

Robert H. Holzworth
Professor of Earth and Space Sciences, and Adjunct Professor of Physics
University of Washington, Seattle, WA
4/12/2020

Professional Preparation

University of Colorado, Boulder (Physics and Math) BS (Magna Cum Laude) 1972
University of California, Berkeley (Physics) MS 1974, **PhD 1977**
University of California, Berkeley (Space Sciences Laboratory) Asst. Research Physicist 1,
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Appointments

Current: Professor of Earth and Space Sciences and Adjunct Professor of Physics, University of Washington (1992 – present)
Former: Asst. and Asso. Prof of E&SS and Adjunct Asst. and Asso. Prof. of Physics, Univ of Washington (initial appointment: 1982)
Member of the Technical Staff (MTS), The Aerospace Corp, El Segundo, CA (1978-82)

Refereed Publications: Robert H. Holzworth
(last updated 4-12-2020
(161 publications)

1. Holzworth, R. H., Folklore and the Aurora, Trans. Am. Geophys. Union, 56 (10) p. 686-9, 1975. [reprinted in: History of Geophysics, V.1, Ed. C. S. Gillmor, Am. Geophys. Union, Washington DC, p.41-4, 1984]
2. Holzworth, R. H., and C.-I. Meng, Mathematical Representation of the Auroral Oval, Geophys. Res. Lett., 2 p. 377-80, 1975.
3. Meng, C. -I., and R. H. Holzworth, Auroral Circle -- Delineating the Poleward Boundary of the Quiet Auroral Belt, J. Geophys. Res., 82, p. 164-72, 1977.
4. Holzworth, R. H., J. J. Berthelier, D. K. Cullers, U. V.Fahleson, C. G. Falthammar, M. K. Hudson, L. Jalonen, M. C.Kelley, P. J. Kellogg, P. Tanskanen, M. Temerin, and F. S.Mozer, The Large-scale Ionospheric Electric Field: its Variation with Geomagnetic Activity and relation to Terrestrial Kilometric Radiation, J. Geophys, Res., 82, p. 2735-2742, 1977.
5. Holzworth, R. H., Large Scale DC Electric Fields in the Earth's Environment, Ph.D. dissertation, Physics Department, University of California, Berkeley, California, pp. 147 & 3@mu@fiche, 1977.
6. Gonzales, C. A., M. C. Kelley, L. A. Carpenter, and R. H. Holzworth, Evidence for Magnetospheric Effect on Mid-latitude Electric Fields, J. Geophys. Res., 83, p. 4397-9, 1978.
7. Holzworth, R. H., and F. S. Mozer, Direct Evidence of Solar Flare Modification of Stratospheric Electric Fields, J. Geophys. Res., 84, p. 363-7, 1979.hiss
8. Holzworth, R. H., and F. S. Mozer, Direct Evaluation of the Radial Diffusion Coefficient near L = 6 due to Electric Field Fluctuations, J. Geophys. Res., 84, p. 2559-66, 1979.
9. Wygant, J. R., R. H. Holzworth, and F. S. Mozer, Balloon borne Electric Field Experiments, in Scientific Ballooning (COSPAR), Pergamon Press, New York, p. 105-18, 1979.

10. Holzworth, R. H., and H. C. Koons, VLF Emissions from a Modulated Electron Beam in the Auroral Ionosphere, *J. Geophys. Res.*, 86, p. 853-7, 1981.
11. Holzworth, R. H., High Latitude Stratospheric Electrical Measurements in Fair and Foul Weather under Various Solar Conditions, *J. A. T. P.*, 43, 1115-1125, 1981.
12. Schroeder, K., P. Kintner, C. Cornish, R. Green, and R. H. Holzworth, In Situ Data Analysis on High Altitude Balloons using Microprocessors, *IEEE Trans. on Geo. & Rem. Sens.*, GE- 19, 129-32, 1981.
13. Holzworth, R. H., M. H. Dazey, E. R. Schnauss, and O. Youngbluth, Direct Measurement of Lower Atmospheric Vertical Potential Differences, *Geo. Res. Lett.*, 8, 783-6, 1981.
14. Holzworth, R. H., J. Wygant, F. Mozer, C. Gonzales, R. Greenwald, M. Blanc, J. Vickery, and A. Kishi, Global Ionospheric Electric Field Measurements in April 1978, *J. Geophys. Res.*, 86, p. 6859-68, 1981.
15. Holzworth, R. H., W. B. Harbridge, and H. C. Koons, Plasma Waves Stimulated by Electron Beams in the Lab and in the Auroral Ionosphere, pp. 381-91 in *Artificial Particle Beams in Space Plasma Studies*, B. Grandel (ed.), Plenum Press, N. Y., pp. 704, 1982.
16. Bernstein, W., P. O. Kellogg, S. Manson, R. Holzworth, and B. Wahlen, Recent Observations of Beam Plasma Interactions in the Ionosphere and a Comparison with Laboratory Studies of the Beam Plasma Discharge, pp. 35-64 in *Artificial Particle Beams in Space Plasma Studies*, B. Grandel (ed.), Plenum Press, N. Y., pp. 704, 1982.
17. Kellogg, P. J., H. R. Anderson, W. Bernstein, T. J. Hallinan, R. H. Holzworth, R. J. Jost, H. Leinback and E. P. Szuszczewicz, Laboratory Simulation of Injection of Particle Beams in the Ionosphere, pp. 289-329 in *Artificial Particle Beams in Space Plasma Studies*, B. Grandel (ed.), Plenum Press, N. Y., pp. 704, 1982.
18. Holzworth, R. H., and Y. T. Chiu, Sferics in the Stratosphere, pp. 1-20 in *Handbook of Atmospherics*, Vol. II, H. Volland (ed.), C.R.C. Press, Boca Ratan, pp. 327, 1982.
19. Holzworth, R. H., Electrodynamics of the Stratosphere using 5000 @m sup 3@ Superpressure Balloons, pp.107-14 in *Scientific Ballooning III*, W. Reidler and M. Friedrich (eds.), Pergamon Press, Oxford, 1983.
20. Holzworth, R. H., and C.-I. Meng, Auroral Boundary Variations and the Interplanetary Magnetic Field, *Planetary and Space Science*, 32, 25-29, 1984.
21. Kramer, B., P. Kintner, and R. Holzworth, Data Acquisition, Reduction and Transmission of Atmospheric Electricity Data on High Altitude Scientific Balloons, *IEEE trans. on Geo. and Rem. Sens.*, GE-22, 169-71, 1984.
22. Elvidge, J., P. Kintner, and R. Holzworth, Microprocessor Implementation of an FFT for Ionospheric VLF Observations, *IEEE trans. on Geo. and Rem. Sens.*, GE-22, 171-4, 1984.
23. Holzworth, R. H., Hy-wire measurements of Atmospheric Potential, *J. Geophys. Res.*, 89, 1395-1401, 1984.
24. Holzworth, R. H. On the Interpretation of Hy-wire Atmospheric Potential Measurements at Wallops Island: A Reply, *J. Geophys. Res.*, 89, 2637-8, 1984.
25. Holzworth, R. H., T. Onsager, P. Kintner and S. Powell, Planetary Scale Variability of the Fair Weather Vertical Electric Field in the Stratosphere, *Phys. Rev. Lett*, 53, 1398-401, 1984.
26. Kelley, M. C., C. L. Siefring, R. P. Pfaff, P. M. Kintner, M. Larsen, R. Green, R. H. Holzworth, L. C. Hale, J. D. Mitchell and D. LeVine, Electrical Measurements in the Atmosphere and in the Ionosphere over an Active Thunderstorm, 1. Campaign Overview and initial ionospheric results, *J. Geophys. Res.*, 90, 9815-23, 1985.

27. Holzworth, R. H., M. C. Kelley, C. L. Siefring, L. C. Hale and J. D. Mitchell, Electrical Measurements in the Atmosphere and the Ionosphere over an Active Thunderstorm: 2. Direct Current Electric Fields and Conductivity, *J. Geophys. Res.*, 90, 9824-30, 1985.
28. Hausler, B., R. R. Anderson, D. A. Gurnett, H. C. Koons, R. H. Holzworth, O. H. Bauer, R. Treumann, K. Gnaiger, D. Odem, W. B. Harbridge and F. Eberl, The Plasma wave instrument on board the AMPTE IRM satellite, *I.E.E.E. Trans. Geo. & Rem. Sens.*, GE-23, 267-274, 1985
29. Gurnett, D. A., R. R. Anderson, B. Hausler, G. Haerendel, O. H. Bauer, R. A. Treumann, H. C. Koons, R. H. Holzworth and H. Luhr, Plasma waves associated with the AMPTE artificial comet, *G. Res. Lett.*, 12, 851-854, 1985.
30. Hausler, B., L. J. Woolliscroft, R. R. Anderson, D. A. Gurnett, R. H. Holzworth, H. C. Koons, O.H. Bauer, G. Haerendel, R. A. Treumann, P. J. Christiansen, A. G. Darbyshire, M. P. Gough, S. R. Jones, A. J. Norris, H. Luhr and N. Klocker, Plasma waves observed by the IRM and UKS spacecraft during the AMPTE solar wind lithium releases: Overview, *J. Geophys. Res.*, 91, 1283-1300, 1986.
31. Gurnett, D. A., T. Z. Ma, R. R. Anderson, O. H. Bauer, G. Haerendel, B. Hausler, G. Paschmann, H. C. Koons, R. Holzworth and H. Luhr, Analysis and interpretation of the shocklike electrostatic noise associated with the AMPTE solar wind lithium releases, *J. Geophys. Res.*, 91, 1301-1310, 1986.
32. Holzworth, R. H., K. Norville, P. M. Kintner and S. Powell, Stratospheric Conductivity Variations over Thunderstorms, *J. Geophys. Res.*, 91, 13257-13263, 1986.
33. Holzworth, R. H. and H. Volland, Do we need a geoelectric index?, *EOS Trans. Am. Geophys. Union*, 67, 545-548, 1986.
34. Gurnett, D. A., R. R. Anderson, P. A. Bernhardt, H. Luhr, G. Haerendel, O. H. Bauer, H. C. Koons and R. H. Holzworth, Plasma waves associated with the first AMPTE Magnetotail barium release, *Geophys. Res Lett.*, 13, 644-647, 1986.
35. Gurnett, D. A., R. R. Anderson, T. Z. Ma, G. Haerendel, G. Paschmann, O. H. Bauer, R. A. Treumann, H. C. Koons, R. H. Holzworth, and H. Luhr, Waves and electric fields associated with the first AMPTE artificial comet, *J. Geophys. Res.*, 91, 10013-10028, 1986.
36. Kellogg, P. J., S. J. Monson, R. H. Holzworth and R. J. Jost, Beam-Generated Waves in a Large Plasma Chamber, *I.E.E.E. Trans. on Plasma Science*, PS-14(6), 891-901, 1986. Norville, K. W. and R. H. Holzworth, Global circuit variability from multiple stratospheric electric field measurements, *J. Geophys. Res.*, 92, 5685-5695, 1987.
37. Woosley, J. D. and R. H. Holzworth, Electrical Potential Measurements in the Lower Atmosphere, *J. Geophys. Res.*, 92, 3127-3134, 1987.
38. Roeder, J. L., H. C. Koons, R. H. Holzworth, R. R. Anderson, O. H. Bauer, D. A. Gurnett, G. Haerendel, B. Hausler and R. Treumann, Electron cyclotron harmonic waves observed by the AMPTE-IRM plasma wave experiment following a lithium release in the solar wind, *J. Geophys. Res.*, 92, 5768-5776, 1987.
39. Holzworth, R. H., Electric Fields in the Middle Atmosphere, *Physica Scripta*, T18, 298-308, 1987.
40. LaBelle, J., R. A. Treumann, G. Haerendel, O. H. Bauer, G. Paschmann, W. Baumjohann, H. Luhr, R. R. Anderson, H. C. Koons and R. H. Holzworth, AMPTE/IRM Observations of Waves Associated with Flux Transfer Events in the Magnetosphere, *J. Geophys. Res.*, 92, 5827-5843, 1987.

41. Koons, H. C., J. L. Roeder, O. H. Bauer, G. Haerendel, R. Treumann, R. R. Anderson, D. A. Gurnett and R. H. Holzworth, Observation of Nonlinear wave decay processes in the solar wind by the AMPTE plasma wave experiment, *J. Geophys. Res.*, 92, 5865-5872, 1987.
42. Quinn, E. P. and R. H. Holzworth, Quasi-Lagrangian Measurements of Density Surface Fluctuations and Power Spectra in the Stratosphere, *J. Geophys. Res.*, 92, 10926-10932, 1987.
43. Holzworth, R. H., K. W. Norville and P. R. Williamson, Solar flare perturbations in stratospheric current systems, *Geophys. Res. Lett.*, 14, 852-855, 1987.
44. Holzworth, R. H., K. W. Norville, P. M. Kintner and S. P. Powell, "Reply to Comments on Stratospheric Conductivity Variations Over Thunderstorms by Vonnegut and Moore", *J. Geophys. Res.*, 93, 3915-3917, 1988.
45. Dowden, R. L. and R. H. Holzworth, Sub-ionospheric propagation at 5 kHz over and in the vicinity of Antarctica, *J. Geomag. Geoelect.*, 40, 1437-1444, 1988
46. Onsager, T. G., R. H. Holzworth, K. C. Koons, O. H. Bauer, G. Haerendel, R. Treumann, D. A. Gurnett, R. R. Anderson, H. Luhr and C. W. Carlson, High frequency electrostatic waves near the Earth's Bow Shock, *J. Geophys. Res.*, 94, 13397-13407, 1989
47. Hu, H., R. H. Holzworth and Y. Li, Storm related variations in stratospheric conductivity measurements, *J. Geophys. Res.*, 94, 16429, 1989
48. Holzworth, R. H., A new source of horizontal electric fields in the middle latitude stratosphere, *J. Geophys. Res.*, 94, 12795, 1989.
49. Onsager, T. G. and R. H. Holzworth, Measurement of electron beam mode in the Earth's foreshock, *J. Geophys. Res.*, 95, 4175- 4186, 1990.
50. Dowden, R. L. and R. H. Holzworth, Longitudinal variation of midlatitude hiss from six long duration balloon flights, *J. Geophys. Res.*, 95, 10599-10608, 1990.
51. Kelley, M. C., J. G. Ding and R. H. Holzworth, Intense ionospheric electric field pulses generated by lightning, *Geophys. Res. Lett.*, 17, 2221, 1990.
52. Li, Ya Qi, Robert H. Holzworth, Hua Hu, Michael McCarthy, Dayle Massey, Paul M. Kintner, Juan Rodriguez, Umran S. Inan and William C. Armstrong, Anomalous Optical Events Detected by Rocket- and Balloon-Mounted Detectors in the WIPP Campaign, *J. Geophys. Res.* 96, 1315-1326, 1991.
53. Goldberg, R. A. and R. H. Holzworth, Middle Atmosphere Electrodynamics, Middle Atmosphere Program (MAP) Handbook, 32, 65-84, 1991 (Copies available through SCOSTEP Secretariat, U. of Illinois, 1406 W. Green St., Urbana, IL 61801).
54. Holzworth, R. H., Conductivity and electric field variations with altitude in the stratosphere, *J. Geophys. Res.*, 96, 12857- 12864, 1991.
55. Holzworth, R. H., Atmospheric Electrodynamics in the US:1987- 1990, Reviews of Geophysics, 29, (U.S. Report to IUGG - Supplement), pp. 115-120, 1991.
56. Rodriguez, J. V., U. S. Inan, Y. Q. Li, R. H. Holzworth, A. J. Smith, R. E. Orville and T. J. Rosenberg, A case study of lightning, whistlers and associated ionospheric effects during a substorm particle injection event, *J. Geophys. Res.*, 97, 65-76, 1992.
57. Holzworth, R. H., K. W. Norville, H. Hu, R. L. Dowden, C. D. D. Adams, J. Brundell, Jr. O. Pinto, I. Pinto, and W. D. Gonzalez, "ELBBO: Extended Life Balloon Borne Observatories," *URSI Radioscientist*, vol. 4, pp. 33 - 37, 1993.
58. de la Morena, B. A., L. F. Alberca, J. J. Curto and R. H. Holzworth, "Stratospheric electric field measurements with transmediterranean balloons", *Adv. Space Res.*, 13(1) p. 381- 384, 1993.

59. Holzworth, R. H., E. V. Suvorov, V. Y. Trakhtengerts and R. A. Goldberg, "Middle Electrodynamic and Composition, A STEP Workshop: Preface", *J. Geophys. Res.*, 99, 21057-21058, 1994.
60. Holzworth, R. H., "Quasistatic Electromagnetic phenomena in the atmosphere and ionosphere," Chapter 10 (pp. 235-266) in *Handbook of Atmospheric Electrodynamics*, Vol.I, ed. H. Volland, CRC Press, Boca Raton, 1995. Now in e-Book format: <https://www.taylorfrancis.com/books/e/9781351443272> (2017)
61. Holzworth, R. H. and H. Hu, *Global Electrodynamics from Superpressure Balloons*, *Adv. Space. Res.*, 16(5), 131-140, 1995
62. Holzworth, R. H. "Electrodynamic and Plasma Measurements", Chapter II 2.5 (pp. 244-60) of *The Upper Atmosphere: Data Analysis and Interpretation*, eds: W. Dieminger; G.K. Hartmann and R. Leitinger, Springer-Verlag, Berlin, 1996.
63. Barnum, B, R. H. Holzworth and R. L. Dowden, "VLF wave modes determined by the height gains measured during the Extended Life Balloon-Borne Observatory test flight", *Radio Science*, 31(1) 193-210, 1996.
64. Seliga, T. A., J. D. Sahr and R. H. Holzworth, "Probing electric fields near sprites and jets using multiparametric radar and chaff", *IEEE Geo. and Rem. Sens. Soc.*, Vol. 1, 569-73, 1996.
65. Hu, Hua and R. H. Holzworth, Observations and Parameterization of the Stratospheric Electrical Conductivity, *J. Geophys. Res.*, 101, 29,539-29,552, 1996.
66. Hua Hu and R. H. Holzworth, An inertial wave-driven stratospheric horizontal electric field: new evidence, *Journal of Geophysical Research*, v 102, n D16, p 19717-30, 27 Aug. 1997
67. Kelly, M.C.; Baker, S.D.; Holzworth, R.H.; Argo, P and Cummer, S.A, LF and MF observations of the lightning electromagnetic pulse at ionospheric altitudes, *Geophysical Research Letters*, v 24, n 9, p 1111-14, 1 May 1997
68. Holzworth, R. H. and E. A. Bering, III, Ionospheric Electric Fields from Stratospheric Balloon-Borne Probes, pp. 79-86 in *Measurement Techniques in Space Plasmas: Fields*, eds: Pfaff, Borovsky and Young, (JGR Monograph), 1998
69. Holzworth, R. H., R. M. Winglee, B. H. Barnum and YaQi Li, Lightning whistler waves in the high-latitude magnetosphere, *J. Geophys. Res.*, 104, 17369, 1999
70. Holzworth, R.H., R.F. Pfaff, R.A. Goldberg, S.R. Bounds, F.J. Schmidlin, H.D. Voss, A.J. Tuzzolino, C.L. Croskey, J.D. Mitchell, G. von Cossart, W. Singer, U.P. Hoppe, D. Murtagh, G. Witt, J. Gumbel and M. Friedrich, "Large Electric Potential Perturbations in PMSE During DROPPS", *.Geophys. Res. Lett.*, 28 (8), 1435, 2001.
71. Pfaff, R. ; Holzworth, R. ; Goldberg, R. ; Freudenreich, H. ; Voss, H. ; Croskey, C. ; Mitchell, J. ; Gumbel, J. ; Bounds, S. ; Singer, W. ; Latteck, R. Rocket probe observations of electric field irregularities in the polar summer mesosphere, *Geophys. Res. Lett. Vol. 28 (8)*, 1431, 2001
72. Curto, J.J., Alberca, L.F.; Holzworth, R.H.; de la Morena, B.; Batillo, J.; Sole, J.G.; Altadill, D. Electric conductivity and electric field in the stratosphere: middle-latitude balloon flight results *Journal of Geophysical Research*, v 106, n A10, 1 Oct. 2001, p 21337-42
73. de La Beaujardiere, O; Jeong, L.; Basu, B.; Basu, S.; Beach, T.; Bernhardt, P.; Burke, W.; Groves, K.; Heelis, R.; Holzworth, R.; Huang, C.; Hunton, D.; Kelley, M.; Pfaff, R.; Retterer, J.; Rich, F.; Starks, M.; Straus, P.; Valladares, C. ,C/NOFS: a mission to forecast scintillations, *Journal of Atmospheric and Solar-Terrestrial Physics*, v 66, n 17, Nov. 2004, p 1573-91
74. Lay, Erin H., Robert H. Holzworth, Jeremy N. Thomas, Richard L. Dowden, Craig J. Rodger and Osmar Pinto, Jr., WWLL Global Lightning Detection System: Regional Validation Study in Brazil, *Geophys. Res. Lett.*, Vol. 31, L03102, doi:10.1029/2003/GL018882, 2004.

75. Pinto, O., Jr., Saba, M.M.F.; Pinto, I.R.C.A.; Tavares, F.S.S.; Naccarato, K.P.; Solorzano, N.N.; Taylor, M.J.; Pautet, P.D.; Holzworth, R.H., Thunderstorm and lightning characteristics associated with sprites in Brazil, *Geophysical Research Letters*, v 31, n 13, 16 July 2004, p 4 pp.
76. Thomas, Jeremy N., Robert H. Holzworth, and John Chin, A New High Voltage Electric Field Instrument for Studying Sprites, *IEEE Transactions on Geoscience and Remote Sensing*, IEEE Trans. Geosci. Rem. Sens. V.. 42, NO. 7, July 2004
77. Holzworth, Robert H. and Richard A. Goldberg, Electric Field Measurements in Noctilucent Clouds, *J. Geophys. Res.*, Vol. 109, /2003JD004468 Aug 2004
78. Sternovsky, Z., R. H. Holzworth, M. Horányi and S. Robertson, Potential distribution around sounding rockets in mesospheric layers with charged aerosol particles, *Geophys. Res. Lett.* Vol. 31, L22101, doi:10.1029/2004GL020949, 2004.
79. Holzworth, R. H., M. P. McCarthy, J. N. Thomas, J. Chin, T. M. Chinowsky, M. J. Taylor, and O. Pinto Jr., Strong electric fields from positive lightning strokes in the stratosphere, *Geophys. Res. Lett.*, V. 32, L04809, doi:10.1029/2004GL021554, 2005
80. Bering III, E.A., Benbrook, J.R.; Holzworth, R.H.; Byrne, G.J.; Gupta, S.P. Latitude gradients in the natural variance in stratospheric conductivity - Implications for studies of long-term changes Source: *Advances in Space Research*, v 35, n 8 SPEC. ISS., 2005, p 1385-1397
81. Thomas, Jeremy N, Robert H. Holzworth, Michael P. McCarthy, and Osmar Pinto Jr., Lightning sferics and stroke-delayed pulses measured in the stratosphere: Implications for mesospheric currents, *Geophysical Res. Lett.*, VOL. 32, L22807, doi:10.1029/2005GL024629, 2005
82. Holzworth, Robert H., et al, Balloon observations of temporal variation in the global circuit compared to global lightning activity, *Advances in Space Research* 36 (2005) 2223–2228
83. Thomas, J.N., Holzworth, R.H.; McCarthy, M.P.; Pinto, O., Jr. Predicting lightning-driven quasi-electrostatic fields at sprite altitudes using in situ measurements and a numerical model, *Geophysical Research Letters*, v 32, n 10, 28 May 2005.
84. Bering, E.A., III, Holzworth, R.H.; Reddell, B.D.; Kokorowski, M.F.; Kadokura, A.; Yamagishi, H.; Sato, N.; Ejiri, M.; Hirose, H.; Yamagami, T.; Torii, S.; Tohyama, F.; Nakagawa, M.; Okada, T., Balloon observations of temporal and spatial fluctuations in stratospheric conductivity, *Advances in Space Research*, v 35, n 8, 2005, p 1434-49
85. Kokorowski, M., Sample, J.G.; Holzworth, R. H., Bering, E.A.; Bale, S.D.; Blake, J.B.; Collier, A.B.; Hughes, A.R.W.; Lay, E.; Lin, R.P.; McCarthy, M.P.; Millan, R.M.; Moraal, H.; O'Brien, T.P.; Parks, G.K.; Pulupa, M.; Reddell, B.D.; Smith, D.M.; Stoker, P.H.; Woodger, L. Rapid fluctuations of stratospheric electric field following a solar energetic particle event, *Geophysical Research Letters*, v 33, n 20, 28 Oct. 2006, p 6 pp
86. Rodger, C. J., S. Werner, J. B. Brundell, E. H. Lay, N. R. Thomson, R. H. Holzworth, and R. L. Dowden, Detection efficiency of the VLF World-Wide Lightning Location Network (WWLLN): initial case study, *Ann. Geophys.*, 24, 3197–3214, 2006
87. Jacobson, A.R., R. H. Holzworth, Harlin, J.; Dowden, R.; Lay, E., Performance assessment of the World Wide Lightning Location Network (WWLLN), using the Los Alamos Sferic Array (LASA) as ground truth Source: *Journal of Atmospheric and Oceanic Technology (JTech)*, v 23, n 8, Aug. 2006, p 1082-92
88. Thomas, Jeremy N; Michael J. Taylor, Dominique Pautet, and Matthew Bailey,; Natalia N. Solorzano, Robert H. Holzworth, Michael P. McCarthy, Michael Kokorowski, Fernanda Sao Sabbas, Osmar Pinto Jr; Steven A. Cummer, Nicolas Jaugey, and Jingbo Li, Nelson Jorge

Schuch A Very Active Sprite-Producing Storm Observed Over Argentina, *Eos, Vol. 88, No. 10, 6 March 2007, PAGES 117–119*

89. Lay Erin, H., Robert H. Holzworth, Abram R. Jacobson, Craig J. Rodger, and Richard L. Dowden: Local Time Variation in Land/Ocean Lightning Count Rates as Measured by the World Wide Lightning Location Network, *Journal of Geophysical Research-Part D-Atmospheres*, v 112, n 13, 16 July 2007, p D13111-1-9
90. Taylor, M. J., M. A. Bailey, P. D. Pautet, S. A. Cummer, N. Jaugey, J. N. Thomas, N. N. Solorzano, F. S. Sabbas, R.H. Holzworth, O. Pinto, and N. J. Schuch (2008), Rare Measurements of a Sprite with Halo Event Driven by a Negative Lightning Discharge Over Argentina, *Geophys. Res. Lett.*, VOL.35, L14812, doi:10.1029/2008GL033984, July 2008
91. Jacobson, A. R., R. Holzworth, and X.-M. Shao, Low-frequency ionospheric sounding with Narrow Bipolar Event lightning radio emissions: energy-reflectivity spectrum, *Ann. Geophys.*, 26, 1793–1803, 2008
92. Kokorowski, M., Bering, E.A., III; Ruohoniemi, M.; Sample, J.G.; Holzworth, R.H.; Bale, S.D.; Blake, J.B.; Collier, A.B.; Hughes, A.R.W.; Lay, E.H.; Lin, R.P.; McCarthy, M.P.; Millan, R.M.; Moraal, H.; O'Brien, T.P.; Parks, G.K.; Pulupa, M.; Reddell, B.D.; Smith, D.M.; Stoker, P.H.; Woodger, L., Magnetospheric electric field variations caused by storm-time shock fronts, *Advances in Space Research*, v 42, n 1, 1 July 2008, p 181-91
93. Thomas J. N., B. H. Barnum, E. Lay, R. H. Holzworth, M. Cho, M. C. Kelley (2008), Lightning-driven electric fields measured in the lower ionosphere: Implications for transient luminous events, *J. Geophys. Res.*, 113, A12306, doi:10.1029/2008JA013567
94. Dowden, R.; Holzworth, R.; Rodger, C.; Lichtenberger, J.; Thomson, N.; Jacobson, A.; Lay, E.; Brundell, J.; Lyons, T.; O'Keefe, S.; Kawasaki, Z.; Price, C.; Prior, V.; Ortega, P.; Weinman, J.; Mikhailov, Y.; Veliz, O.; Qie, X.; Burns, G.; Collier, A.; Pinto, O.; Diaz, R.; Adamo, C.; Williams, E.; Kumar, S.; Raga, G.; Rosado, J.; Avila, E.; Clilverd, M.; Ulich, T.; Gorham, P.; Shanahan, T.; Osipowicz, T.; Cook, G.; Zhao, Y, .World-wide lightning location using VLF propagation in the earth-ionosphere waveguide, *IEEE Antennas and Propagation Magazine*, v 50, n 5, p 40-60, Oct. 2008
95. Thomas, J.N.; Holzworth, R.H.; McCarthy, M.P. ,In situ measurements of contributions to the global electrical circuit by a thunderstorm in southeastern Brazil, *Source: Atmospheric Research*, v 91, n 2-4, p 153-60, Feb. 2009
96. Abram R. Jacobson,¹ Xuan-Min Shao,² and Robert Holzworth, Full-wave reflection of lightning long-wave radio pulses from the ionospheric D region: Numerical model, *JOURNAL OF GEOPHYSICAL RESEARCH*, VOL. 114, A03303, doi:10.1029/2008JA013642, 2009
97. M. Shimogawa and R. H. Holzworth, Electric field measurements in a NLC/PMSE region during the MASS/ECOMA campaign, *Ann. Geophys.*, 27, 1423–1430, 2009
98. Robertson, S., M. Horanyi, S. Knappmiller, Z. Sternovsky, R. Holzworth, M. Shimogawa, M. Friedrich, K. Torkar, J. Gumbel, L. Megner, G. Baumgarten, R. Latteck, M. Rapp, U.-P. Hoppe, and M. E. Hervig, Mass analysis of charged aerosol particles in NLC and PMSE during the ECOMA/MASS campaign, *Ann. Geophys.*, 27, 1213–1232, 2009
99. Bering, E.; Engebretson, M. ; Holzworth, R.; Kadokura, A.; Kokorowski, M.; Reddell, B.; Posch, J.; Yamagishi, H., Simultaneous observations of Pc 1 micropulsation activity and stratospheric electrodynamic perturbations on 27 January 2003, *Advances in Space Research*, v 43, n 5, p 802-818, March 2, 2009

100. Hazelton B. J., B. W. Grefenstette, D. M. Smith, J. R. Dwyer, X.-M. Shao, S. A. Cummer, T. Chronis, E. H. Lay, R. H. Holzworth (2009), Spectral dependence of terrestrial gamma-ray flashes on source distance, *Geophys. Res. Lett.*, 36, L01108, doi:10.1029/2008GL035906.
101. Rodger, C.J., Brundell, J.B.; Holzworth, R.H.; Lay, E.H, Growing detection efficiency of the world wide lightning location network, *AIP Conference Proceedings* (refereed), v 1118, p 15-20, 2009.
102. Cifelli, Robert, Timothy Lang, Steven A. Rutledge, Nick Guy, Edward J. Zipser, Jon Zawislak, and Robert Holzworth, Characteristics of an African Easterly Wave Observed During NAMMA, *Journal of the Atmospheric Sciences*, Vol. 67, No. 1, pp. 3-25, January DOI: 10.1175/2009JAS3141.1, 2010.
103. Jeremy N. Thomas, Natalia N. Solorzano, Steven A. Cummer, and Robert H. Holzworth, Polarity and energetics of inner core lightning in three intense North Atlantic hurricanes, *J. Geophys. Res.*, VOL. 115, doi:10.1029/2009JA014777, 2010
104. Jacobson, Abram R., Xuan-Min Shao, Robert Holzworth, Full-wave reflection of lightning long-wave radio pulses from the ionospheric D-region: Comparison with midday observations of broadband lightning signals, *J. Geophys. Res.*, v. 115, doi:10.1029/2009JA014540RR, 2010
105. Williams, E. R., W. A. Lyons, Y. Hobara, V. C. Mushtak, N. Asencio, R. Boldi, J. Bór, S. A. Cummer, E. Greenberg, M. Hayakawa, R. H. Holzworth, V. Kotroni, J. Li, C. Morales, T. E. Nelson, C. Price, B. Russell, M. Sato, G. Satori, K. Shirahata, Y. Takahashi, K. Yamashita, Ground-based detection of sprites and their parent lightning flashes over Africa during the 2006 AMMA campaign *Q. J. R. Meteorol. Soc.* **136(s1)**: 257–271 (2010)
106. Briggs, M. S., G. J. Fishman, V. Connaughton, P. N. Bhat, W. S. Paciesas, R. D. Preece, C. Wilson-Hodge, V. L. Chaplin, R. M. Kippen, A. von Kienlin, C. A. Meegan, E. Bissal, J. R. Dwyer, D. M. Smith, R. H. Holzworth, J. E. Grove, and A. Chekhtman, First Results on Terrestrial Gamma-ray Flashes from the Fermi Gamma-ray Burst Monitor, *JOURNAL OF GEOPHYSICAL RESEARCH*, VOL. 115, A07323, doi:10.1029/2009JA015242, 2010
107. Bucsela, E. J., K. E. Pickering, T. L. Huntemann, R. C. Cohen, A. Perring, J. F. Gleason, R. J. Blakeslee, R. I. Albrecht, R. Holzworth, J. P. Cipriani, D. Vargas-Navarro, I. Mora-Segura, A. Pacheco-Hernández, and S. Laporte-Molina, Lightning-generated NO_x seen by OMI during NASA's TC4 experiment *J. Geophys. Res.-Atmos.* 115, Art. No. D00J10, issn: 0148-0227, ids: 636GB, doi: 10.1029/2009JD013118, Published 5-Aug 2010.
108. Connaughton, V., M. S. Briggs, R. H. Holzworth, M. L. Hutchins, G. J. Fishman, C. A. Wilson-Hodge, V. L. Chaplin, P. N. Bhat, J. Greiner, A. von Kienlin, R. M. Kippen, C. A. Meegan, W. S. Paciesas, R. D. Preece, E. Cramer, J. R. Dwyer, and D. M. Smith, Associations between Fermi Gamma-ray Burst Monitor terrestrial gamma ray flashes and sferics from the World Wide Lightning Location Network, *J. Geophys. Res.*, V. 115, A12307, doi:10.1029/2010JA015681, 2010.
109. Abreu, D., D. Chandan, R. H. Holzworth, and K. Strong, A performance assessment of the World Wide Lightning Location Network (WWLLN) via comparison with the Canadian Lightning Detection Network (CLDN), *Atmos. Meas. Tech.*, 3, 1143–1153, 2010
110. Lay, Erin H., Craig J. Rodger, Robert H. Holzworth, Mengyu Cho, and Jeremy N. Thomas, Temporal-spatial modeling of non-linear electron density enhancement due to successive lightning strokes *JOURNAL OF GEOPHYSICAL RESEARCH*, VOL. 115, A00E59, 8 PP., doi:10.1029/2009JA014756, 2010

111. Smith, D.M., B. J. Hazelton, B. W. Grefenstette, J. R. Dwyer, R. H. Holzworth, and E. H. Lay, Terrestrial gamma ray flashes correlated to storm phase and tropopause height, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 115, A00E49, doi:10.1029/2009JA014853, Jan 2011
112. *)Holzworth, R. H., M. P. McCarthy, R. F. Pfaff, A. R. Jacobson, W. L. Willcockson and D. E. Rowland: Lightning-Generated -Whistler Waves Observed by [Probes on the C/NOFS Satellite at Low Latitudes](#), J. Geo. Res., 116, A06306, doi:10.1029/ 2010JA016198, 2011
113. *)Jacobson, A. R., R. H. Holzworth, R. F. Pfaff, and M. P. McCarthy, Study of oblique whistlers in the low-latitude ionosphere, jointly with the C/NOFS satellite and the World-Wide Lightning Location Network, Ann. Geophys., 29, 851–863, doi:10.5194/angeo-29-851-2011, 2011
114. *)**) Virts, Katrina S., Joel A. Thornton, John M. Wallace, Michael L. Hutchins, Robert H. Holzworth, and Abram R. Jacobson, Daily and intraseasonal relationships between lightning and NO₂ over the Maritime Continent, Geophys. Res. Lett., V. 38, L19803, doi:10.1029/2011GL048578, 2011
115. *) Jacobson, A. R., R. H. Holzworth and X.-M. Shao, Observations of multi-microsecond VHF pulsetrains in intracloud lightning discharges, Ann. Geophys., 29, 1587–1604, 2011.
116. *) Jacobson, A. R., R. H. Holzworth, M. P. McCarthy, R. P. Pfaff,, Initial studies with the Lightning Detector on the C/NOFS satellite, and cross-validation with WWLLN, Journal of Atmospheric and Oceanic Technology (JTech) DOI: 10.1175/JTECH-D-11-00047.1, V. 28, p. 1423, 2011
117. *) Jacobson, A. R., X.-M. Shao, and R. H. Holzworth (2011), Satellite triangulation of thunderstorms, from fading radio fields synchronously recorded on two orthogonal antennas, Radio Sci., 46, RS6012, doi:10.1029/2011RS004783
118. Xiong, S., M. S. Briggs, V. Connaughton, G. J. Fishman, D. Tierney, G. Fitzpatrick, S. Foley, S. Guiriec, R. H. Holzworth, and M. L. Hutchins, Location prediction of electron TGFs, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 117, A02309, doi:10.1029/2011JA017085, Feb 2012
119. *)**) Hutchins, M.L., R. H. Holzworth, C. J. Rodger and J. B. Brundell, Far field power of lightning strokes as measured by the World Wide Lightning Location Network, JTech (J. Atmos. and Ocean. Tech. (AMS), DOI: 10.1175/JTECH-D-11-00174.1, V.29, 1102-10, 2012
120. Kokorowski, M., A. Seppälä, J. G. Sample, R. H. Holzworth, M. P. McCarthy, E. A. Bering, E. Turunen Atmosphere-ionosphere conductivity enhancements during a hard solar energetic particle event, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 117, A05319, doi:10.1029/2011JA017363, 14 PP., 2012
121. *)**) Hutchins, M.L., R. H. Holzworth, J. B. Brundell, and C. J. Rodger, Relative Detection Efficiency of the World Wide Lightning Location Network, Radio Science, V.47(6) December 2012, DOI: 10.1029/2012RS005049, RS6006, 9pp, 2012
122. *)**) Connaughton, Valerie, Michael S. Briggs, Shaolin Xiong, Joseph R. Dwyer, Michael L. Hutchins, Eric Grove, Alexandre Chekhtman, Dardave Tierney, Gerard Fitzpatrick, Suzanne Foley, Shelia McBreen, P. N. Bhat, Vandiver L. Chaplin, Eric Cramer, Gerald J. Fishman, Robert H. Holzworth, Melissa Gibby, Jochen Greiner, Andreas von Kienlin, R. Marc Kippen, Charles A. Meegan, William S. Paciasas, Robert D. Preece, and Colleen Wilson-Hodge. Radio signals from electron beams in Terrestrial Gamma-ray Flashes, JGR-Space Physics, Accepted Nov 29, 2012

123. ^{*)},^{**}) Virts, Katrina S., John M. Wallace, Michael L. Hutchins, and Robert H. Holzworth, Highlights of a new ground-based, hourly global lightning climatology, *Bulletin of the American Meteorological Society* (BAMS) DOI:10.1175/BAMS-D-12-00082.1, pp. 1381-91, 2013
124. Michael S. Briggs, Shaolin Xiong, Valerie DOI:10.1175/BAMS-D-12-00082.1, pp. 1381-91, 2013 Connaughton, Dave Tierney, Gerard Fitzpatrick, Suzanne Foley, J. Eric Grove, Alexandre Chekhtman, Melissa Gibby, Gerald J. Fishman, Shelia McBreen, Vandiver L. Chaplin, Sylvain Guiriec, Emily Layden, P. N. Bhat, Maximilian Hughes, Jochen Greiner, Andreas von Kienlin, R. Marc Kippen, Charles A. Meegan, William S. Paciasas, Robert D. Preece, Colleen Wilson-Hodge, Robert H. Holzworth, Michael L. Hutchins, Terrestrial gamma-ray flashes in the Fermi era: Improved observations and analysis methods, *J. Geophys. Res.- Space Physics*, DOI: 10.1002/jgra.50205, 21 JUN 2013
125. ^{*)} Jacobson, Abram R., Robert H. Holzworth, Robert Pfaff, Roderick Heelis, Patrick Colestock, A method to estimate whistler wave vector from polarization using 3-component satellite E-field data, *Radio Science*, DOI: 10.1002/2013RS005335, 31 JAN 2014
126. ^{*)},^{**}) Hutchins, M. L., Abram R. Jacobson, Robert H. Holzworth, James B. Brundell, Azimuthal dependence of VLF propagation, *JGR Space Physics*, DOI: 10.1002/jgra.505335, SEP 2013
127. ^{*)},^{**}) Virts, Katrina S., Wallace, John M., Hutchins, Michael L., Holzworth, Robert H., Diurnal Lightning Variability over the Maritime Continent: Impact of Low-Level Winds, Cloudiness, and the MJO., *Journal of the Atmospheric Sciences*, Vol. 70 Issue 10, p3128-3146., Oct 2013
128. Lichtenberger, János, Mark A. Clilverd, Balázs Heilig, Massimo Vellante, Jyrki Manninen, Craig J. Rodger, Andrew B. Collier, Anders M. Jørgensen, Jan Reda, Robert H. Holzworth, Reinhard Friedel and Mea Simon-Wedlund, The plasmasphere during a space weather event: first results from the PLASMON project, *J. Space Weather Space Clim, Volume 3, 2013* doi.org/10.1051/swsc/2013045, 26 June 2013
129. ^{*)},^{**}) Burkholder, Brian S., Michael L. Hutchins, Michael P. McCarthy, Robert F. Pfaff, Robert H. Holzworth Attenuation of lightning-produced sferics in the Earth-ionosphere waveguide and low-latitude ionosphere, *J. Geophys. Res.-Space Physics*, DOI: 10.1002/jgra.50351, 17 JUN 2013
130. ^{*)},^{**}) Hutchins, M. L., R. H. Holzworth, K. S. Virts, J. M. Wallace, S. Heckman, Radiated VLF energy differences of land and oceanic lightning, *Geophys. Res. Lett.*, DOI: 10.1002/grl.50406, 30 MAY 2013
131. ^{*)} Holzworth, R. H., Chapters 1 and 2 of *The Earth's Electric Field: Sources from Sun to Mud*, Michael C. Kelley, Elsevier Science; 1 edition, ISBN 978-0-12-397886-8, September 21, 2013
132. Dudkin, D., V. Pilipenko, V. Korepanov, S. Klimov, R. Holzworth, Electric field signatures of the IAR and Schumann resonance in the upper ionosphere detected by Chibis-Mmicosatellite, *Journal of Atmospheric and Solar-Terrestrial Physics*, 117(2014)81–87 (2014)
133. ^{**}), ^{*)}) Hutchins, Michael L., Robert H. Holzworth and James B. Brundell, Diurnal variation of the global electric circuit from clustered thunderstorms, *Journal of Geophysical Research: Space Physics*, Volume 119, Issue 1, pages 620–629, DOI: 10.1002/2013JA019593, January 2014

- 134.**)*)Virts, Katrina S., John M. Wallace, Michael L. Hutchins, and Robert H. Holzworth, Diurnal and seasonal lightning variability over the Gulf Stream and the Gulf of Mexico, *Journal of the Atmospheric Sciences* doi: <http://dx.doi.org/10.1175/JAS-D-14-0233.1>, 2015
135. *) Permyakov, M. S., E. Yu. Potapova, , B. M. Shevtsov , N. V. Cherneva , and R.H. Holzworth, Thunderstorm Activity and the Structure of Tropical Cyclones, ISSN 10248560, *Atmospheric and Oceanic Optics*, 2015, Vol. 28, No. 6, pp. 485–490. © Pleiades Publishing, Ltd., 2015 (Original Russian Text © M.S. Permyakov, E.Yu. Potapova, B.M. Shevtsov, N.V. Cherneva, R.H. Holzworth, @@, published in *Optika Atmosfery i Okeana*.)
136. Hardman, Rachael, Mark A. Clilverd, Craig J. Rodger, James B. Brundell, Roger Duthie, Robert H. Holzworth, Ian R. Mann, David K. Milling, Eva Macusova, A case study of electron precipitation fluxes due to plasmaspheric hiss, *J. Geophysical, Res.*, V. 128(8), pp.6736-48, Aug 2015
137. *) Shevtsov, B. M., P. P. Firstov, N. V. Cherneva, R. H. Holzworth, and R. R. Akbashev, Lightning and electrical activity during the Shiveluch volcano eruption on 16 November 2014, *Nat. Hazards Earth Syst. Sci. Discuss.*, 3, 6745–6755, 2015 (first view Nov 2014)
138. Chronis, T., M. Briggs, G. Priftis, V. Connaughton, J. Brundell, R. Holzworth, S. Heckman, S. McBreen, G. Fitzpatrick, and M. Stanbro, 2015: Characteristics of Thunderstorms that produce Terrestrial Gamma-ray Flashes. *Bull. Amer. Meteor. Soc.*, 639-653, doi:10.1175/BAMS-D-14-00239.1, Apr. 2016.
139. **)*)Zheng, H., R. H. Holzworth, J. B. Brundell, A. R. Jacobson, J. R. Wygant, G. B. Hospodarsky, F. S. Mozer, and J. Bonnell, A statistical study of whistler waves observed by Van Allen Probes (RBSP) and lightning detected by WWLLN, *J. Geophys. Res. Space Physics*, 121, doi:10.1002/2015JA022010. (2016),
140. **)*) Dixon, Ken, Clifford F. Mass, Gregory J. Hakim, and Robert H. Holzworth, The Impact of Lightning Data Assimilation on Deterministic and Ensemble Forecasts of Convective Events, *JTECH*, *JTECH*, V. 33, doi: 10.1175/JTECH-D-15-0188.1, June 2016
141. Pickering, K. E., E. Bucsela, D. Allen, A. Ring, R. Holzworth, and N. Krotkov (2016), Estimates of lightning NO_x production based on OMI NO₂ observations over the Gulf of Mexico, *J. Geophys. Res. Atmos.*, 121, doi:10.1002/2015JD024179., July 2016.
142. *) Jacobson, A. R., R. H. Holzworth, R. Pfaff, and R. Heelis (2016), Automated identification of discrete, lightning generated, multiple-dispersed whistler waves in C/NOFS-VEFI very low frequency observations, *Radio Sci.*, 51, doi:10.1002/2016RS005989, August 2016
143. Smith, D. M., P. Buzbee, N. A. Kelley, A. Infanger, R. H. Holzworth, and J. R. Dwyer (2016), The rarity of terrestrial gamma-ray flashes: 2. RHESSI stacking analysis, *J. Geophys. Res. Atmos.*, 121, 11,382–11,404, doi:10.1002/2016JD025395.
144. Solorzano, N. N.; Thomas, J. N.; Hutchins, M. L. and R. H. Holzworth, WWLLN lightning and satellite microwave radiometrics at 37 to 183 GHz: Thunderstorms in the broad tropics, *J. Geophys. Res. Atmos.*, 121, 12,298-318, DOI: 10.1002/2016JD025374, 2016
145. Thornton, J. A., K. S. Virts, R. H. Holzworth, and T. P. Mitchell (2017), Lightning enhancement over major oceanic shipping lanes, *Geophys. Res. Lett.*, 44, 9102–9111, doi:10.1002/2017GL074982
146. Firstov, P.P., R. Akbashev, R. H. Holzworth, B.M. Shevtsov, Atmospheric Electric Effects during the Explosion of Shiveluch Volcano on November 16, 2014, *Izvestiya Atmospheric and Oceanic Physics* 53(53 1):24-31 · January 2017, DOI: 10.1134/S0001433817010066

147. Bowers G. S., D. M. Smith N. A. Kelley G. F. Martinez-McKinney S. A. Cummer J. R. Dwyer S. Heckman R. H. Holzworth F. Marks P. Reasor J. Gamache J. Dunion T. Richards H. K. Rassoul (2018). A terrestrial gamma-ray flash inside the eyewall of Hurricane Patricia. *Journal of Geophysical Research: Atmospheres*, doi.org/10.1029/2017JD027771, Accepted article online 4 MAY 2018
148. Jacobson, A. R., Holzworth, R. H., Pfaff, R., & Heelis, R. (2018). Coordinated satellite observations of the very low frequency transmission through the ionospheric D layer at low latitudes, using broadband radio emissions from lightning. *Journal of Geophysical Research: Space Physics*, 123, 2926–2952. <https://doi.org/10.1002/2017JA024942>
149. Roberts, O. J., G. Fitzpatrick M. Stanbro S. McBreen M. S. Briggs R. H. Holzworth J. E. Grove A. Chekhtman E. S. Cramer B. G. Mailyan, The First Fermi-GBM Terrestrial Gamma-ray Flash Catalog, *Journal of Geophysical Research: Space Physics*, 123, 2018, [10.1029/2017JA0248](https://doi.org/10.1029/2017JA0248)
150. Hargie, K.A., A.R. Van Eaton, L.G. Mastin, R. H. Holzworth, J.W. Ewert, M. Pavolonis, Globally detected volcanic lightning and umbrella dynamics during the 2014 eruption of Kelud, Indonesia, *Journal of Volcanology and Geothermal Research*, Volume 382, 15 September 2019, Pages 81-91. <https://doi.org/10.1016/j.jvolgeores>.
151. Romps, D. M., A. B. Charn, R. H. Holzworth, W. E. Lawrence, J. Molinari and D. Vollaro (2018) CAPE times P Explains Lightning Over Land but Not the Land-ocean Contrast, *Geophys. Res. Lett.*, 45, <https://doi.org/10.1029/2018GL080267>
152. Aich, V., R. Holzworth, S. J. Goodman, Y. Kuleshov, C. Price, and E. Williams (2018), Lightning: A new essential climate variable, *Eos*, 99, <https://doi.org/10.1029/2018EO104583>. Published on 07 September 2018.
153. Yagova, N. V., A. K. Sinha, V. A. Pilipenko, E. N. Fedorov, R. H. Holzworth and G. Vichare, ULF electromagnetic noise from regional lightning activity: Model and observations, *J. of Atmos and Solar-Terrestrial Physics*, 182, January 2019, pp.223-8
154. PERMYAKOV, MIKHAIL, TATIANA KLESHCHEVA, AND EKATERINA POTALOVA, ROBERT H. HOLZWORTH, Characteristics of Typhoon Eyewalls According to World Wide Lightning Location Network Data, *Monthly Weather Review (AMS)* V.147(11), <https://doi.org/10.1175/MWR-D-18-0235.1>, Nov 2019
155. Abram R. Jacobson, Robert H. Holzworth, Robert Pfaff, Roderick Heelis, Low-latitude whistler-wave spectra and polarization from VEFI and CINDI payloads on C/NOFS satellite, *JGR Space Physics*, Volume 125, Issue 1, January 2020, e2019JA027074
156. Bucsel, Eric, Kenneth E. Pickering, Dale Allen, Robert Holzworth, Nickolay Krotkov, Midlatitude lightning NO_x production efficiency inferred from OMI and WLLN data, (2019). Midlatitude lightning NO_x production efficiency inferred from OMI and WLLN data. *Journal of Geo. Res: Atmospheres*, 124, 13, 475–13,497. <https://doi.org/10.1029/2019GL083827>
157. Larkey, R. K., Sample, J. G., Smith, D. M., Briggs, M. S., Lapierre, J. L., & Holzworth, R. H. (2019). Evidence for extended charging periods prior to terrestrial gamma ray flashes. *Geophysical Research Letters*, 46, <https://doi.org/10.1029/2019GL083827>
158. Dale J. Allen¹, Kenneth E. Pickering¹, Eric Bucsel², Nickolay Krotkov³, and Robert Holzworth⁴ Lightning NO_x Production in the Tropics as Determined Using OMI NO₂ Retrievals and WLLN Stroke Data, *JGR* 2019
159. Holzworth, R.H., M. P. McCarthy, J. B. Brundell, A. R. Jacobson, C. J. Rodger, Global distribution of superbolts, *Journal of Geophysical Research: Atmospheres*, 124, <https://doi.org/10.1029/2019JD030975>, 2019

160. A Fermi Gamma-Ray Burst Monitor Event Observed as a Terrestrial Gamma-Ray Flash and Terrestrial Electron Beam, M. Stanbro M. S. Briggs O. J. Roberts E. Cramer J. R. Dwyer R.H. Holzworth B. G. Mailyan S. L. Xiong, *J. Geophys Res Space Physics*, 123(12), 10580-10591, 2019
161. Detection of VLF attenuation in the Earth-ionosphere waveguide caused by X-class solar flares using a global lightning location network, Anderson, T. S., McCarthy, M. P., & Holzworth, R. H. (2020), *Space Weather*, 18 (3), e2019SW002408. <https://doi.org/10.1029/2019SW002408>
162. Smith, D. M., Kelley, N. A., Buzbee, P., Infanger, A., Splitt, M., Holzworth, R. H., & Dwyer, J. R. (2020). Special classes of terrestrial gamma ray flashes from RHESSI. *Journal of Geophysical Research: Atmospheres*, Volume 125, Issue 20, 27 October 2020, e2020JD033043125, e2020JD033043. <https://doi.org/10.1029/2020JD033043>
163. Van Eaton, Alexa R., David J. Schneider, Cassandra M. Smith, Matthew M. Haney, John J. Lyons, Ryan Said, David Fee, Robert H. Holzworth & Larry G. Mastin, special classes Did ice-charging generate volcanic lightning during the 2016–2017 eruption of Bogoslof volcano, Alaska?, *Bull. Of Volcanology* (2020) 82:24, <https://doi.org/10.1007/s00445-019-1350-5>
164. Firstov, Pavel P.; Malkin, Evgeniy I.; Akbashev, Rinat R.; Druzhin, Gennadiy I.; Cherneva, Nina V.; Holzworth, Robert H.; Uvarov, Vladimir N.; Stasiy, Ivan E. 2020. "Registration of Atmospheric-Electric Effects from Volcanic Clouds on the Kamchatka Peninsula (Russia)" *Atmosphere* 11, no. 6: 634. <https://doi.org/10.3390/atmos11060634>
165. Radio Frequency Emissions Associated with Multi-Pulsed Terrestrial Gamma-ray Flashes, Mailyan Bagrat, Mark Stanbro, M.S. Briggs, S. Cummer, J. R. Dwyer, O. J. Roberts and R. Holzworth, *JGR Space Physics*, 2020JA027928RRR, 2021
166. Holzworth, R. H., Brundell, J. B., McCarthy, M. P., Jacobson, A. R., Rodger, C. J., & Anderson, T. S. (2021). Lightning in the Arctic. *Geophysical Research Letters*, 48, e2020GL091366. <https://doi.org/10.1029/2020GL091366>
167. Cheng, W.-Y., Kim, D., & Holzworth, R. H. (2021). CAPE threshold for lightning over the tropical ocean. *Journal of Geophysical Research: Atmospheres*, 126, e2021JD035621. <https://doi.org/10.1029/2021JD035621>
168. Larkey, R. K., Sample, J. G., Smith, D. M., Lapierre, J. L., DiGangi, E., & Holzworth, R. H. (2021). The relationship between TGF production in thunderstorms and lightning flash rates and amplitudes. *Journal of Geophysical Research: Atmospheres*, 126, e2020JD034401. <https://doi.org/10.1029/2020JD034401>
169. R. Pfaff · P. Uribe · R. Fourre · J. Kujawski · N. Maynard · M. Acuña · D. Rowland, H. Freudenreich · K. Bromund · S. Martin · C. Liebrecht · R. Kramer · F. Hunsaker, R. Holzworth · M. McCarthy · W. Farrell · J. Klenzing · G. Le · A. Jacobson, J. Houser · C. Steigies, J.-J. Berthelier, The Vector Electric Field Investigation (VEFI) on the C/NOFS Satellite. *Space Sci Rev* 217, 85 (2021). <https://doi.org/10.1007/s11214-021-00859-y>
170. Jacobson, A. R., Holzworth, R. H., & Brundell, J. B. (2021). Using the World Wide Lightning Location Network (WWLLN) to study very low frequency transmission in the Earth-ionosphere waveguide: 1. Comparison with a full-wave model. *Radio Science*, 56, e2021RS007293. <https://doi.org/10.1029/2021RS007293>
171. Jacobson, A. R., Holzworth, R. H., & Brundell, J. B. (2022). Using the World Wide Lightning Location Network (WWLLN) to study Very Low Frequency transmission in the Earth-Ionosphere Waveguide: 2. Model test by patterns of detection/non-detection. *Radio Science*, 57, e2021RS007362. <https://doi.org/10.1029/2021RS007362>

172. Briggs, M. S., S. Lesage, C. Schultz, B. Mailyan, R. H. Holzworth, A Terrestrial Gamma-ray Flash from the 2022 Hunga Tonga–Hunga Ha’apai Volcanic Eruption, *Geophys. Res. Letters*, 2022 (accepted and in press)
173. Zengxin Pan, Feiyue Mao, Daniel Rosenfeld, Yannian Zhu, Lin Zang, Xin Lu, Joel A. Thornton, R. H. Holzworth, Jianhua Yin, Avichay Efraim, Wei Gong, Coarse Sea Spray Inhibits Lightning, *NCOMMS (Nature Communications)*, 2022 (accepted and in press)

Submitted/Under Review

*) denotes R. H. Holzworth as PI on the funding grant

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