Sean Wahl — Curriculum Vitae

University of California Berkeley
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Education

University of California, Berkeley, CA — August 2011 – May 2017

Ph.D., Earth and Planetary Science (EPS) Department
Designated Emphasis in Computational Science and Engineering
GPA: 3.966

Massachusetts Institute of Technology, Cambridge, MA — August 2007 – May 2011

B.S. Earth, Atmospheric and Planetary Science and Physics (dual major)
GPA: 4.8 (on 5.0 scale)

Highlights

Skills

Python, C++, FORTRAN, statistical analysis, data visualization, parallel computing (openMP), technical writing, LaTeX, object-oriented programing, machine learning (scikit-learn), image processing, GIS, shell scripting, Git, unit-testing, GNU Make, SQL

Programming

- Designed algorithms for and developed a software package to calculate self-consistent gravitational fields for fluid planets in *C++* and *Fortran*; plan to distribute to the planetary science community.
- Modified and utilized code on *massively parallel* machines to perform novel types of first-principles quantum chemistry simulations.
- Implemented system for storing and analyzing simulation results using *Python* and statistical mechanics methods.
- Performed a statistical study of the relation between social media and billboard success as part of the 2015 *CDIPS* Data Science Workshop at UC Berkeley.

Project Design

- Collaborated with the science team for *NASA*'s *JUNO* spacecraft mission. Developed a computational framework and methods for analyzing gravitational data and comparing to state-of-the-art models of planet interiors.
- Designed and carried out research projects applying first-principles quantum chemistry techniques to outstanding problems in planetary science. Co-authored grant proposals to the *NSF* and *NASA*. Presented results at internationally recognized conferences and in peer-reviewed journal articles, including 5 first author publications.

Leadership

Co-led a project with a multi-disciplinary team of young scientists as part of the *Cooperative Institute for Dynamic Earth Research* 2014 Summer Program.

Mentored visiting scholar from Japan. Aided him in designing a research project based around the resources and knowledge available through my research group at UC Berkeley

Mentored a visiting undergraduate student from Caltech. Aided him in designing a research project based around the resources and knowledge available through my research group at UC Berkeley

Developed tutorials on scientific computing, data analysis and visualization in *Python* for fellow researchers as part of the Berkeley Chapter of *The Hacker Within*.

Developed class materials for programing in *Python* for *EPS 109: Computer Simulations in Earth and Planetary Science*

Led review sessions and developed class material as a graduate teaching assistant for *EPS 100A: Minerals Their Constitution and Origin.*

Volunteered as part of the *Bay Area Scientists in Schools* developing material to help bay area middle school students understand geological processes going on beneath their feet.

Participated in research group, including aiding in the research of undergraduate and new graduate students.

Research Experience

Post-doctoral Researcher in Planetary Science and Computational Condensed Matter Physics, Department of Earth and Planetary Science, UC Berkeley	July 2017 – present
Graduate Student Researcher in Planetary Science and Computational Condensed Matter Physics, Department of Earth and Planetary Science, UC Berkeley	2011 – May 2017
User, NASA Advanced Supercomputing (NAS) Department	2012 – present
Cooperative Institute for Dynamic Earth Research (CIDER) Summer Program	2014
Undergraduate Researcher in Planetary Science, Department of Earth, Atmospheric & Planetary Science, MIT	2010 – 2011
MIT Department Earth, Atmospheric & Planetary Science Geology Field Camp	2010
Summer Undergraduate Research Fellow, Caltech	2008 and 2009
Undergraduate Research Assistant in Experimental Petrology, Department of Earth, Atmospheric & Planetary Science, MIT	2009
Undergraduate Research Assistant in Paleomagnetism, Department of Earth, Atmospheric & Planetary Science, MIT	2008

Awards and Honors

Berkeley Graduate Research Fellowship, EPS Department, UC Berkeley	2011
Christopher Goetze Prize for Undergraduate Research, MIT	2011
Summer Undergraduate Research Fellowship, Caltech	2008 and 2009

Peer-Reviewed Publications

14. **SM Wahl**, M Parisi, WM Folkner, WB Hubbard, B Militzer, *Equilibrium Tidal Response of Jupiter: Detectability by Juno*, *Astrophysical Journal*, 891, 1, 2020.
13. B. Militzer, **SM Wahl**, WB Hubbard, *Models of Saturn's Interior Constructed with an Accelerated Concentric Maclaurin Spheroid Method*, *Astrophysical Journal*, 879 78, 2019.
12. L Iess, B Militzer, Y Kaspi, P Nicholson, D Durante, P Racioppa, A Anabtawi, E Galanti, W Hubbard, MJ Mariani, P Tortora, **SM Wahl**, M Zannoni, *Measurement and implications of Saturn's gravity field and ring mass*, *Science*, 2019.
11. L Iess, B Militzer, Y Kaspi, P Nicholson, D Durante, P Racioppa, A Anabtawi, E Galanti, W Hubbard, MJ Mariani, P Tortora, **SM Wahl**, M Zannoni, *Measurement and implications of Saturn's gravity field and ring mass***,** *Science,* 2018.
10. T Guillot, Y Miguel, B Militzer, WB Hubbard, Y Kaspi, E Galanti, H Cao, R Helled, **SM Wahl**, L Iess, WM Folkner, DJ Stevenson, JI Lunine, DR Reese, A Biekman, M Parisi, D Durante, JEP Connerney, SM Levin, SJ Bolton, A Suppression of Differential Rotation in Jupiter's Deep interior*, Nature,* 555, 227–230, 2018.
9. Y Kaspi, E Galanti, WB Hubbard, DJ Stevenson, SJ Bolton, L Iess, T Guillot, J Bloxham, JEP Connerney, H Cao, D Durante, WM Folkner, R Helled, AP Ingersoll, SM Levin, JI Lunine, Y Miguel, B Militzer, M Parisi, and **SM Wahl**, Jupiter's atmospheric jet streams extend thousands of kilometres deep*, Nature,* 555, 223–226 2018.
8. L Iess, WM. Folkner, D Durante, M Parisi, Y Kaspi, E Galanti, T Guillot, WB Hubbard, DJ Stevenson, JD Anderson, DR Buccino, L Gomez Casajus, A Milani, R Park, P Racioppa, D Serra, P Tortora, M Zannoni, H Cao, R Helled, JI Lunine, Y Miguel, B Militzer, **SM Wahl**, JEP Connerney, SM Levin SJ Bolton. Measurement of Jupiter's asymmetric gravity field. *Nature*, *555*(7695), 220–222, 2018.
7. **SM Wahl**, W Hubbard, B Militzer, T Guillot, Y Miguel, N Movshovitz, Y Kaspi, R Helled, D Reese, Eli Galanti, S Levin, J Connerney, S Bolton, Comparing Jupiter Interior Structure Models to Juno Gravity Measurements and the Role of a Dilute Core, *Geophys. Res. Lett.,* , 44, 4649–4659, 2017.
6. Kaspi, Y., T Guillot ,E Galanti, Y Miguel, R Helled, WB Hubbard, B Militzer**, SM Wahl**, S Levin, JEP Connerney, SJ Bolton, The effect of differential rotation on Jupiter's low-degree even gravity moments, *Geophys. Res. Lett*., 44, 5960–5968, 2017.
5. **SM Wahl**, W Hubbard, B Militzer, Tidal Response of Preliminary Jupiter Model, *ApJ,* 831 (1), 14*, 2016.*
4. **SM Wahl**, W Hubbard, B Militzer, The Concentric Maclaurin Spheroid method with tides and a rotational enhancement of Saturn's tidal response, *Icarus*, 282,183-194, 2016.
3. Militzer, B., F. Soubiran, **S.M. Wahl**, and W. Hubbard, Understanding Jupiter's interior, *J. Geophys. Res. Planets*, 121, 2016.
2. **SM Wahl**, B Militzer, High-temperature miscibility of iron and rock during terrestrial planet formation, *Earth and Planetary Science Letters*, 410, 25–33, 2015.
1. **SM Wahl**, HF Wilson, B Militzer, Solubility of iron in metallic hydrogen and stability of dense cores in giant planets, *The Astrophysical Journal* 773 (2), 95, 11, 2013.

Theses

2. SM Wahl, *Modeling Planetary Interiors: From Microscopic to Global Scales*, Ph.D. Thesis, 2017.
Department of Earth & Planetary Science, UC Berkeley
Committee: Burkhard Militzer (chair), Bruce Buffett, David Romps, Eugene Chiang

1. SM Wahl, *Impact Modification of Mercury's Mantle Composition*, Undergraduate Thesis, 2011.
Department of Earth, Atmospheric & Planetary Science, MIT
Advisor: Linda Elkins-Tanton

Presentations

12. **SM Wahl**, B Militzer, WB Hubbard, *Jupiter's static tidal respionse from Juno and improved CMS theory*, 2019. (poster)
11. **SM Wahl**, B Militzer, WB Hubbard, F Soubiran, *Hydrogen-helium Equation of States and Jupiter's Interior Structure*, *American Geophysical Union Fall Meeting*, 2017. (invited talk)
10. **SM Wahl**, Jupiter's Interior and Juno Gravity Measurements, *Center for Integrative Planetary Science Seminar*, Berkeley, 2017. (talk)
9. **SM Wahl**, WB Hubbard, B Militzer, Tidal Response of Jupiter and Saturn from CMS Calculations, *Meeting of the Division of Planetary Science*, 2016. (talk)
8. **SM Wahl**, WB Hubbard, B Militzer, Interior Structure and Tidal Response of Jupiter and Saturn, *American Geophysical Union Fall Meeting*, 2016. (poster)
7. **SM Wahl**, Closure of the MgO-Fe Solvus During the Formation of Terrestrial Planets, *Cooperative Center for Dynamic Earth Research*, 2014. (poster)
6. **SM Wahl**, High Temperature Miscibility of terrestrial Materials, *Center for Integrative Planetary Science Seminar*, Berkeley, 2014. (talk)
5. **SM Wahl**, Closure of the MgO-Fe Solvus During the Formation of Terrestrial Planets, *Gordon Research Conference on Research at High Pressure*, 2014. (talk and poster)
4. **SM Wahl,** B Militzer, High Temperature Miscibility of Terrestrial Materials: First Principles Calculations for the Early Earth, *Berkeley Seismological Laboratory Annual Report*, 2014.
3. **SM Wahl**, B Militzer, Miscibility of MgO and Fe in hot terrestrial planet interiors, *American Geophysical Union Fall Meeting*, 2013. (poster)
2. **SM Wahl**, HF Wilson, B Militzer, Ab initio Calculations of Iron's Solubility in Metallic Hydrogen in Giant Planet Interiors*, American Geophysical Union Fall Meeting*, 2012. (poster)
1. **SM Wahl,** DJ Stevenson, L Elkins-Tanton, Modification of Mercury's Bulk Mantle Composition by Reaccumulation of Condensed Ejecta from a Formative Giant Impact, *Meeting of the Division of Planetary Science*, 2010. (poster)

Teaching Experience

Graduate Student Instructor, EPS 100A: Minerals: Their Constitution and Origin, UC Berkeley	2014
Graduate Student Instructor, EPS/Astron C12: The Planets, UC Berkeley	2011
Undergraduate Teaching Assistant, 12.001: Introduction to Geology, MIT	2010

Professional Memberships

American Astronomical Society	2016 - present
American Geophysical Union	2011 - present

Outreach

Volunteer, Berkeley-Stanford Science Olympiad Tournament	2016 – present
Volunteer, The Hacker Within, UC Berkeley Chapter	2015 – present
Volunteer, Py4science, D-Lab, UC Berkeley	2014
Volunteer, Bay Area Scientists in Schools (BASIS), UC Berkeley	2013 – present
Volunteer, Informal Geology presentation to 4th grade classes, Tara Hills Elementary	2013
Volunteer, 2013 Cal Day, UC Berkeley	2013

Mentoring

Mentor for visiting undergraduate student researcher from Caltech	2019-2020
Mentor for visiting student researcher from Tokyo Institute of Technology	2015