

Michael J. Peterson, Ph.D.

Curriculum Vitae, 02/20/17

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EDUCATION

2014/08

Ph.D. in Atmospheric Sciences

The University of Utah, Salt Lake City, UT

Dissertation title: *Variations of optical and radio lightning characteristics and the relationship between storm convective intensity and above-cloud electric fields*

2011/11

M.S. in Atmospheric Sciences

The University of Utah, Salt Lake City, UT

Thesis title: *Satellite and ground based observations of lightning flashes in the stratiform and anvil regions of convective systems*

2009/05

B.S. in Meteorology

Iowa State University, Ames, IA

PROFESSIONAL APPOINTMENTS

2016/08 –
present

University of Maryland Earth System Science Interdisciplinary Center

College Park, MD

Post-Doctoral Research Fellow

Used spaceborne Lightning Imaging Sensor (LIS) and ground-based Lightning Mapping Array (LMA) observations to document the morphologies, energetics, and evolutions of lightning flashes and then relate them to lightning physics and convective processes within the parent thunderstorm.

2014/08 –
2016/08

National Center for Atmospheric Research

Boulder, CO

Post-Doctoral Research Fellow

Developed a satellite algorithm that estimates Wilson currents from passive microwave observations. Used the algorithm to estimate the total source current for the Global Electric Circuit and examine its variations as part of the NSF Frontiers in Earth System Dynamics (FESD) Electrical Connections and Consequences within the Earth System (ECCWES) project.

2014/05 –
2014/08

The University of Utah

Salt Lake City, UT

Post-Doctoral Research Fellow

RESEARCH INTERESTS AND EXPERIENCE

Atmospheric electricity	satellite and ground-based lightning detection, lightning physics, the Global Electric Circuit
Remote sensing	precipitation measurement, storm reconnaissance, optical lightning detection, radar, passive microwave, visible / IR including TRMM, GPM, GOES, NASA ER-2, LMAs
Computational geoscience	geoinformatics, data analysis, high-performance computing, database, retrieval algorithm, scientific software and hardware development, Big Data solutions

PUBLICATIONS

- 2017 **Peterson, M. J.**, W. Deierling, C. Liu, D. Mach, C. Kalb, 2017: A TRMM/GPM Retrieval of the Total Mean Source Current for the Global Electric Circuit, *J. Geophys. Res.*, under review.
- Peterson, M. J.**, W. Deierling, C. Liu, D. Mach, C. Kalb, 2017: Performance Assessment of the Passive Microwave Electric Field Retrieval Algorithm with TRMM Satellite Observations. *J. Atmos. Oceanic Technol.*, under review.
- 2016 **Peterson, M. J.**, W. Deierling, C. Liu, D. Mach, C. Kalb, 2016: The Properties of Optical Lightning Flashes and the Clouds They Illuminate, *J. Geophys. Res.*, **122**, 116, 423-442.
- Kalb, C. P., W. D. Deierling, A. Baumgaertner, **M. J. Peterson**, C. Liu, and D. Mach, 2016: Parameterizing total storm conduction currents in the Community Earth System Model, *J. Geophys. Res.*, in press.
- 2015 **Peterson, M. J.**, C. Liu, D. Mach, W. Deierling, C. Kalb, 2015: A method of estimating electric fields above electrified clouds from passive microwave observations, *J. Atmos. Oceanic Technol.*, **32**, 8, 1429-1446.
- 2014 **Peterson, M. J.**, 2014: Variations of optical and radio lightning characteristics and the relationship between storm convective intensity and above-cloud electric fields, *Ph.D. dissertation*, 253 pages
- Garstang, M., R. E. Davis, K. Leggett, O. W. Frauenfeld, S. Greco, E. Zipser, and **M. Peterson**, 2014: Response of African elephants (*Loxodonta africana*) to seasonal changes in rainfall, *Pub. Lib. Sci. One*, in press
- 2013 **Peterson, M. J.** and C. Liu, 2013: Characteristics of Lightning Flashes with Exceptional Illuminated Areas, Durations, and Optical Powers and Surrounding Storm Properties in the Tropics and Inner Subtropics, *J. Geophys. Res. Atmos.*, **118**, 11,727-11,740, doi: 10.1002/jgrd.50715
- 2011 **Peterson, M. J.**, 2011: Satellite and ground based observations of lightning flashes in the stratiform and anvil regions of convective systems, *M.S. thesis*, 139 pages
- Peterson, M. J.** and C. Liu, 2011: Global statistics of lightning in anvil and stratiform regions over the tropics and subtropics observed by TRMM, *J. Geophys. Res. Atmos.*, **116**, D23, doi: 10.1029/2011JD015908

INSTITUTIONAL AND INVITED TALKS

- 2016 **Peterson, M. J.**, 2016: Orbital and ground-based perspectives on the characteristics of lightning flashes and thunderstorms. *Earth Networks*, 65 slides.
- Peterson, M. J.**, 2016: A TRMM/NLDN look at the properties of lightning flashes and thunderstorms. Vaisala, 54 slides.
- Peterson, M. J.**, 2016: Using TRMM/GPM to diagnose current sources for the Global Electric Circuit. *University of Utah Atmospheric Sciences Dep't.*, 72 slides.
- Peterson, M. J.**, 2016: Current contributions of electrified clouds to the Global Electric Circuit: a satellite based approach. *Naval Research Laboratory*, 70 slides.
- Peterson, M. J.**, 2016: Lightning, electrified clouds, and the Global Electric Circuit. *RAL Seminar Series*, 59 slides
- 2015 **Peterson, M. J.**, 2015: Lightning, thunderstorms, and the Global Electric Circuit. *CU Boulder ATOC*, 49 slides
- Peterson, M. J.**, W. Deierling, C. Liu, D. M. Mach, and T. Kalb, 2015: A TRMM and GPM Examination of Electrified Clouds and Implications for the temporal Variability of the Global Electric Circuit. *FESD Biannual Meeting*, 45 slides
- Peterson, M. J.**, 2015: An Interactive Data Analysis and Visualization Software for the Web Browser. *UCAR Software Engineering Assembly*, 43 slides
- Peterson, M. J.**, 2015: A Data Visualization and Analysis Software in “the Cloud.” *Ignite NCAR VII*, 20 slides
- Peterson, M. J.**, 2015: The Weather Archive. *CU Boulder ATOC*, 63 slides
- Peterson, M. J.**, 2015: The Weather Archive. *UNIDATA*, 22 slides
- 2014 **Peterson, M. J.**, C. Liu, D. M. Mach, W. Deierling, and T. Kalb, 2014: A Microwave Retrieval Algorithm of Above-Cloud Electric Fields. *FESD Biannual Meeting*, 32 slides

CONFERENCE PRESENTATIONS

- 2015 **Peterson, M. J.**, W. Deierling, C. Liu, D. M. Mach, and T. Kalb, 2015: On the Variations of Electric Fields, Lightning and Storm Properties. *AGU Fall Meeting 2015*, AE31C-0460, poster.
- 2014 **Peterson, M. J.**, W. Deierling, C. Liu, D. M. Mach, and T. Kalb, 2014: A Comparison of Satellite-Based Estimates of Global Electricity. *AGU Fall Meeting 2014*, AE13B-3363, poster.
- Peterson, M. J.**, C. Liu, D. M. Mach, W. Deierling, and T. Kalb, 2014: A microwave retrieval algorithm of above cloud electric fields. *XV International Conference on Atmospheric Electricity*, 12 pages.

- 2013 **Peterson, M. J.**, C. Liu, D. M. Mach, W. Deierling, and T. Kalb, 2013: Of Ice and Charging: A look at Thundercloud Electric Fields and Passive Microwave Observations. *AGU Fall Meeting 2013*, AE13B-0347, poster.
- Deierling, W., C. Kalb, D. Mach, C. Liu, and **M. Peterson**, 2013: Total storm currents in relation to storm type and lifecycle. *AGU Fall Meeting 2013*, AE23B-0427, poster.
- Kalb, C., W. Deierling, D. Mach, C. Liu, and **M. Peterson**, 2013: Total storm currents and their relationship to microphysical and dynamical cloud properties. *AGU Fall Meeting 2013*, AE23B-0421, poster.
- 2012 **Peterson, M. J.** and C. Liu, 2012: The Properties of Thunderstorms with Lightning Flashes Illuminating Large Areas. *AGU Fall Meeting 2012*, poster
- 2011 **Peterson, M. J.**, 2011, Satellite and ground based observations of lightning flashes in the stratiform and anvil regions of convective systems, *M.S. thesis defense*, 99 slides.
- Peterson, M. J.** and C. Liu, 2011: A TRMM survey of lightning flashes illuminating large areas. *AGU Fall Meeting 2011*, poster.
- Davis, R. E., M. Garstang, K. Leggett, E. Zipser, S. Greco, and **M. Peterson**, 2011: Weather and climate influences on the movement patterns of the African elephant (*Loxodonta africana*) and the role of infrasound. *19th International Congress of Biometeorology*.
- 2010 Liu, C., E. Zipser, H. Jiang, and **M. J. Peterson**, 2010: Improvements of University of Utah Precipitation Feature Database. *PMM Science Meeting 2010*, poster.
- Peterson, M. J.** and C. Liu, 2010: Stratiform and anvil lightning: a TRMM perspective. *AGU Fall Meeting 2010*, poster

AWARDS AND RECOGNITION

- 2015 **Vaisala Open Weather Data Challenge**
Finalist
- 2014 **National Science Foundation (NSF) Visualization Challenge**
Finalist

PROFESSIONAL SERVICE

- 2015 **NCAR Early Career Scientist Assembly (ECSA) Steering Committee**
Member
- High Altitude Observatory (HAO) Strategic Plan Committee**
Goal Team Leader

Reviewer for:

Journal of Geophysical Research
Bulletin of the American Meteorological Society
Atmospheric Research
Advances in Space Research

LABORATORY AND FIELD EXPERIENCE

- 2012 **CHUVA Sul Field Campaign**
 Santa Maria, Brazil
 Graduate student participant
- 2008 **USDA National Soil Tilth Lab**
 Ames, IA
 Undergraduate research assistant
- 2007 **Iowa State University Tornado and Microburst Simulator**
 Ames, IA
 Undergraduate research assistant

RELEVANT EXPERIENCE AND SKILLS

- 2015 **The Martian Environment Explorer (mars.wxarch.com)**
 Founder and lead developer
- Climate Change Knowledge Portal (wbcliamte.wxarch.com)**
 Co-founder and lead developer
- 2014 **The Weather Archive (www.WxArchive.com)**
 Founder and lead developer
- The Weather Forecaster (forecast.wxarch.com)**
 Founder and lead developer
- 2010 – **The TRMM Data Analysis Tool**
2014 *Developer*

Programming Experience

- | | | | |
|------------|--------------|------------------------|----------|
| - FORTRAN | - HTML | - UNIX shell scripting | - Python |
| - Perl | - JavaScript | - IDL | - Matlab |
| - Assembly | - PHP | - GRADS | |

Software Expertise

Mac OS	10.*
Windows	3.1, 95, 98, 2000, XP, Vista, 7, 8, 10
Linux	Ubuntu, RHEL, Fedora, Debian: GNOME, KDE, LXDE
Microsoft Office	Word, Excel, Access, PowerPoint, Publisher: 2003+
Adobe	Photoshop, Illustrator, Dreamweaver, After Effects: CS4
IDL	7, 8
Matlab	R2008b

Languages:

English - fluent
Spanish - conversational

AFFILIATIONS

2005 – **American Meteorological Society**
present *Member*

2009 – **American Geophysical Union**
present *Member*