

Jeremy N. Thomas, Assistant Professor of Physics

Bard High School Early College II
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Education:

Ph.D. Earth and Space Sciences, University of Washington, 2005.

Dissertation: Lightning-Driven Electric and Magnetic Fields Measured in the Stratosphere:
Implications for Sprites.

M.S. Physics, University of Washington, 2002.

B.A. Physics, Bard College, 2000.

Academic and Professional Appointments:

September 2008 – current, Assistant Professor of Physics, Bard High School Early College II, Elmhurst, NY.

September 2008 – current, Research Scientist, Northwest Research Associates, Redmond, WA.

July 2008 – current, Visiting Scholar, Dept. of Earth and Space Sciences, University of Washington, Seattle, WA.

March 2007 – September 2008, Mendenhall Postdoctoral Fellow, Geomagnetism Program, U.S. Geological Survey, Denver, CO.

September 2007 – June 2008, Visiting Lecturer, Dept. of Earth and Space Sciences, University of Washington, Seattle, WA.

September 2006 - December 2006, Adjunct Professor of Computer Engineering, Digipen Institute of Technology, Redmond, WA.

August 2005-March 2007, Postdoctoral Research Associate, Dept. of Earth and Space Sciences, University of Washington, Seattle, WA.

June 2001-August 2005, Graduate Student Research Assistant, Dept. Earth and Space Sciences, University of Washington, Seattle, WA.

September 2000-June 2001, Graduate Student Teaching Assistant, Physics Dept., University of Washington, Seattle, WA.

Current Teaching:

September 2008 – current, Developing and teaching advanced high school and early college physics courses. (Physics Program, Bard High School Early College II)

Current Research:

August 2006 - present, Magnetic activity precursory to large earthquakes. Analyzing geomagnetic data to reexamine and scrutinize reports of magnetic precursors to large earthquakes, such as the Loma Prieta EQ of 1989 (Collaborators: Jeffrey Love and Malcolm Johnston, USGS).

August 2002 - present, The World Wide Lightning Location Network (WWLLN). Currently studying lightning activity in tropical cyclones. (Collaborators: Natalia Solorzano, Digipen Institute of Technology and Robert Holzworth, University of Washington).

June 2001 - present, Sprite Balloon Campaigns in Brazil. Worked on all aspects of these experiments: designing some of the instrumentation, launching the payloads, taking data, and analyzing data. Project manager and currently the lead data analyst for the Sprite II Balloon Campaign that took place during Feb.-March 2006. (Collaborators: Robert Holzworth and Michael McCarthy, University of Washington; Michael Taylor, Utah State University; and Steven Cummer, Duke University).

May 2006 - present, Examining thunderstorm contributions to the global electrical circuit using in situ measurements (Collaborators: Robert Holzworth and Michael McCarthy, University of Washington).

March 2006 - present, Analyzing data from the Thunderstorm-III rocket campaign, specifically lightning driven electric fields at 75-130 km in altitude (Collaborators: Benjamin Barnum, Johns Hopkins University and Robert Holzworth, University of Washington).

January 2003 - present, Numerical modeling of EM fields driven by large lightning strokes to directly compare with in situ balloon- and rocket-borne data. (Collaborators: Robert Holzworth and Michael McCarthy, University of Washington).

Past Teaching Experience:

September 2007 – June 2008, Visiting Lecturer for Space and Space Travel (ESS 102) and Access to Space (ESS205) (ESS Dept., University of Washington).

January 2007 – March 2007, Co-Instructor and teaching assistant for Space and Space Travel (ESS 102, ESS Dept., University of Washington).

September 2006 - December 2006, Developed and taught a digital electronics course including lectures and labs (Digipen Institute of Technology).

Spring Quarters 2003-06, Teaching assistant and balloon launch manager for Access to Space (ESS 205). Numerous student built payloads have been successfully launched to above 25 km altitude (ESS Dept., University of Washington)

September 2000-May 2001, Lab teaching assistant for Introductory Physics for Scientists and Engineers (Physics Dept., University of Washington).

September 1996-May 1997, Math tutor (Bard College).

Past Research:

June 2001-August 2002, EMA and ELBBO long duration balloon flights data analysis, specifically looking at inertial wave driven stratospheric electric fields. (Advisor: Robert Holzworth, ESS Dept, University of Washington).

August 1999-May 2000, Theoretical study of neutrino oscillations as part of my senior project for Bard College. (Advisors: Peter Skiff, Physics Dept., Bard College and Rudolph Tegen, Physics Dept., University of the Witwatersrand, South Africa).

May 1999-August 1999, The LSND and BooNE neutrino oscillation experiments at Los Alamos National Laboratory. (Advisor Rex Tayloe, LANL).

May 1998-August 1998, Theoretical study of astrophysical neutrinos as part of the University of Oklahoma Summer Research Program For Undergraduates. (Advisor: Edward Barron, Dept. of Physics, University of Oklahoma).

Computing Experience:

Experience with Windows and Linux operating systems. Programming experience in MATLAB, FORTRAN, and C.

Refereed Publications:

[10] **Thomas, J. N.**, B. H. Barnum, E. Lay, R. H. Holzworth, M. Cho, and M. C. Kelley, "Lightning-driven Electric Fields Measured in the Lower Ionosphere: Implications for Transient Luminous Events", *J. of Geophys. Res.*, in press October 2008.

[9] **Thomas, J. N.**, R. H. Holzworth, and M. P. McCarthy, "In Situ Measurements of Contributions to the Global Electrical Circuit by a Thunderstorm in Southeastern Brazil", *Atmos. Res.*, doi:10.1016/j.atmosres.2008.03.026, in press September 2008.

[8] Taylor, M.J., M. Bailey, P.D. Pautet, S. A. Cummer, N. Jaugey, **J. N. Thomas**, N.N. Solorzano, F.T. Sao Sabbas, R. H. Holzworth, O. Pinto and N. Schuch, "Rare Measurements of a Sprite With Halo Event Driven by a Negative Lightning Discharge Over Argentina", *Geophys. Res. Lett.*, doi:10.1029/2008GL033984, 2008.

[7] **Thomas, J.N.**, et al., "A Very Active Sprite-Producing Storm Observed Over Argentina", *EOS, Transactions, American Geophysical Union* (cover story), Vol. 88, No. 10, 6 March 2007, pp. 117-128.

[6] **Thomas, J. N.**, R. H. Holzworth, M. P. McCarthy, and O. Pinto, Jr., "Lightning Sferics and Stroke Delayed Pulses Measured in the Stratosphere: Implications for Mesospheric Currents", *Geophys. Res. Lett.*, vol. 32, L22807, doi:10.1029/2005GL024629, 2005.

[5] **Thomas, J. N.**, R. H. Holzworth, M. P. McCarthy, and O. Pinto, Jr., "Predicting Lightning-driven Quasi-electrostatic fields at Sprite Altitudes Using In Situ Measurements and a Numerical Model", *Geophys. Res. Lett.*, vol. 32, L10809, doi:10.1029/2005GL022693, 2005.

[4] 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.*, vol. 32, L04809, doi:10.1029/2004GL021554, 2005.

[3] **Thomas, J. N.**, R. H. Holzworth, and J. Chin, "A New High Voltage Electric Field Instrument for Studying Sprites," *IEEE Transactions on Geosciences and Remote Sensing*, vol. 42, no. 7, July 2004.

[2] Lay, E. H., R. H. Holzworth, C. J. Rodger, **J. N. Thomas**, O. Pinto, Jr., and R. L. Dowden, "WWLL Global Lightning Detection System Regional Validation Study in Brazil," *Geophys. Res. Lett.*, vol. 31, L03102, doi:10.1029/2003GL018882, 2004.

[1] Tegen, R., **J. N. Thomas**, Y. Yan, "Why Neutrinos Oscillate," *South African Journal of Science*, vol. 98, pp. 147-153, 2002.

Publications Recently Submitted:

[S-2] **Thomas, J. N.**, J. J. Love, and M. J. S. Johnston, "On the Reported Magnetic Precursor of the 1989 Loma Prieta Earthquake", *Physics of the Earth and Planetary Interiors*, submitted August 2008.

[S-1] São Sabbas, F. T., P. D. Pautet, M. J. Taylor, M. Bailey, V. T. Rampinelli, N. N. Solorzano, N. N., **J. N Thomas**, S. A. Cummer, R. H. Holzworth, O. Pinto, and N. J. Schuch,, "IR Temperature

Characteristics of a Prolific TLE Producing Storm in South America Observed During a Sprite Campaign in Brazil”, *J. Geophys. Res.*, submitted December 2007

Publications in Preparation:

[P-6] **Thomas, J. N.**, J. J. Love, and M. J. S. Johnston, “On the Magnetic Precursor of the 1993 Guam Earthquake, to be submitted to *Geophys. Res. Lett.*

[P-5] **Thomas, J. N.**, N. N. Solorzano, S. A. Cummer and R. H. Holzworth, “Polarity and Energetics of Inner Core Lightning in Hurricanes Katrina and Rita”, to be submitted to *Geophys. Res. Lett.*

[P-4] Solorzano, N. N., **J. N. Thomas**, and R. H. Holzworth, “Lightning Activity and Intensity Change in Cyclone Nargis”, to be submitted to *Science*.

[P-3] Solorzano, N. N., **J. N. Thomas**, and R. H. Holzworth, “Lightning Activity in Intense Western Pacific Tropical Cyclones During 2005-06”, to be submitted to *Geophys. Res. Lett.*

[P-2] Bailey, M. M. J. Taylor, P. D. Pautet, S. A. Cummer, N. Jaugey, **J. N. Thomas**, N. N. Solorzano, F. T. Sao Sabbas, R. H. Holzworth, O. Pinto and N. Schuch, “Halos Driven-by Positive and Negative Cloud-to-Ground Lightning Over Argentina and Brazil”, to be submitted to *J. Geophys Res.*

[P-1] **Thomas, J. N.**, R. H. Holzworth, M. P. McCarthy, N. N. Solorzano, K. P. Naccarato, and O. Pinto, Jr., “Lightning-driven Electric Fields Measured in the Stratosphere: Implications for Transient Luminous Events”, to be submitted to *J. Geophys Res.*

Recently Published Conference Proceedings:

Solorzano, N. N., **J. N. Thomas**, and R. H. Holzworth, “Global Studies of Tropical Cyclones Using the World Wide Lightning Location Network”, *Third Conf. on Meteo. Applic. of Lightning Data*, New Orleans, LA, 2008.

Thomas, J. N., R. H. Holzworth, and M. P. McCarthy, “Electric Fields and Conductivity Measured in the Stratosphere Above Thunderstorms: Implications for the Global Electrical Circuit”, *13th International Conference on Atmospheric Electricity*, Beijing, China, 2007.

Solorzano, N. N., **J. N. Thomas**, and R. H. Holzworth, “Studying Intense Tropical Cyclones Using the World Wide Lightning Location Network”, *13th International Conference on Atmospheric Electricity*, Beijing, China, 2007.

Recent Invited Presentations:

URSI National Radio Science Meeting, Boulder, CO, Jan. 2008

Thomas, J.N, et al., “Sprite and Halos Produced by Negative and Positive Cloud-to-Ground Lightning Over Argentina and Brazil”.

AGU Fall Meeting, San Francisco, CA, Dec. 2007

Thomas, J.N, et al., “Very Active Sprite-Producing Thunderstorms Over Argentina”.

NOAA Space Environment Center Seminar, Boulder, CO, July 2007

Thomas, J. N., “In Situ Measurements to Investigate Transient Luminous Events Above Thunderstorms”.

USGS Geologic Hazards Team Seminar,
Golden, CO, March 2006

Thomas, J. N., “Measuring Electric and Magnetic Fields High Above Thunderstorms: Implications for Sprites, Jets, and Elves”.

AGU Fall Meeting, San Francisco, CA, Dec. 2005

Thomas, J. N., et al., “Large Stratospheric Electric Fields Driven by Possible Upward Initiated Positive Lightning”.

URSI National Radio Science Meeting, Boulder, CO, Jan. 2005

Thomas, J.N., et al., “In-Situ and Ground-Based Investigations of Sprites Over Brazil”.

Awards and Grants Received:

USGS Mendenhall Fellowship, “Magnetic Precursors to Earthquakes”, approximately \$200,000 over two years, 2006-2008.

AGU Fall Meeting Outstanding Student Paper, Honorable Mention, 2004.

NATO and NSF Travel Awards for NATO ASI on Sprites and Intense Lightning in Corte, Corsica, France, 2004.

Bard College Distinguished Scientist Scholarship, 1996-2000.

Grants Pending:

Toshiba America Foundation, “Urban Effects on Lightning Activity in Queens, NY”, \$13,500 for 1 year, with Natalia Solorzano of Bard High School Early College II.

National Science Foundation, “A Global Investigation of Lightning Outbreaks and Intensity Change in Tropical Cyclones”, \$343,600 over 3 years, with Natalia Solorzano of Bard High School Early College II.

Grants to be submitted in Fall 2008:

National Science Foundation, “Investigation of Lightning-driven Energetic Coupling Between the Troposphere and Ionosphere Using In Situ Balloon and Rocket Data”, approx. \$200,000 over 3 years, with Robert Holzworth of the U. of Washington and Erin Lay of Los Alamos National Laboratory

National Science Foundation, “Imaging and Radio Frequency Observations of Transient Luminous Events Over Costa Rica”, approx. \$50,000 for 1 year, with Natalia Solorzano of Bard High School Early College II.

Synergistic Activities:

External reviewer for NSF proposals.

Referee for papers submitted to the *Journal of Geophysical Research*, *Geophysical Research Letters*, and *IEEE Transactions on Geoscience and Remote Sensing*.

Numerous national and international television and newspaper interviews concerning lightning, ball lightning, sprites, and magnetic earthquake precursors. Examples include:

- Oakland Tribune, Precursor to Loma Prieta Earthquake, 2007.
- CNN South America, Sprites in Brazil, 2003.
- Evening Magazine Seattle, Ball Lightning, 2002.

Referees:

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