

# Dr. John R. Leeman

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## Personal

Born on October 05, 1988.

United States Citizen.

## Education

PhD Geoscience, Penn State, 2017.

B.S. Geophysics, University of Oklahoma, 2012.

B.S. Meteorology, University of Oklahoma, 2012.

Minor Mathematics, University of Oklahoma, 2012.

## Experience

**January 2017 - Present** - Software Engineer, UCAR/Unidata

**July 2012 - July 2017** - Research Assistant, Chris Marone/Demian Saffer, Penn State Rock and Sediment Mechanics Laboratory

**2012 (Summer)** - Teaching Assistant for Geophysics Field Camp and Geophysics for Geologists

**2008 - 2012** - University of Oklahoma Undergraduate Research Assistant, Gas Hydrates Laboratory with Dr. Megan Elwood Madden

**2011 (Fall)** - Teaching Assistant for "Global Geophysics" Laboratory and developed associated assignments/lab content

**2011 (Summer)** - National Aeronautics and Space Administration (NASA) Summer Intern in Aerospace and Flight Mechanics Division

**2011 (Summer)** - Assistant, Managed and maintained geophysics instrumentation and equipment (valued at ~ \$500K) and set-up/administered a Linux-based computer network for field camp

**2011 (Spring)** - Teaching Assistant for "Introduction to Meteorology" Laboratory

**2009 - 2010 (Summers)** - Oak Ridge National Laboratory (ORNL) Summer Intern in Gas Hydrates

**2008 (Summer)** - National Oceanic and Atmospheric Administration (NOAA) Fisheries Volunteer

## Professional Qualifications

### *Professional Memberships*

**2009 - Present** - American Geophysical Union

**2009 - Present** - American Physical Society

**2017 - Present** - Seismological Society of America

### *Computer Skills*

Python programming including matplotlib, numpy, scipy and other modules

Version control and continuous integration

Certified LabView Developer

Linux use, setup, and administration

Instrument monitoring and control

Numerical Methods for evaluating and visualizing data

L<sup>A</sup>T<sub>E</sub>X Typesetting and Document Preparation

Adobe Creative Suite

Microcontroller Programming

KiCAD Schematic and PCB Software

Fusion 360 Solid CAD and CAM

## Publications

### *Journal Articles*

Kyungjae Im, Derek Elsworth, Chris Marone, and John Leeman. The impact of frictional healing on stick-slip recurrence interval and stress drop: Implications for earthquake scaling. *Journal of Geophysical Research: Solid Earth*, 2017.

A student's guide to python for physical modeling. *American Journal of Physics*, 85(5):399–399, 2017.

JR Leeman, RD Valdez, RB Alley, S Anandkrishnan, and DM Saffer. Mechanical and hydrologic properties of whillans ice stream till: Implications for basal strength and stick-slip failure. *Journal of Geophysical Research: Earth Surface*, 121(7):1295–1309, 2016.

JR Leeman, DM Saffer, MM Scuderi, and C Marone. Laboratory observations of slow earthquakes and the spectrum of tectonic fault slip modes. *Nature Communications*, 7, 2016.

John Leeman, Marco Maria Scuderi, Chris Marone, and Demian Saffer. Stiffness evolution of granular layers and the origin of repetitive, slow, stick-slip frictional sliding. *Granular Matter*, pages 1–11, May 2015.

- J. R. Leeman, M. M. Scuderi, C. Marone, D. M. Saffer, and T. Shinbrot. On the origin and evolution of electrical signals during frictional stick slip in sheared granular material. *J. Geophys. Res. Solid Earth*, 119(5):4253–4268, May 2014.
- T. A. Bonin, P. B. Chilson, B. S. Zielke, P. M. Klein, and J. R. Leeman. Development and comparisons of wind retrieval algorithms for small unmanned aerial systems. *Geoscientific Instrumentation, Methods and Data Systems Discussions*, 2(2):953–979, Dec 2012.
- J.R. Leeman, C.J. Rawn, S. Ulrich, M. Elwood Madden, and T.J. Phelps. Interpreting temperature - strain data from mesoscale clathrate experiments. *Computers & Geosciences*, 38(1):62–67, Jan 2012.
- C. J. Rawn, J. R. Leeman, S. M. Ulrich, J. E. Alford, T. J. Phelps, and M. E. Madden. Fiber optic sensing technology for detecting gas hydrate formation and decomposition. *Rev. Sci. Instrum.*, 82(2):024501, 2011.
- M.E. Elwood Madden, J.R. Leeman, M.J. Root, and S. Gainey. Reduced sulfur-carbon-water systems on mars may yield shallow methane hydrate reservoirs. *Planetary and Space Science*, 59(2-3):203–206, Feb 2011.
- John R. Leeman and Ernst D. Schmitter. Electric signals generated by tornados. *Atmospheric Research*, 92(2):277–279, Apr 2009.

### Conference Presentations/Posters

- Ryan M. May and J. R. Leeman. Growing the foundation for pangeo: Bringing together metpy and xarray. EarthCube All-hands Meeting, 2018. Poster.
- J. R. Leeman and Ryan M. May. The metpy roadmap: Replacing legacy meteorological tools. American Meteorological Society Annual Meeting, 2018. Poster.
- Ryan M. May and J. R. Leeman. Metpy advancement and community-driven development. American Meteorological Society Annual Meeting, 2018. Talk.
- Sean C. Arms, Ryan M. May, and J. R. Leeman. Siphon—simplifying data access and expanding data sources. American Meteorological Society Annual Meeting, 2018. Poster.
- Matthew B. Wilson, J. R. Leeman, and Ryan M. May. Bulk shear, supercell composite, precipitable water, and more: Exploring metpy’s new cape-abilities with an interactive sounding plotter. American Meteorological Society Annual Meeting, 2018. Poster.
- Tyler Wixtrom, R.M. May, J. R. Leeman, and K.H. Goebbert. Vertical interpolation in metpy: Sigma to isobaric to isentropic. American Meteorological Society Annual Meeting, 2018. Poster.
- J. R. Leeman and R. May. Meteorologists and their capes. SciPy Scientific Programming, 2017. Poster.
- J. R. Leeman and C. Ammon. Measuring the seismic and acoustic time of flight - lessons in earthquakes and thunder. American Geophysical Union Fall Meeting, 2016. Poster.
- J. R. Leeman, R.D. Valdez, R.B. Alley, S. Anandakrishnan, and D.M. Saffer. Poro-elastic properties of whillan’s ice stream till: Implications for basal stick-slip. American Geophysical Union Fall Meeting, 2016. Talk.
- J. R. Leeman, C. Marone, and D.M. Saffer. Controls on fault zone stability and the mechanics of slow earthquakes. Gordon Research Conference - Rock Deformation, 2016. Poster.
- J. R. Leeman, R. May, C. Marone, and D. Saffer. Modeling rate-and-state friction with python. SciPy Scientific Programming, 2016. Talk.

- J. R. Leeman, C. Marone, and D.M. Saffer. Laboratory observations of the spectrum of fault slip: Implications for slow earthquakes. European Geophysical Union Meeting, 2016. Poster.
- J. R. Leeman, D. Saffer, M. Scuderi, and C. Marone. Laboratory observations of slow earthquakes - insights on the mechanics of slow stick-slip. AGU Chapman Conference on the Slow Slip Phenomena, 2016. Poster.
- C. Marone, J. R. Leeman, M. Scuderi, D. Saffer, and C. Collettini. The mechanics of slow earthquakes and the spectrum of fault slip behaviors. AGU Chapman Conference on the Slow Slip Phenomena, 2016. Talk.
- D.M. Saffer, L.M. Wallace, H. Kitajima, M. Ikari, J.R. Leeman, C. Marone, and M. Scuderi. The hydrologic, metamorphic, and frictional habitat of shallow slow earthquakes. AGU Chapman Conference on the Slow Slip Phenomena, 2016. Talk.
- M.M. Scuderi, C. Marone, E. Tinti, L. Scognamiglio, J.R. Leeman, D.M. Saffer, G. Di Stefano, and C. Collettini. Seismic velocity changes across the transition from slow- to fast- frictional sliding in earthquake-like laboratory experiments. AGU Chapman Conference on the Slow Slip Phenomena, 2016. Poster.
- J. R. Leeman. Measuring gravitational tides cheaply with arduino. American Geophysical Union Fall Meeting, 2015. Talk.
- J. R. Leeman, D. Saffer, M. Scuderi, and C. Marone. Laboratory observations of the full spectrum of fault slip modes: Implications for the mechanics of slow earthquakes. American Geophysical Union Fall Meeting, 2015. Poster.
- J. R. Leeman, S. Dulin, B. Etherington, D. Fourman, S. Pestana, and C. West. Podcasting as a medium to share steam fields. American Geophysical Union Fall Meeting, 2015. Talk.
- C. Marone, J. R. Leeman, M. Scuderi, D. Saffer, and C. Collettini. The mechanics of transient fault slip and slow earthquakes. American Geophysical Union Fall Meeting, 2015. Talk.
- S. Dulin and J. Leeman. Podcasting as an outreach and teaching tool: Lessons learned from year one of don't panic geocast. Geological Society of America Meeting, 2015. Poster.
- D. Saffer, H. Kitajima, J.R. Leeman, M. Ikari, C. Marone, and M. Scuderi. In situ conditions and the mechanics of slow earthquakes along subduction megathrusts: Insights from laboratory experiments. GeOPRISMS 'Subduction Cycles and Deformation Theoretical and Experimental Institute', 2015.
- J. R. Leeman, R. May, C. Marone, and D. Saffer. rsfmodel - a frictional modeling tool for fault and laboratory data analysis. SciPy Scientific Programming, 2015. Poster.
- C. Marone, M. Scuderi, J. Leeman, D. Saffer, C. Collettini, and P. Johnson. Slow earthquakes and the mechanics of slow frictional stick-slip. European Geophysical Union Meeting, 2015. Talk.
- J. R. Leeman, D.M. Saffer, and C. Marone. Laboratory observations of the full spectrum of fault slip modes: implications for the mechanics of slow earthquakes. Seismology Student Workshop, 2015. Talk.
- J. R. Leeman, C. Ammon, and S. Anandkrishnan. Using low cost environmental sensors in geoscience education. American Geophysical Union Fall Meeting, 2014. Talk.
- J. R. Leeman, M. M. Scuderi, C. Marone, and D. M. Saffer. The role of stiffness in the dynamics of frictional stick-slip failure: Insights from laboratory experiments. American Geophysical Union Fall Meeting, 2014. Poster.

- P. Johnson, M.M. Scuderi, J. R. Leeman, J. Riviere, B. Ferdowski, J. Carmeliet, and C. Marone. Fault gouge velocity characteristics during slow-slip and stick-slip under laboratory conditions. American Geophysical Union Fall Meeting, 2014. Talk.
- P. Bhattacharya, A. Rubin, M.M. Scuderi, J.R. Leeman, K. Ryan, and C. Marone. The role of stressing rate in state evolution under rate-state friction. American Geophysical Union Fall Meeting, 2014. Poster.
- J. R. Leeman, M. M. Scuderi, C. Marone, and D. M. Saffer. Stiffness controls on the stability of frictional systems. Gordon Research Conference - Rock Deformation, 2014. Poster.
- J. R. Leeman. Investigating stiffness controls on earthquake behavior - an ideal environment for python workflows. SciPy Scientific Programming, 2014. Poster.
- J. R. Leeman, M. M. Scuderi, C. Marone, and D. M. Saffer. Electrical potentials observed during frictional stick-slip - a semiconductor mechanism. American Geophysical Union Fall Meeting, 2013. Talk.
- J. R. Leeman, M. M. Scuderi, C. Marone, and D. M. Saffer. Electrical anomalies observed during frictional stick-slip in granular materials. 40th Workshop of the International School of Geophysics: Properties and Processes of Crustal Fault Zones, 2013. Poster.
- J. R. Leeman. Electrical potentials during ice deformation: Theory and laboratory results. Midwest Glaciology Meeting, 2013. Talk.
- M.E. Elwood Madden, M. Root, S. Gainey, and J.R. Leeman. Gas clathrate hydrate thermodynamics and kinetics: limits on near-surface volatile fluxes for cold terrestrial planet systems through deep time. Goldschmidt Conference, 2012. Talk.
- J.R. Leeman, M.E. Elwood Madden, T.J. Phelps, and C.J. Rawn. Experimental results of hydrate reservoir destabilization through heating. American Geophysical Union Fall Meeting, 2011. Poster.
- B.W Umphlett, J.R. Leeman, and M. Morrissey. Detection of wildfires with artificial neural networks. American Geophysical Union Fall Meeting, 2011. Poster.
- J.R. Leeman and M.E. Elwood Madden. Rapid heat induced clathrate dissociation events - a planetary context. Lunar and Planetary Science Convention, 2011. Poster.
- S.R. Gainey, M.E. Elwood Madden, J.R. Leeman, and B.M. Guttery. Kinetics of methane hydrate formation & dissociation under mars relevant conditions. Lunar and Planetary Science Convention, 2011. Poster.
- J.R. Leeman, M.E. Elwood Madden, J.E. Alford, T.J. Phelps, and C.J. Rawn. Evaluation of heat induced methane release from methane hydrates. American Geophysical Union, 2010. Poster.
- J.R. Leeman and M.E. Elwood Madden. CO<sub>2</sub> clathrate formation and dissociation rates below 273k. Goldschmidt Conference, 2010. Poster.
- C.J. Rawn, J.R. Leeman, S.M. Ulrich, J.E. Alford, M.E Elwood Madden, and T.H. Phelps. Homogeneous and heterogeneous sediment experiments using fiber optic sensing technology for detecting gas hydrate formation. Goldschmidt Conference, 2010. Poster.
- J.R. Leeman, D.G. Blackburn, M.E. Elwood Madden, R. Ulrich, and V. Chevrier. Clathrate dissociation rates below the freezing point of water. Lunar and Planetary Science Convention, 2010. Poster.
- J.R. Leeman, M.E. Elwood Madden, J.E. Alford, T.J. Phelps, and C.J. Rawn. Meso-scale clathrate experiments: Effect of grain size on formation pathways. American Geophysical Union Fall Meeting, 2009. Talk.

C.J. Rawn, B.C. Chakoumakos, O. Garlea, J.R. Leeman, J.E. Alford, M.E. Elwood Madden, and T.J. Phelps. Neutron powder diffraction study of CO<sub>2</sub> hydrate as a function of pressure. American Geophysical Union Fall Meeting, 2009. Talk.

D.G. Blackburn, R. Ulrich, M.E. Elwood Madden, and J.R. Leeman. Experimental study of the kinetics of CO<sub>2</sub> hydrate dissociation under simulated martian conditions. Lunar and Planetary Science Convention, 2009. Poster.

M.R. Elwood Madden, J.R. Leeman, and B. Guttery. Methane hydrates: A source for slow methane release on Mars? Hydrates Meeting, 2009. Talk.

### *Other Works*

J. R. Leeman. The multi-rotor hobbyist - evaluating your drone needs. *Servo Magazine*, 2018.

J. R. Leeman. The multi-rotor hobbyist - drone delivery - part 2. *Servo Magazine*, 2018.

J. R. Leeman. The multi-rotor hobbyist - drone delivery - part 1. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - build a drone crash beacon. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - the lynxmotion quadrino nano flight controller. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - scanse sweep 3d scanner review. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - taking the earth's temperature with aerial infrared mapping. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - esc basics. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - brushless motor basics. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - photogrammetry with opendronemap - part 2. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - photogrammetry with opendronemap - part 1. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - hacking the cheerson CX-10. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - fat shark teleporter v5 review. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - adding telemetry to the elev-8. *Servo Magazine*, 2017.

J. R. Leeman. The multi-rotor hobbyist - understanding and balancing propellers. *Servo Magazine*, 2016.

J. R. Leeman. The multi-rotor hobbyist - flyfi: Weather data telemetry. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - part 6: Review of parallax's elev8 v3. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - gps guided flights. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - part 4 : Training for flight. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - part 3 : Drone electronics and flight controller. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - part 2 : Building an airframe. *Servo Magazine*, 2016.

J. R. Leeman. Build your own drone - part 1 : Getting started. *Servo Magazine*, 2016.

J. R. Leeman. Pi booth - a raspberry pi based photobooth. *Nuts and Volts*, 2016.

J. R. Leeman. Morpheus data parsing and plotting: A new approach to large data set analysis with open source tools. *NASA Technical Paper*, 2011.

J. R. Leeman, B.W. Umphlett, and M. Morrissey. Detection of wildfires from advanced very high resolution radiometer (AVHRR) data with artificial neural networks. *University of Oklahoma School of Meteorology Capstone Papers*, 2011.

J.R. Leeman and M.E. Elwood Madden. Collaborative gas hydrates research at OU. *Earth Scientist*, 2010.

J.R. Leeman and K. Keranen. Locating a historic norman gravesite with geophysical methods. *Earth Scientist*, 2010.

## Grants/Fellowships

**2017** - National Science Foundation, "SI2-SSE: MetPy - A Python GEMPAK Replacement for Meteorological Data Analysis" (\$500k)

**2016** - Offered GEOPRISMS/National Science Foundation, "Understanding Fault Zone Stiffness Through Pre-Slow-Slip Seismic Velocity Changes" (\$213k)

**2015** - Hess Corporation Exploration & Production Technology Scholarship, "A Laboratory Study of Slow Slip Earthquakes with Polarimetry and Audio Emission" (\$3.8k)

**2015** - Shell Geosciences Energy Research Facilitation Award, "Building a Direct Shear Device to Study Complex Loading and Healing of Mudstones" (\$2k)

**2014** - Hess Corporation Exploration & Production Technology Scholarship, "3D Printing to Enhance Rock and Sediment Mechanics Studies" (\$2k)

**2014** - Shell Geosciences Energy Research Facilities Award, "Evolution of Porosity, Permeability, and Acoustic Velocity with Load Cycling in Mudstone" (\$2k)

**2013** - Charles E. Knopf Sr. Memorial Scholarship Award, "Inversion of Rock Frictional Parameters with Evolutionary Algorithms and the Influence of Dynamic Apparatus Stiffness" (\$3.2k)

**2013** - Shell Geosciences Energy Research Facilities Award, "Electrical Resistivity Measurements in the Laboratory - Comparison to Borehole Readings" (\$2k)

**2013** - National Science Foundation Graduate Fellowship (Approx. \$110k)

**2013** - Offered National Defense Science & Engineering Graduate Fellowship

**2012** - GDL Foundation Fellowship, "Evaluation of Fluid/Core Electrical Conductivity During Deformation as a Proxy for Porosity and Borehole Logging Data" (\$3k)

**2012** - University Graduate Fellowship Penn State

## Awards

- 2016 - Penn State Graduate Exhibition - 1st Place in Physical Sciences and Mathematics
- 2015 - Outstanding Student Paper - AGU Fall Meeting
- 2015 - Millennium Cafe Poster Competition - 3rd Place
- 2015 - Peter Deines Lectureship
- 2012 - Honorable Mention - 5th Annual GSA Photography Contest
- 2012 - Thomas Julian Lockhart Scholarship in Meteorological Measurements and Observing Systems - University of Oklahoma School of Meteorology
- 2011 - Outstanding Student Paper - AGU Fall Meeting
- 2011 - 3rd Place Outstanding Senior - University of Oklahoma College of Earth and Energy
- 2011 - Alan Witten Scholarship & Outstanding Senior Award - University of Oklahoma School of Geology and Geophysics

## Service

- 2017 - Teach four Python workshops
- 2017 - Equipment proposal review panel UCAR/Unidata
- 2016 - Chair AGU Fall Meeting Session "Sympathy for the Data: Novel Approaches to the Art of Data Visualization"
- 2014 - 2015 - Judge Undergraduate Exhibition Poster Session (Engineering)
- 2014 - 2015 - Chair AGU Fall Meeting Education Session "Teaching and Career Challenges in Geoscience"
- 2014 - 2017 - Penn State College of Earth and Mineral Science Academic Integrity Committee,
- 2014 - 2016 - Penn State Department of Geoscience Colloquium Committee
- 2013 - 2017 - Co-Found Geoscience Computer User's Group
- 2012 - 2017 - Chair Penn State Department of Geoscience Computer Committee

## Outreach

- 2015 - AfricaArray NSF REU Laboratory Tour and Demonstrations
- 2015 - 2016 - Demonstrations and Outreach at State College Easterly Elementary Science Fair
- 2012 - 2016 - Shake, Rattle, Rocks! Laboratory Tour and Demonstrations
- 2012 - 2015 - Spend a Summer Day Laboratory Tour and Demonstrations