, D. T., & Tóth, G. (2010). Including gap region field-aligned currents and magnetospheric currents in the MHD calculation of ground-based magnetic field perturbations. *Journal of Geophysical Research*, 115(A8). <https://doi.org/10.1029/2009JA014869>
- Yue, C., & Zong, Q. (2011). Solar wind parameters and geomagnetic indices for four different interplanetary shock/ICME structures. *Journal of Geophysical Research*, 116(A12). <https://doi.org/10.1029/2011JA017013>
- Yue, C., Zong, Q., Wang, Y., Vogiatzis, I. I., Pu, Z., Fu, S., & Shi, Q. (2011). Inner magnetosphere plasma characteristics in response to interplanetary shock impacts. *Journal of Geophysical Research*, 116(A11). <https://doi.org/10.1029/2011JA016736>
- Yue, C., Zong, Q. G., & Wang, Y. F. (2009). Response of the magnetic field and plasmas at the geosynchronous orbit to interplanetary shock. *Chinese Science Bulletin*, 54, 4241-4252. <https://doi.org/10.1007/s11434-009-0649-6>
- Yue, C., Zong, Q. G., Zhang, H., Wang, Y. F., Yuan, C. J., Pu, Z. Y., Fu, S. Y., Lui, A. T. Y., Yang, B., & Wang, C. R. (2010). Geomagnetic activity triggered by interplanetary shocks. *Journal of Geophysical Research*, 115(A00I05), 1-13. <https://doi.org/10.1029/2010JA015356>
- Zesta, E., Boudouridis, A., Weygand, J., Yizengaw, E., Moldwin, M. B., & Chi, P. (2016). Inter-hemispheric asymmetries in magnetospheric energy input. In T. Fuller-Rowell, E. Yizengaw, P. H. Doherty, & S. Basu (Eds.), *Ionospheric Space Weather: Longitude Dependence and Lower Atmosphere Forcing*, Geophysical Monograph Series (Vol. 220, p. 3-20). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1002/9781118929216.ch1>
- Zesta, E., & Huang, C. Y. (2016). Satellite orbital drag. In G. V. Khazanov (Ed.), *Space Weather Fundamentals* (pp. 329-351). Boca Raton, FL: CRC Press.
- Zesta, E., & Oliveira, D. M. (2019). Thermospheric heating and cooling times during geomagnetic storms, including extreme events. *Geophysical Research Letters*, 46(22), 12,739-12,746. <https://doi.org/10.1029/2019GL085120>
- Zesta, E., Oliveira, D. M., Khazanov, G. V., Michell, R., Samara, M., Wing, S., Asamura, K., & Hirahara, M. (2020). Magnetosphere-Ionosphere coupling processes shape precipitating electron distribution functions within the aurora. In *Final paper abstract number: SA026-07*. Presented at the 2020 AGU Fall Meeting (virtual), 1-17 Dec.

- Zesta, E., Oliveira, D. M., Schuck, P. W., & Wilson, G. (2018). Ionosphere-thermosphere system response to extreme geomagnetic storms. In *Final paper abstract number: SM51A-08*. Presented at 2018 AGU Fall Meeting, Washington, D.C., 10-14 Dec..
- Zesta, E., Singer, H. J., Lummerzheim, D., Russell, C. T., Lyons, L. R., & Brittnacher, M. J. (2000). The effect of the January 10, 1997, pressure pulse on the magnetosphere-ionosphere current system. In S.-I. Ohtani, R. Fujii, M. Hesse, & R. L. Lysak (Eds.), *Magnetospheric Current Systems*, Geophysical Monograph Series (Vol. 118, p. 217-226). Washington, D.C.: American Geophysical Union. <https://doi.org/10.1029/GM118p0217>
- Zhang, D., Liu, W., Du, J., Yu, Y., Xinlin Li and, T. E. S., & Cao, J. (2022). Response of electric field in terrestrial magnetosphere to interplanetary shock. *The Astrophysical Journal*, *938*(1). <https://doi.org/10.3847/1538-4357/ac90cc>
- Zhang, H., Sibeck, D. G., Zong, Q.-G., McFadden, J. P., Larson, D., Glassmeier, K.-H., & Angelopoulos, V. (2012). Global magnetosphere response to an interplanetary shock: THEMIS observations. *Annales Geophysicae*, *30*(2), 379-387. <https://doi.org/10.5194/angeo-30-379-2012>
- Zhang, J., Poomvises, W., & Richardson, I. G. (2008). Sizes and relative geoeffectiveness of interplanetary coronal mass ejections and the preceding shock sheaths during intense storms in 1996-2005. *Geophysical Research Letters*, *35*(2). <https://doi.org/10.1029/2007GL032045>
- Zhang, J.-C., Liemohn, M. W., Kozyra, J. U., Lynch, B. J., & Zurbuchen, T. H. (2004). A statistical study of the geoeffectiveness of magnetic clouds during high solar activity years. *Journal of Geophysical Research*, *109*(A9). <https://doi.org/10.1029/2004JA010410>
- Zhang, J. J., Wang, C., Sun, T. R., Liu, C. M., & Wang, K. R. (2015). GIC due to storm sudden commencement in low-latitude high-voltage power network in China: Observation and simulation. *Space Weather*, *13*(10), 643-655. <https://doi.org/10.1002/2015SW001263>
- Zhang, J. J., Wang, C., Sun, T. R., & Liu, Y. D. (2016). Risk assessment of the extreme interplanetary shock of 23 July 2012 on low-latitude power networks. *Space Weather*, *14*(3), 259-270. <https://doi.org/10.1002/2015SW001347>
- Zhang, S.-M., & Liu, L.-G. (2020). A Mitigation Method Based on the Principle of GIC-Even Distribution in Whole Power Grids. *IEEE Access*, *8*, 65,096-65,103. <https://doi.org/10.1109/ACCESS.2020.2984262>
- Zhang, T.-L., Schwingenschuh, K., & Russell, C. T. (1995). A study of the solar wind deceleration in the Earth's foreshock region. *Advances in Space Research*, *15*(8-9), 137-140. [https://doi.org/10.1016/0273-1177\(94\)00095-I](https://doi.org/10.1016/0273-1177(94)00095-I)
- Zhang, X. J., Deng, L. H., Fei, Y., Li, C., Tian, X. A., & Wan, Z. J. (2022). Hemispheric asymmetry of long-term sunspot activity: sunspot relative numbers for 1939–2019. *Monthly Notices of the Royal Astronomical Society*, *514*(1), 1140–1147. <https://doi.org/doi.org/10.1093/mnras/stac1231>
- Zhang, X.-Y., & Moldwin, M. B. (2014). The source, statistical properties, and geoeffectiveness of long-duration southward interplanetary magnetic field inter-

- vals. *Journal of Geophysical Research: Space Physics*, 119(2), 658-669.
<https://doi.org/10.1002/2013JA018937>
- Zhang, X. Y., Zong, Q.-G., Wang, Y. F., Zhang, H., Xie, L., Fu, S. Y., Yuan, C. J., Yue, C., Yang, B., & Pu, Z. Y. (2010). ULF waves excited by negative/positive solar wind dynamic pressure impulses at geosynchronous orbit. *Journal of Geophysical Research*, 115(A10). <https://doi.org/10.1029/2009JA015016>
- Zhang, Y., Paxton, L. J., Lu, G., & Yee, S. (2019). Impact of nitric oxide, solar EUV and particle precipitation on thermospheric density decrease. *Journal of Atmospheric and Solar-Terrestrial Physics*, 182, 147-154. <https://doi.org/10.1016/j.jastp.2018.11.016>
- Zhao, J., & Han, Y.-B. (2008). Historical Dataset Reconstruction and a Prediction Method of Solar 10.7cm Radio Flux. *Chinese Journal of Astronomy and Astrophysics*, 8(4), 472-476. <https://doi.org/10.1088/1009-9271/8/4/11>
- Zhao, X., & Dryer, M. (2014). Current status of CME/shock arrival time prediction. *Space Weather*, 12(7), 448-469. <https://doi.org/10.1002/2014SW001060>
- Zhao, X. H., & Feng, X. S. (2014). Shock Propagation Model version 2 and its application in predicting the arrivals at Earth of interplanetary shocks during Solar Cycle 23. *Journal of Geophysical Research: Space Physics*, 119(1), 1-10. <https://doi.org/10.1002/2012JA018503>
- Zheng, Y., Brandt, P. C., Lui, A. T. Y., & Fok, M.-C. (2008). On ionospheric trough conductance and subauroral polarization streams: Simulation results. *Journal of Geophysical Research*, 113(A4). <https://doi.org/10.1029/2007JA012532>
- Zheng, Y., Lui, A. T. Y., Fok, M.-C., Anderson, B. J., Brandt, P. C., Immel, T. J., & Mitchell, D. G. (2006). Relationship between Region 2 field-aligned current and the ring current: Model results. *Journal of Geophysical Research*, 111(A11). <https://doi.org/10.1029/2006JA011603>
- Zhigulev, V. N., & Romishevskii, E. A. (1960). Concerning the interaction of currents flowing in a conducting medium with the Earth's magnetic field. *Soviet Phys. Dok.*, 4, 859-862.
- Zhou, X., & Tsurutani, B. T. (2001). Interplanetary shock triggering of nightside geomagnetic activity: Substorms, pseudobreakups, and quiescent events. *Journal of Geophysical Research*, 106(A9), 18957-18967. <https://doi.org/10.1029/2000JA003028>
- Zhou, X., Zhou, X.-Z., Angelopoulos, V., Raeder, J., Oliveira, D., & Shi, Q. (2014). Observations and MHD simulations for a shocked magnetotail. In *Abstract SM31D-4225*. AGU Fall Meeting, San Francisco, CA.
- Zhou, X.-Y., & Smith, E. J. (2015). Supercriticality of ICME and CIR shocks. *Journal of Geophysical Research: Space Physics*, 120(3), 1526-1536. <https://doi.org/10.1002/2014JA020700>
- Zhou, X.-Y., Strangeway, R. J., Anderson, P. C., Sibeck, D. G., Tsurutani, B. T., Haerendel, G., Frey, H. U., & Arballo, J. K. (2003). Shock aurora: FAST and DMSP observations. *Journal of Geophysical Research*, 108(A4). <https://doi.org/10.1029/2002JA009701>
- Zhou, X.-Y., & Tsurutani, B. (2002). Interplanetary shock effects on the nightside auroral zone, magnetosphere and ionosphere. In L.-H. Lyu (Ed.), *Space weather study us-*

- ing multipoint techniques proceedings of the cospar colloquium* (Vol. 12, p. 139-147). Pergamon. [https://doi.org/10.1016/S0964-2749\(02\)80213-X](https://doi.org/10.1016/S0964-2749(02)80213-X)
- Zhou, X.-Y., & Tsurutani, B. T. (1999). Rapid intensification and propagation of the dayside aurora: Large scale interplanetary pressure pulses (fast shocks). *Geophysical Research Letters*, *26*(8), 1097-1100. <https://doi.org/10.1029/1999GL900173>
- Zhou, Y.-L., Ma, S.-Y., Lühr, H., Wang, H., & Dang, G. (2007). Changes of thermospheric mass density and their relations with Joule heating and ring current index during Nov. 2003 superstorm – CHAMP observations. *Chinese Journal of Geophysics*, *50*(4), 856-865. <https://doi.org/10.1002/cjg2.1103>
- Zhu, H., Zhu, W., & He, M. (2022). Solar Cycle 25 Prediction Using an Optimized Long Short-Term Memory Mode with F10.7. *Solar Physics*, *297*(157). <https://doi.org/10.1007/s11207-022-02091-5>
- Zhu, Q., Lu, G., & Deng, Y. (2022). Low- and Mid-Latitude Ionospheric Response to the 2013 St. Patrick's Day Geomagnetic Storm in the American Sector: Global Ionosphere Thermosphere Model Simulation. *Frontiers in Astronomy and Space Science*, *9*(916739). <https://doi.org/10.3389/fspas.2022.916739>
- Zhuang, H. C., Russell, C. T., Smith, E. J., & Gosling, J. T. (1981). Three-dimensional interaction of interplanetary shock waves with the bow shock and magnetopause: A comparison of theory with ISEE observations. *Journal of Geophysical Research*, *86*(A7), 2156–2202. <https://doi.org/10.1029/JA086iA07p05590>
- Zirker, J. B. (2009). *The magnetic universe - the elusive traces on an invisible force*. Baltimore, MD: The Johns Hopkins University Press.
- Zmuda, A. J., Martin, J. H., & Heuring, F. T. (1966). Transverse magnetic disturbances at 1100 kilometers in the auroral region. *Journal of Geophysical Research*, *71*(21), 5033-5045-97. <https://doi.org/10.1029/JZ071i021p05033>
- Zois, I. P. (2013). Solar activity and transformer failures in the Greek national electric grid. *Journal of Space Weather and Space Climate*, *3*(A32). <https://doi.org/10.1051/swsc/2013055>
- Zong, Q., Rankin, R., & Zhu, X. (2017). The interaction of ultra-low-frequency pc3-5 waves with charged particles in Earth's magnetosphere. *Reviews of Modern Plasma Physics*, *1*(10), 1-90. <https://doi.org/10.1007/s41614-017-0011-4>
- Zong, Q.-G., Reinisch, B. W., Song, P., Wei, Y., & Galkin, I. A. (2010). Dayside ionospheric response to the intense interplanetary shocks–solar wind discontinuities: Observations from the digisonde global ionospheric radio observatory. *Journal of Geophysical Research*, *115*(A6). <https://doi.org/10.1029/2009JA014796>
- Zong, Q.-G., Wang, Y. F., Zhang, H., Fu, S. Y., Zhang, H., Wang, C. R., Yuan, C. J., & Vogiatzis, I. (2012). Fast acceleration of inner magnetospheric hydrogen and oxygen ions by shock induced ULF waves. *Journal of Geophysical Research*, *117*(A11). <https://doi.org/10.1029/2012JA018024>
- Zong, Q.-G., Yue, C., & Fu, S. Y. (2021). Shock Induced Strong Substorms and Super Substorms: Preconditions and Associated Oxygen Ion Dynamics. *Space Science Reviews*, *217*(33). <https://doi.org/10.1007/s11214-021-00806-x>
- Zong, Q.-G., & Zhang, H. (2011). On magnetospheric response to solar wind dis-

continuities. *Journal of Atmospheric and Solar-Terrestrial Physics*, 73(1), 1-4.
<https://doi.org/10.1016/j.jastp.2010.11.001>

- Zong, Q.-G., Zhou, X.-Z., Wang, Y. F., Li, X., Song, P., Baker, D. N., Fritz, T. A., Daly, P. W., Dunlop, M., & Pedersen, A. (2009). Energetic electron response to ULF waves induced by interplanetary shocks in the outer radiation belt. *Journal of Geophysical Research*, 114(A10204), 1-13. <https://doi.org/10.1029/2009JA014393>
- Zuccaro, D. R., & Holt, B. J. (1982). A technique for establishing a reference potential on satellites in planetary ionospheres. *Journal of Geophysical Research*, 87(A10), 8327-8329. <https://doi.org/10.1029/JA087iA10p08327>
- Zuo, P., Feng, X., Xie, Y., Wang, Y., & Xu, X. (2015). Strong Solar Wind Dynamic Pressure Pulses: Interplanetary Sources and Their Impacts on Geosynchronous Magnetic Fields. *The Astrophysical Journal*, 812(2), 152. <https://doi.org/10.1088/0004-637X/812/2/152>
- Zurbuchen, T. H., & Richardson, I. G. (2006). In-situ solar wind and magnetic field signatures of interplanetary coronal mass ejections. *Space Science Reviews*, 123(1-3), 31-43. <https://doi.org/10.1007/s11214-006-9010-4>
- Zwickl, R. D., R., J., Asbridge, J. R., Bame, S. J., Feldman, W. C., Gosling, J. T., & Smith, E. J. (1983). Plasma properties of driver gas following interplanetary shocks observed by ISEE-3. In *Solar wind five* (p. 711-717). NASA Conf. Publ. (CP-2280)