

Jeremy N. Thomas, Ph.D.

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Education

Ph.D. Geophysics, 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***Current***

August 2013 – current, Chair of Electrical & Computer Engineering Dept., DigiPen Institute of Technology, Redmond, WA.

August 2011 – current, Associate Professor of Electrical & Computer Engineering, DigiPen Institute of Technology, Redmond, WA.

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

October 2011 – current, Affiliate Associate Professor, Dept. of Earth and Space Sciences, University of Washington, Seattle, WA.

Past

August 2010 – July 2011, Assistant Professor of Electrical & Computer Engineering, DigiPen Institute of Technology, Redmond, WA.

September 2008 – August 2010, Assistant Professor of Physics, Bard High School Early College Queens, Long Island City, NY.

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.

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 Management

August 2013 – current, Chair of Electrical & Computer Engineering Dept. at DigiPen Institute of Technology, where I manage 5 faculty members and the BS in Computer Engineering Program.

August 2013 – current, Faculty Senate Steering Committee member at DigiPen Institute of Technology.

August 2013 – current, Lead for Assessment and ABET accreditation at DigiPen Institute of Technology.

August 2006 – current, Member of managing board for the World Wide Lightning Location Network (WWLLN).

Current Research

August 2006 – present, Magnetic and ionospheric anomalies precursory to large earthquakes. Analyzing geomagnetic and GPS derived total electron content (TEC) data to reexamine reports of magnetic and ionospheric precursors to large earthquakes, such as the Loma Prieta earthquake of 1989.

(Collaborators: Jeffrey Love & Malcolm Johnston, USGS, and Fabrizio Masci, Istituto Nazionale di Geofisica e Vulcanologia, Italy).

August 2002 – current, The World Wide Lightning Location Network (WWLLN). Fusing lightning and satellite microwave radiometer data to study tropical convection. (Collaborators: Natalia Solorzano, DigiPen and Robert Holzworth, University of Washington).

June 2001 – current, Stratospheric balloon systems to study thunderstorms and the global electrical circuit. Work on all aspects of these experiments: designing and building the sensor system, data acquisition, and data analysis. (Collaborators: Robert Holzworth and Michael McCarthy, University of Washington, Natalia Solorzano, DigiPen, Michael Taylor, Utah State University, and Steven Cummer, Duke University).

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

Current Teaching

August 2010 – current, Developing and teaching courses in Digital Electronics Design, Control Systems, Signal Processing, and Embedded Systems (Dept. of Electrical & Computer Engineering, DigiPen Institute of Technology).

Past Research

August 2008 – August 2010, Urban effects on lightning activity in Queens, NY. (Collaborator: Natalia Solorzano, DigiPen).

March 2006 – March 2009, 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).

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, 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).

Past Teaching Experience

September 2008 – August 2010, Developed and taught early college physics and atmospheric science courses and labs (Physics Dept., Bard High School Early College Queens).

September 2007 – June 2008, 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 were 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).

Computing Experience

Windows, Apple, and Linux operating systems. Programming in MATLAB / Simulink, FORTRAN, C/C++, Python, IDL, and Verilog. Embedded systems experience with PIC & ARM microcontrollers and Altera FPGAs.

Refereed Publications

PDFs are available at: http://earthweb.ess.washington.edu/jnt/JNThomas_Publications.html

Google scholar page (h-index=11; i10-index=11):

<http://scholar.google.com/citations?user=OUq6L2AAAAAJ&hl=en>

[25] Masci, F. and **Thomas, J. N.**, "Comment on "Ultra low frequency (ULF) electromagnetic anomalies associated with large earthquakes in Java Island, Indonesia by using wavelet transform and detrended fluctuation analysis", by Febriani et al. (2014)", *Nat. Hazards Earth Syst. Sci. Discuss.*, 3, 5665-5675, doi:10.5194/nhessd-3-5665-2015, 2015.

[24] Masci, F., and **J. N. Thomas**, "On the reliability of the Spatial Scintillation Index to detect earthquake precursors in the ionosphere", *Radio Sci.*, 50, 745-753, doi:10.1002/2015RS005734, 2015.

[23] **Thomas, J. N.**, C. Theriault, C. Duba, L. P. van Ginneken, N. J. Rivera, and B. M. Tugade, "A Project-based Computer Engineering Curriculum", 122nd ASEE Annual Conference, Seattle, WA, June 2015, Paper #11947.

[22] Masci, F., **J. N. Thomas**, F. Villani, J. A. Secan, and N. Rivera, "On the onset of ionospheric precursors 40 minutes before strong earthquakes", *J. Geophys. Res. Space Physics*, accepted article, doi: 10.1002/2014JA020822, 2015.

- [21] **Thomas, J. N.**, Masci, F., and Love, J. J.: On a report that the 2012 M 6.0 earthquake in Italy was predicted after seeing an unusual cloud formation, *Nat. Hazards Earth Syst. Sci.*, 15, 1061-1068, doi:10.5194/nhess-15-1061-2015, 2015.
- [20] Masci, F., and **J. N. Thomas**, “Comment on “Temporal and spatial precursors in ionospheric total electron content of the 16 October 1999 Mw 7.1 Hector Mine earthquake” by Su et al. (2013)”, *J. Geophys. Res. Space Physics*, 119, doi:10.1002/2014JA019896., 2014.
- [19] Masci, F. and **J. N. Thomas**, Review “On the relation between the seismic activity and the Hurst exponent of the geomagnetic field at the time of the 2000 Izu swarm”, *Nat. Hazards Earth Syst. Sci. Discuss.*, 1, 681-691, doi:10.5194/nhessd-1-681-2013, 2013.
- [18] Masci, F. and **J. N. Thomas**, “Comment on “Fractal analysis of ULF electromagnetic emissions in possible association with earthquakes in China” by Ida et al. (2012)”, *Nonlin. Processes Geophys.*, 20, 417-421, doi:10.5194/npg-20-417-2013, 2013.
- [17] Love, J. J., and **J. N. Thomas**, “Insignificant solar-terrestrial triggering of earthquakes”, *Geophys. Res. Lett.*, 40, 1165–1170, doi:10.1002/grl.50211, 2013.
- [16] **Thomas, J. N.**, J. J. Love, A. Komjathy, O. P. Verkhoglyadova, M. Butala, and N. Rivera, “On the reported ionospheric precursor of the 1999 Hector Mine, California earthquake”, *Geophys. Res. Lett.*, 39, L06302, doi:10.1029/2012GL051022, 2012.
- [15] Lay, E. H., C. J. Rodger, R. H. Holzworth, M. Cho, and **J. N. Thomas**, “Temporal-spatial modeling of electron density enhancement due to successive lightning strokes”, *J. Geophys. Res.*, doi:10.1029/2009JA014756, 2010.
- [14] Sao Sabbas, F. T., M. J. Taylor, P.-D. Pautet, M. Bailey, S. A. Cummer, R.R. Azambuja, J.P.C. Santiago, **J. N. Thomas**, O. Pinto, N. N. Solorzano, N. J. Schuch, S. R. Freitas, N.J. Ferreira, and J.C. Conforte, “Observations of Prolific Transient Luminous Event Production Above a Mesoscale Convective System in Argentina during the Sprite2006 Campaign in Brazil”, *J. Geophys. Res.*, doi:10.1029/2009JA014857, 2010.
- [13] **Thomas, J. N.**, N. N. Solorzano, S. A. Cummer, and R. H. Holzworth, “Polarity and energetics of inner core lightning in three intense North Atlantic hurricanes”, *J. Geophys. Res.*, 115, A00E15, doi:10.1029/2009JA014777, 2010.
- [12] **Thomas, J. N.**, J. J. Love, M. J. S. Johnston, and K. Yumoto, “On the reported magnetic precursor of the 1993 Guam earthquake”, *Geophys. Res. Lett.*, 36, L16301, doi:10.1029/2009GL039020, 2009.
- [11] **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*, vol. 173, pp.207-215, doi:10.1016/j.pepi.2008.11.014, 2009.
- [10] **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.*, vol. 91, pp. 153-160, doi:10.1016/j.atmosres.2008.03.026, 2009.
- [9] **Thomas, J. N.**, B. H. Barnum, E. H. 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. Geophys. Res.*, 113, A12306, doi:10.1029/2008JA013567, 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, pp. 117-128, 6 March 2007.
- [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 Submitted or in Preparation

Thomas, J. N., et al., "A Project-based 1st Year Electrical & Computer Engineering Course: Sensor and Telemetry Systems for High-altitude Balloons", *American Society for Engineering Education Annual Conference*, Seattle WA, 2015 (submitted October 2015).

Masci, F., and **J. N. Thomas**, "Are there new findings in the search for ULF magnetic precursors to earthquakes?", under review in *J. Geophys. Res. Space Physics* (October 2015).

Solorzano, N. N., **J. N. Thomas**, and R. H. Holzworth, "Lightning and satellite radiometrics at 37 to 183", to be submitted to *IEEE Transactions on Geoscience and Remote Sensing*.

Thomas, J. N., J. E. Huard, and F. Masci, "A statistical study of total electron content changes in the ionosphere prior to earthquake occurrences" to be submitted to *J. Geophys. Res.*

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.

Invited Presentations

INTEL International Science Fair in Phoenix, Symposium Presentation, 14 May 2013. Thomas, J. N., "Integrating Year-long Student Projects with a Rigorous Computer Engineering Curriculum".

NASA Marshall Space Flight Center / University of Alabama in Huntsville. MSFC/NSSTC Space Science Colloquium, 3 August 2009. Thomas, J. N. et al., "In Situ Measurements of Electrodynamics Above Thunderstorms: Implications for Transient Luminous Events".

AGU Chapman Conference on Effects of Thunderstorms and Lightning in the Upper Atmosphere. The Pennsylvania State University, University Park, PA, 10–14 May 2009. Thomas, J. N. et al., "In Situ Measurements of Electrodynamics Above Thunderstorms: Past Results and Future Directions".

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 Earthquake Hazards program, "Reports of Magnetic and Atmospheric Earthquake Precursors" (\$63,686; 2015 – 2016).

USGS Earthquake Hazards External Research Support Grant, "Ionospheric-Precursory Signals to Large Earthquakes", \$50,764 (July 2011 – June 2012).

Toshiba America Foundation, "Urban Effects on Lightning Activity in Queens, NY", with Natalia Solorzano, \$13,500 for 1 year (Nov. 2008 – Oct. 2009).

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.

Pending Support

NASA ROSES 2015 with Naval Research Laboratory, "A Statistical Study of Pre- and Co-seismic Changes in Passive Microwave Radiation Emissions and the Ionosphere Near Fault Regions", \$241,000 (2016-2019)

External Review and Outreach Activities

External reviewer for NSF proposals and for national funding sources in South Africa.

Referee for papers submitted to journals such as *Journal of Geophysical Research*, *Geophysical Research Letters*, *Radio Science*, *IEEE Transactions on Geoscience and Remote Sensing*, *Physics of the Earth and Planetary Interiors*, *Journal of Atmospheric and Oceanic Technology*, *Comptes Rendus Geoscience*, *Journal of Atmospheric and Solar-Terrestrial Physics*, *Journal of Electromagnetic Waves and Applications*, and *Natural Hazards and Earth System Sciences*.

Participating in k-12 curriculum development for DigiPen ProjectFun, 2011 – current.

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

- Phys.org, No link between solar activity and earthquakes, 2013.
- National Geographic, Earthquake prediction, 2013.
- BBC, Mesoscale thunderstorms over South America, 2011.
- Discovery News, Lightning in tropical cyclones, 2009.
- Oakland Tribune, Precursor to Loma Prieta earthquake, 2007.
- CNN South America, Sprites in Brazil, 2003.
- Evening Magazine Seattle, Ball lightning, 2002.

Professional Development Activities and Service Committees

INTEL International Science Fair Symposium in Phoenix, AZ in May 2013.

ABET Assessment Workshop in Portland, OR in April 2013.

Active member of IEEE (Seattle Executive Committee member & DigiPen Student Branch Advisor), American Geophysical Union, and American Meteorological Society.

DigiPen Institute of Technology Committees: Faculty Senate Steering Committee; Lead for CE Program ABET Accreditation; Curriculum Committee; Library Committee; Computing Committee, Institutional Advancement Committee; Admissions Committee; ECE and CS Hiring Committees; Faculty Promotion Committees.

Other efforts at DigiPen Institute of Technology:

- Participate in curriculum development for a new BS in Systems Engineering in Singapore to be offered jointly by DigiPen and the Singapore Institute of Technology.
- Work with Admissions and Outreach Dept. to better promote the Computer Engineering Program at events like the INTEL Science Faire, Maker Faire, and IEEE Meetings.
- Work with Library Director to order Computer Engineering related books.
- Work with Marketing Dept. to update Computer Engineering print and online material.
- Work with Financial Aid Dept. to develop a new Computer Engineering Scholarship.
- Reviewer for First Robotics Scholarships and Computer Engineering Scholarships.
- Serve as an advisor to the Sound Engineering Program on Digital Signal Processing and Physics Courses.
- Meet with representative from companies such as Microsoft, Amazon, UIEvolution, Intel, ARM, and Texas Instruments to establish a pipeline for student internships and collaborations.

Bard College (Queens, NYC campus) Committees: Hiring Committees; Executive Committee.