

Dr. Matthew A. Siegler

Planetary Science Institute and Southern Methodist University
msiegler@psi.edu, msiegler@smu.edu (626) 616-5276

EDUCATION

UNIVERSITY OF CALIFORNIA, Los Angeles, CA, 2006-2012:

Ph.D. in Geophysics and Space Physics (awarded Dec 13, 2011) Advisor: Dr. David A. Paige
Dissertation title: “Evolution of Temperature Driven Stability of Ice on the Moon”

CORNELL UNIVERSITY, Ithaca, NY, 2000-2003

B.A., Double major Physics (astronomy concentration) and Film (production)

RELEVANT RESEARCH EXPERIENCE: SUMMARY

PLANETARY SCIENCE INSTITUTE (2014-Present) Associate Research Scientist

- Lunar Reconnaissance Orbiter Diviner Co-Investigator (Ice stability, Heat Flow, Thermal Properties of Lunar Regolith and Crust, Laboratory Thermal Properties Investigation)
- Vortices (APL SSERVI node) team member (Thermal Modeling and Ice Stability)
- InSight team member (Lander and Crustal-scale subsurface thermal models)
- Lunar Heat Flow Experiment re-Analysis (SSW 2016, PI)
- Measurements of Lunar Subsurface Temperatures with VLA and Arecibo (SSO 2016, PI)
- Low Temperature Lab Measurements of Apollo Regolith (SSW 2017, Co-I/Science PI)
- Long-Term Ice Stability Due to Polar Wander (SSW 2016, Co-I)
- Effect of temperatures on Lunar Argon (SSW 2016, Co-I)
- Chang'E Microwave Radiometer Studies (Co-I)
- Lunar Resource Prospector Thermal Modeling

SOUTHERN METHODIST UNIVERSITY (2014-Present) Research Associate Professor

- Physical home for above research and Professor Geo-1307 “The Solar System”

ADVANCED SEISMIC INSTRUMENTATION AND RESEARCH (2016-Present)

- Lunar Borehole Seismometer Project (Science PI)

NASA/CALTECH- JET PROPULSION LABORATORY (2013-2015, still current Affiliate)

- Staff Research Scientist, Geophysics & Planetary Geosciences
- Collaborator on InSight HP3 heat flow investigation, Lander thermal modeling.
- Lunar, Mars, asteroid thermal and volatile mission analysis and modeling.
- Beginning as Co-Investigator on Lunar Reconnaissance Orbiter Diviner Lunar Radiometer
- Studies comparing Lunar and Mercurian ice deposits

NASA/CALTECH- JET PROPULSION LABORATORY (2012-2013) Advisor: Dr. Suzanne Smrekar

- Caltech Postdoctoral Scholar, Geophysics & Planetary Geosciences
- Heat Flow modeling of the Moon and Mars
- Diviner Lunar Radiometer Team member, primarily polar observations (Heat Flow and low temperature regolith thermal properties)
- Mercury ice stability modeling and measurements from MESSENGER (With D. Paige)
- Long term ice stability on Mercury and orbital evolution
- Study of Chang'e-1 Microwave radiometer for potential subsurface lunar analysis

UNIVERSITY OF CALIFORNIA, LOS ANGELES (2006-2012) Advisor: Dr. David Paige

- Diviner Lunar Radiometer Team member, specializing in surface and near surface temperature modeling (Mentors: Dr. D. Paige-UCLA, Dr. A. Vasavada-JPL).
- Orbital evolution of the Lunar spin axis (Mentor: Dr. B. Bills- JPL).
- Reanalysis of the Apollo Lunar heat flow experiments (Mentor: Dr. S. Keihm- JPL)
- Laboratory measurements of thermal properties of icy Martian regolith analogs (Mentors: Dr. O. Aharonson, Caltech and Dr. N. Schorghofer, U. Hawaii).

- Spatial distribution of past lunar ice deposition (Mentors: Dr. Paige, Dr. B.Bills, R. Elphic).
 - Heat Flow from the Lunar Interior as observed by Diviner (with Dr. Paige).
- CALIFORNIA INSTITUTE OF TECHNOLOGY (2004-2011) Advisor: Dr. Oded Aharonson
- Laboratory measurements of thermal and diffusive properties of icy Martian regolith (with Dr. N. Schorghofer- U. Hawaii, Dr. M. Choukroun, Dr. T. Hudson-JPL).
 - Cryobot design and construction (with Dr. M. Hecht- JPL).
 - Phoenix Mars lander Thermal and Electrical Conductivity Probe testing (with Dr. M.Foote - JPL).
- UNIVERSITY OF ZURICH, Zurich, Switzerland (2003-2004) Advisor: Dr. Frank Lerhner
- Thermal and radiation design and assembly of the silicon vertex tracker LHCb at CERN.
- CORNELL UNIVERSITY (1999-2003) Advisors: Dr. Steven Squyres, Dr. James Bell, Dr. Peter Thomas
- Student assistant Mars Exploration Rover design and construction, MER Instrument calibration studies, MER Landing site selection, Martian polar ice cap stratigraphy.
- FERMI NATIONAL ACCELERATOR LAB (Summer 2003), Advisor: Dr. Charles Newsom
- Beam line testing of BTEV silicon tracker detectors.
- UNIVERSITY OF ZURICH, Zurich, Switzerland (Summer 2002), Advisor: Dr. Frank Lerhner
- LHCb detector and CERN thermal design studies.
- FERMI NATIONAL ACCELERATOR LAB (Summer 2001), Advisors: Dr. Simon Kwan
- BTEV silicon detector thermal and electrical design.
- FERMI NATIONAL ACCELERATOR LAB (Summer 2000), Advisor: Greg Sellberg, Eric Ramberg
- Silicon detector testing and prototyping for D0 and BTEV.

PEER-REVIEWED PUBLICATIONS, H-index:12 as of 9/2017

16. Plesa, A. C., Grott, M., Lemmon, M. T., Müller, N., Piqueux, S., **Siegler, M. A.**, Smrekar, S.E., Spohn, T. (2016). Interannual perturbations of the Martian surface heat flow by atmospheric dust opacity variations. *JGR: Planets*, 121(10), 2166-2175.
15. **Siegler, M.A.**, Smrekar, S.E. Piqueux, S., Müller, N., Grott M. (2017) Three-Dimensional Thermal Modeling for the 2016 InSight Mission *Space Science Reviews- InSight Special Issue*
14. **Siegler, M.A.**, Miller, R., Keane, J, Laneuville, M., Paige, D., Matsuyama, I., Crotts, A., Poston, M. (2016) Lunar True Polar Wander Inferred from Polar Hydrogen, *Nature* Vol 531. 480-484.
13. Johnson, C. L., Phillips, R. J., Purucker, ... **Siegler M.A.**... Solomon S.C. (2015) Low-altitude magnetic field measurements by MESSENGER reveal Mercury's ancient crustal field *Science* Vol. 348
12. **Siegler M.A.**, Paige, D.A., Williams, J.P., Bills, B.G., (2015) Evolution of Lunar Polar Ice Stability, *Icarus* Special Issue on Lunar Volatiles- Volume 255, 78–87
11. Hayne, A Hendrix, E Sefton-Nash, **Siegler, M.A.**,... (2015) Evidence for exposed water ice in the Moon's south polar regions from LRO UV albedo and temperature measurements. *Icarus* 255-58
10. Hurley, D. M., Sarantos, M., Grava, C., Williams, J. P., Retherford, K. D., **Siegler, M.A.**, ... (2015). An analytic function of lunar surface temperature for exospheric modeling. *Icarus* 255
9. Gong, X., Paige, D. A., **Siegler, M. A.**, & Jin, Y. Q. (2015). Inversion of Dielectric Properties of the Lunar Regolith Media With Temperature Profiles Using Chang'e Microwave Radiometer Observations. *Geoscience and Remote Sensing Letters, IEEE*, 12(2), 384-388.
8. **Siegler, M.A.**; Smrekar, S. (2014) Lunar Heat Flow: Regional Prospective of the Apollo Landing sites, *JGR Planets* [Volume 119, Issue 1](#), DOI: 10.1002/2013JE004453
7. **Siegler, M. A.**; Bills, B. G.; Paige, D. A. (2013a) Long term climate variability of Mercury's Poles *JGR Planets*, Vol. 118, 1–8, doi:10.1002/jgre.20070
6. Paige, D.A., **Siegler, M.A.**, Harmon, J.K., Neumann, G.A. , Mazarico, E.M., Smith, D.E., Zuber, M.T., Harju, E., Delitsky, M.L., and Solomon, S.C. (2013) Thermal stability of volatiles in the north polar region of Mercury- *Science*, doi 10.1126/science.1231106
5. Vasavada, A. R., Bandfield, J. L., Greenhagen, B. T., Hayne, P. O., **Siegler, M. A.**, Williams, J. P., & Paige, D. A. (2012). Lunar equatorial surface temperatures and regolith properties from the Diviner Lunar Radiometer Experiment. *JGR Planets*, 117(E12).
4. **Siegler M.A.**, Aharonson O., Choukroun M., Hudson T., Schorghofer N., Xu S. (2012) Measurements of

- thermal properties of icy Mars regolith analogs *JGR Planets*, doi:10.1029/2011JE003938
3. **Siegler M.A.**, Bills B.G., Paige D.A. (2011) Effects of orbital evolution on lunar ice stability, *JGR Planets* VOL. 116, doi:10.1029/2010JE003652
 2. Paige D.A., **Siegler M.A.**, Zhang J.A., Hayne P.O., Diviner Team (2010) Diviner Observations of Cold Traps in the Lunar South Polar Region: Spatial Distribution and Temperature, *Science*
 1. Hayne, P. O., Greenhagen, B. T., Foote, M. C., **Siegler, M. A.**, Vasavada, A. R., & Paige, D. A. (2010). Diviner lunar radiometer observations of the LCROSS impact. *Science*

CONFERENCE ABSTRACTS (Recent, 1st Author Only):

- Siegler M. A. * Feng J. Microwave Remote Sensing of Lunar Subsurface Temperatures: Reconciling Chang'e Microwave radiometer and LRO Diviner, #1705, LPSC meeting, Woodlands, TX
- Siegler, M.A., Miller, R., Keane, J, Laneuville, M., Paige, D., Matsuyama, I., Crotts, A., Poston, M. (2016) Lunar True Polar Wander Inferred from Polar Hydrogen, NASA ESF, Ames
- Siegler, M.A., Zhong, F, Woods-Robinson, R., Carey, E., Paige, D. (2016) Thermal Conductivity of Cryogenic Regolith, LPSC 47
- Siegler, M.A., Keane, J, Laneuville, M., Chen, Y. Economos, R. (2016) Do Lunar Polar Volatiles Record the Geophysical Evolution of the Moon?, LPSC 47
- Siegler, M.A., Miller, R., Keane, J, Laneuville, M., Paige, D., Matsuyama, I., Crotts, A., Poston, M. (2015) Hidden in the Neutrons: Physical Evidence for Lunar True Polar Wander, Brown-Vernadsky Microsymposium, LPSC Woodlands, Texas
- Siegler, M.A., Smrekar, S.E. Piqueux, S., Müller, N., Grott M. (2015) Three-Dimensional Thermal Modeling for the 2016 InSight Mission, LPSC, Woodlands, Texas
- Siegler, M. A.; Lucey, P., Neumann, G., Hayne, P., Paige, D.A.; Greenhagen, B. (2014) *Evidence for Surface Volatiles on the Moon and Mercury: A Planetary Comparison*. LEAG meeting
- Siegler, M. A.; Paige, D.A.; Williams, J-P. (2014) Evolution of Lunar Polar Ice Stability, NASA SSERVI Forum, NASA Ames Research Center
- Siegler, M.A., Smrekar, S.E. Piqueux, S., Müller, N., Grott M. (2014) Three-Dimensional Thermal Modeling for the 2016 InSight Mission, 8th International Mars Conference, Pasadena, CA
- Siegler, M.A.; Smrekar, S.E. (2014) Lunar heat flow: Regional prospective of the Apollo landing LPSC XLV, The Woodlands, Texas
- Siegler, M.A.; Smrekar, S.E.; Paige, D.A.; Williams, J-P. (2013) 3D thermal modeling for planetary heat flow measurements, American Geophysical Union, Fall Meeting 2013.
- Siegler, M.A.; Smrekar, S.E.; Paige, D.A.; Williams, J-P. (2012) Lunar Heat Flow: A Global Prospective, American Geophysical Union, Fall Meeting 2012, abstract # P52A-08.
- Siegler, M. A.; Paige, D.A.; Williams, J-P.; Smrekar, S. (2012) The lowest temperatures on the Moon: What can we learn?, NASA Lunar Science Institute Forum, NASA Ames Research Center
- Siegler, M. A.; Bills, B. G.; Paige, D. A. (2012) Spatio-Temporal Evolution of Lunar Polar Cold Traps, LPSC XLIII, The Woodlands, Texas [#2376]
- Siegler, M. A.; Bills, B. G.; Paige, D. A. (2011) Lunar Polar Ice and the obliquity history of the Moon, DPS-EPSC, Nantes France
- Siegler M.A., Aharonson, T., Schorghofer N., Xu S. (2011) Laboratory Measurements of Thermal Properties of Icy Regolith Analogs, DPS-EPSC, Nantes France
- Siegler, M. A.; Bills, B. G.; Paige, D. A. (2011) Lunar Polar Ice and the obliquity history of the Moon, NASA Lunar Science Institute Forum, NASA Ames Research Center
- Siegler M.A., Aharonson, T., Schorghofer N., Xu S. (2011) Laboratory Measurements of Thermal Properties of Martian Permafrost Analogs, LPSC XLII, The Woodlands, Texas

TEACHING AND OUTREACH EXPERIENCE

- Postdoctoral Advisor for Jamie Molaro, PSI, based at JPL, 2017-2018
- Postdoctoral Advisor for Jianqing Feng, CSC, based at SMU 2016, returning PSI 2018
- SMU Professor for “The Solar System”, GEOL-1307, Sophomore-level course, Fall 2016, 2017
- UT Dallas Professor for “Our Nearest Neighbors”, Planets Sophomore-level course, Spring 2017

- Planetary Society “Planetary Report” Article: Icy Mysteries of Mercury and the Moon, Sept 2016
- COSMOS: A SPACETIME ODYSSEY (2012-2014) Science Adviser- Emmy winning sequel to 1980 Sagan work created by Ann Druyan, host Neil deGrasse Tyson. I served as Science Advisor (the main active research scientist on project), review scripts for scientific accuracy, interface between writers and science community, aid if accuracy of special effects and location filming.
- California Institute of Technology Guest Lecture, Remote Sensing: GE157 for Prof. B. Ehlmann
- PHDTV, Los Angeles, CA (2012-Present), (<https://www.youtube.com/user/phdcomics>) Online PhDetours documentary series with Dr. Jorge Cham, creator of PHD Comics, ~1M views. Producer/Director/Camera (arrange interviewees, logistics, organize content, supervise editing)
- GRIFFITH OBSERVATORY, Los Angeles, CA (2006-2014), Museum Tour Guide
- UNIVERSITY OF CALIFORNIA, Los Angeles, CA (2007), Teaching Assistant for ESS 9, Introduction to the Solar System, Prof. Jean-Luc Margot.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, CA (2003) Caltech Classroom Connection Mentor, (2003-2012) Mars Icelab, leading summer students and lab assistants.
- ITHACA SCIENCENTER, Ithaca, NY (1999-2003), Volunteer Museum Guide
- CORNELL UNIVERSITY, Ithaca, NY (1999-2003), Mars Exploration Rover web site Q&A, Built Smithsonian museum model and lecturers, Physics Society afterschool and lecture series.

INVITED TALKS

- Baylor University - Department seminar, Oct 2017
- UT Dallas - Department seminar, Feb 2017
- Southern Methodist University, Dallas, TX – Department seminar, Sept 2016
- Georgia Tech, Atlanta, GA – Department seminar, March 2016
- University of California, Los Angeles, CA - Department seminar, Nov 2015
- University of Texas at Austin, Institute for Geophysics, TX– Department seminar, Sept 2015

AWARDS AND HONORS

- NASA Planetary Early Career Fellowship (with pending \$100K start up if I obtain a tenure track position), July 2016 – SSW Caucus
- Upcoming book- New Views on the Moon II: Co-lead on Volatiles chapter
- Co-Editor on upcoming Elsevier “Comparative Planetology” series
- Icarus, Special Issue on Lunar Volatiles Guest Editor 2015
- LRO Diviner Co-Investigator status 2014
- Early Career Hire Awardee (~25% Staff Scientist salary for 1 year) Jet Propulsion Laboratory
- Lunar Reconnaissance Orbiter Group Achievement Award (2011-14) Diviner Lunar Radiometer