

Krista Marie Soderlund

The University of Texas at Austin

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Research Interests

Geophysical Fluid Dynamics, Magnetohydrodynamics, Planetary Science, Cryosphere

Education

University of California, Los Angeles

Ph.D., Geophysics and Space Physics, 2011

M.S., Geophysics and Space Physics, 2009

Florida Institute of Technology

B.S., Double major in Physics & Space Science, 2005, Summa Cum Laude

Employment

University of Texas at Austin, Institute for Geophysics

Research Associate, September 2014-Present

UTIG Postdoctoral Fellow, October 2011-September 2014

University of California, Los Angeles, Department of Earth and Space Sciences

Graduate Student Researcher, Advisor: Dr. Jonathan M. Aurnou, 2006-2011

California Institute of Technology, Division of Geological and Planetary Sciences

Summer Undergraduate Research Fellow, Dr. Joann M. Stock, 2005

NASA Jet Propulsion Laboratory, CA

Consultant, Dr. Bonnie J. Buratti, 2006

Planetary Geology & Geophysics Undergrad Research Program, Dr. B.J. Buratti, 2004

Florida Institute of Technology, Department of Physics and Space Science

Undergraduate Researcher, Dr. Niescja E. Turner, 2004-2005

Naval Oceanographic Office, Hydrology Code, Stennis Space Center, MS

Physical science aid, 2003

Mission Experience

Saturn Probe Interior and aTmosphere Explorer (SPRITE) mission concept, proposed to NASA New Frontiers 2017 solicitation (declined), Science Team member

Ice Giants Mission Study, Science Definition Team member, 2016

Uranus Pathfinder mission concept, proposed to ESA M-class 2014 solicitation (declined), Science Team member

Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON) instrument, Europa Clipper, Science Team member

Radar for Icy Moon Exploration (RIME) instrument, JUICE mission, Participant

Visual & Infrared Mapping Spectrometer (VIMS) instrument, Cassini, Undergraduate Researcher

Planetary Science Summer School, JPL

Field Experience

Field assistant, Data acquisition, analysis, and management for airborne geophysical surveys in East Antarctica, University of Texas Institute for Geophysics, Nov 2011-Jan 2012

Geophysical watchstander, Data editing and quality assurance onboard the R/V Nathaniel B. Palmer in the South Pacific, California Institute of Technology, March 2006

Funding History

- Principal Investigator*, Evolution of Mercury's core dynamo, NASA Solar System Workings Program, 2019-2022 (\$458,969)
- Co-Investigator*, Oceans Across Space and Time, NASA Center for Life Detection, 2018-2022 (\$45,606)
- Principal Investigator*, Coupling interior and surface deformation of ice shells, NASA Solar System Workings Program, 2018 (\$147,105)
- Principal Investigator*, Ice Giants Mission Studies Science Definition Team, NASA Headquarters, 2016 (\$19,000)
- Principal Investigator*, Modeling the Internal Dynamics of Ice Giants, NASA Solar System Workings Program, 2015-2018 (\$314,212)
- Science Principal Investigator*, Convective Ocean Dynamics of Europa: Effects of Salinity, NASA Outer Planets Research Program, PI Donald Blankenship, 2014-2018 (\$318,175)
- UT Principal Investigator*, Planetary Magnetism and Thermochemical Evolution, NSF, PI Gerald Schubert, 2013-2015 (\$138,597)
- Co-Principal Investigator*, Jackson School of Geosciences Seed Grant Proposal, Proof-of-Concept Investigation of Dynamic Processes at Europa's Ice-Ocean Interface, 2014 (\$8,200)
- Co-Principal Investigator*, Jackson School of Geosciences Seed Grant Proposal, Collaborative Effort to Develop a "Europa Simulator", 2013 (\$3,875)
- Co-Investigator*, Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON), NASA Europa Instrument Investigations Announcement of Opportunity, 2015-2034 (\$136.9M)
- Postdoctoral Associate*, Ice Penetrating Radar (IPR) for Europa Exploration, NASA Instrument Concepts for Europa Exploration, PI Alina Moussessian, 2013-2014 (\$499,868)
- Named Participant*, Jupiter Icy Moon Explorer (JUICE) Radar for Icy Moon Exploration (RIME), ESA, PI Lorenzo Bruzzone, 2013-2033 (\$418,403)
- Participant*, SIMPLE: Sub-ice Investigation of Marine and Planetary-analog Ecosystems, NASA Astrobiology Science & Technology for Exploring Planets, PI Britney Schmidt, 2012-2016
- Participant*, Investigating the Cryospheric Evolution of the Central Antarctic Plate (ICECAP), NSF, PI Donald Blankenship, 2011-2012
- Fellowship*, University of Texas Institute for Geophysics Postdoctoral Fellowship 2011-2013
- Fellowship*, National Defense Science and Engineering Graduate (NDSEG) Fellowship, 2006-2009
- Scholarship*, Marshall H. and Nellie Alworth Scholarship 2001-2006
- Scholarship*, Sons of Norway Nancy Lorraine Jensen Memorial Scholarship, 2003-2005
- Scholarship*, Florida Institute of Technology Presidential Academic Scholarship, 2001-2005
- Scholarship*, Minnesota Technology Scholarship, 2001
- Travel Grant*, National Science Foundation travel award to attend the 2014 SEDI symposium, 2014
- Travel Grant*, Japanese Geophysical Union travel award to attend the 2014 SEDI symposium, 2014
- Travel Grant*, Keith Runcorn Travel Award for Non-Europeans for EGU 2013 conference, 2013

Supercomputing Allocations

- Principal Investigator*, NASA Advanced Supercomputing Division, Coupling interior and surface deformation of ice shells, 2018-2019 (6 million processor-hours)
- Principal Investigator*, NASA Advanced Supercomputing Division, Oceanic circulations and impacts of ice-ocean interaction, 2012-2019 (628,568 processor-hours)
- Co-Investigator*, NASA Advanced Supercomputing Division, Simulating the internal dynamics of the giant planets, 2008-2019 (2.9 million processor-hours)
- Collaborator*, Department of Energy INCITE Program, Frontiers of Planetary & Stellar Magnetism Through High-Performance Computing, 2015-2018 (343 million processor-hours)

Principal Investigator, Texas Advanced Computing Center, Convection in Europa's ocean, 2012
(50,000 processor-hours)

Co-Investigator, San Diego Supercomputing Center, The effects of deep convection on the ice giants,
2007-2008 (6,300 processor-hours)

Awards

NASA Early Career Fellow	2015
UTIG Director's Circle of Excellence Award	2013-2016
UTIG Outstanding Young Researcher Award	2013
UTIG Postdoctoral Fellowship	2011-2013
Sullwold Scholarship for academic excellence and outstanding original research	2010
National Defense Science and Engineering Graduate (NDSEG) Fellowship	2006-2009
L.A. Basin Earth & Planetary Student Research Symposium Best Presentation Award	2007, 2008
NSF Graduate Fellowship Honorable Mention	2006
Florida Institute of Technology Faculty Honors Award for maintaining a 4.0 GPA	2005
Florida Institute of Technology Distinguished and Outstanding Student Scholar Awards	2004-2005
National Collegiate Physical Science Award	2004-2005

Honors

<i>Invited speaker</i> , International Ice Giant Workshop	2019
<i>Invited speaker</i> , The Core of the Moon Workshop	2019
<i>Elected member</i> , American Astronomical Society Division of Planetary Sciences Committee	2018-2021
<i>Selected mentor</i> , NASA-funded Planetary Geology and Geophysics Undergraduate Research Program (PGGURP)	2018
<i>Invited speaker</i> , American Geophysical Union (AGU) Fall Meeting (3 invites, 1 declined)	2018
<i>Invited speaker</i> , ExoOceans: Science Strategy for Space Exploration of the Outer Solar System Icy Moons Oceans, International Space Science Institute	2018
<i>Invited speaker</i> , Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers Conference, Kavli Institute for Theoretical Physics	2018
<i>Invited speaker and panelist</i> , Foster Hewett Lecture series, Lehigh University	2017
<i>Invited speaker</i> , American Geophysical Union (AGU) Fall Meeting	2013, 2016
<i>Invited speaker</i> , Europa Mission Project Science Group Meeting	2016
<i>Invited speaker</i> , 2 nd Annual Ocean Worlds Meeting	2016
<i>Invited discussion leader</i> , SEDI symposium	2016
<i>Invited speaker</i> , Study of Earth's Deep Interior (SEDI) symposium	2014
<i>Cover image</i> , August issue of Astrobiology (Pappalardo et al.)	2013
<i>Cover image</i> , May issue of Icarus (Soderlund et al.)	2013
<i>Invited speaker</i> , European Geophysical Union (EGU) conference	2013
<i>Invited presenter</i> , NASA Exhibit, Supercomputing Conference	2009
<i>Featured Researcher of the Month</i> , San Diego Supercomputing Center	2007

Invited Seminars

University of California, Los Angeles, Department of Earth, Planetary, and Space Sciences Colloquium, May 2019, Los Angeles, CA.

University of Arizona, Lunar and Planetary Laboratory Seminar, April 2019, Tucson, AZ.

Princeton University, Geosciences Departmental Lecture, February 2019, Princeton, NJ.

The University of Texas at Austin, Institute for Geophysics Seminar, November 2018, Austin, TX.

The University of Texas at Austin, Pop-Up Institute on Planetary Habitability, Introduction to Icy Worlds, June 2018, Austin, TX.

California Institute of Technology, Ocean Dynamics of Icy Satellites, February 2018, Pasadena, CA.

Lehigh University, Foster Hewett Lecture, Exploring Europa with Ocean Circulation Models and Ice-Penetrating Radar, November 2017, Bethlehem, PA.

The University of Texas at Austin, Planetary Organization for Space Sciences and Exploration (POSSE), Exploring the Ice Giants with Models and Missions, April 2017.

Southwest Research Institute, Internal Dynamics and Dynamos of Ice Giant Planets, April 2016, San Antonio, TX.

Baylor University, Center for Astrophysics, Space Physics and Engineering Research, Modeling Deep Convective Flows and Magnetic Fields of Uranus and Neptune, October 2015, Waco, TX.

The University of Texas at Austin, Jackson School of Geosciences, DeFord Lecture Series, Rotating Convection and Dynamo Models: A Window into Planetary Interiors, October 2015, Austin, TX.

Georgia Institute of Technology, School of Earth and Atmospheric Sciences, Dynamics and Dynamos of the Ice Giants, April 2015, Atlanta, GA.

The University of Texas at Austin, Department of Astronomy, Theoretical Astrophysics and Interstellar Medium/Planets Seminar. Convective Dynamics in the Interiors of Ice Giants and Icy Satellites, April 2014, Austin, TX.

The University of Texas at Austin, Institute for Geophysics Seminar. Convective Dynamics in the Interiors of Ice Giants and Icy Satellites, March 2014, Austin, TX.

Trinity University, Department of Physics Seminar. Convective Dynamics in the Interiors of Ice Giants and Icy Satellites, March 2014, San Antonio, TX.

Jet Propulsion Laboratory Ices Seminar. Convective Dynamics of the European Ocean: Insights from the giant planets, August 2013, Pasadena, CA.

Universidad de los Andes, Department of Physics Seminar. Convective Dynamics of Ice Giants and Icy Satellites, May 2013, Bogota, Colombia.

The University of Texas at Austin, Institute for Geophysics Brownbag Seminar. Investigating Planetary Interiors Through Convection and Dynamo Modeling, February 2012, Austin, TX.

UCLA, Department of Earth and Space Sciences Planetology Seminar. Convection and Magnetic Field Generation in Planetary Dynamo Models, May 2011, Los Angeles, CA.

Norwegian Polar Institute. Planetary Dynamo Models: Applications to Uranus and Neptune, February 2011, Tromso, Norway.

UCLA, Department of Earth and Space Sciences Planetology Seminar. Behavioral Transitions in Planetary Dynamo and Convection Models, June 2009, May 2010, Los Angeles, CA.

UCLA, Department of Earth and Space Sciences Planetology Seminar. Zonal flows and thermal emissions of the ice giants, May 2008, Los Angeles, CA.

UCLA, Department of Earth and Space Sciences Planetology Seminar. Modeling deep convection on the ice giants, May 2007, Los Angeles, CA.

Peer-Reviewed Journal Articles

[†]Postdoc, [‡]Student

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22. Grima, C., I. Koch, J. Greenbaum, **K.M. Soderlund**, D.D. Blankenship, D.A. Young, D.M. Schroeder, S. Fitzsimons, The distribution of basal processes at South McMurdo and Ross Ice Shelves, Antarctica, by radar statistical reconnaissance, In Prep.
21. **Soderlund, K.M.**, Ocean dynamics of outer solar system satellites, To be submitted to *Geophys. Res. Lett.*
20. Hofstadter, M., A. Simon, S. Atreya, D. Banfield, J. Fortney, A. Hayes, M. Hedman, G. Hospodarsky, A. Masters, K. Mandt, M. Showalter, **K.M. Soderlund**, D. Turrini, E. Turtle, K. Reh, J. Elliott, N. Aurora, A. Petropoulos, and the Ice Giant Mission Study Team, Uranus and Neptune Missions: A Study in Advance of the Next Planetary Science Decadal Survey, *Exp. Astron.*, Submitted.

19. Weller, M.B.[†], L. Fuchs[†], T.W. Becker, **K.M. Soderlund**, Convection in thin shells of icy satellites: Effects of latitudinal surface temperature variations, *J. Geophys. Res.*, In review.
18. Scheinberg, A.[†], **K.M. Soderlund**, L. Elkins-Tanton (2018), A basal magma ocean dynamo to explain the early lunar magnetic field, *Earth Planet. Sci. Lett.* 492, 144-151.
17. Tajeddine, R., **K.M. Soderlund**, P.C. Thomas, P. Helfenstein, P.M. Schenk, M.M. Hedman, J.A. Burns (2017), True polar wander of Enceladus from topographic data, *Icarus* 295, 46-60.
16. Kalousova, K.[†], D.M. Schroeder, **K.M. Soderlund** (2017), Radar attenuation in Europa's ice shell: Obstacles and opportunities for constraining the shell thickness and its thermal structure, *J. Geophys. Res. – Planets*, 122, doi:10.1002/2016JE005110.
15. Grima, C., J.S. Greenbaum[†], E. Lopez Garcia[‡], **K.M. Soderlund**, A. Rosales[‡], D.D. Blankenship, D.A. Young (2016), Brine extent of McMurdo Ice Shelf, Antarctica, mainly controlled by snow accumulation, *Geophys. Res. Lett.* 43, 7011-7018.
14. **Soderlund, K.M.**, A. Sheyko[‡], E.M. King, J.M. Aurnou (2015), The competition between Lorentz and Coriolis forces in planetary dynamos, *Prog. Earth Planet. Sci.* 2, 24.
13. Aurnou, J.M., M.A. Calkins, J.S. Cheng[‡], K. Julien, E.M. King, D. Nieves, **K.M. Soderlund**, S. Stellmach (2015), Rotating convective turbulence in Earth and planetary cores, *Phys. Earth Planet. Int.* 246, 52-71.
12. Scheinberg, A.[‡], **K.M. Soderlund**, G. Schubert (2015), Magnetic field generation in the lunar core: The role of inner core growth, *Icarus* 254, 62-71.
11. Cao, H.[‡], J.M. Aurnou, J. Wicht, W. Dietrich[†], **K.M. Soderlund**, C.T. Russell (2014), A dynamo explanation for Mercury's anomalous magnetic field, *Geophys. Res. Lett.* 41(12), 4127-4134.
10. **Soderlund, K.M.**, E.M. King, J.M. Aurnou (2014), Corrigendum to "The influence of magnetic fields in planetary dynamo models", *Earth Planet. Sci. Lett.* 392, 121-123.
9. **Soderlund, K.M.**, B.E. Schmidt, J. Wicht, D.D. Blankenship (2014), Ocean-driven heating of Europa's icy shell at low latitudes, *Nature Geosci.* 7(1), 16-19, doi:10.1038/ngeo2021.
8. Pappalardo, R.T., S. Vance, F. Bagenal, B.G. Bills, D.L. Blaney, D.D. Blankenship, W.B. Brinckerhoff, J.E.P. Connerney, K.P. Hand, T.M. Hoehler, J.S. Leisner, W.S. Kurth, M.A. McGrath, M.T. Mellon, J.M. Moore, G.W. Patterson, L.M. Prockter, D.A. Senske, B.E. Schmidt, E.L. Shock, D.E. Smith, **K.M. Soderlund** (2013), Science potential from a Europa lander, *Astrobiology* 13(8), 740-773. doi:10.1089/ast.2013.1003.
7. **Soderlund, K.M.**, M.H. Heimpel, E.M. King, J.M. Aurnou (2013), Turbulent models of ice giant internal dynamics: Dynamos, heat transfer, and zonal flows, *Icarus* 224, 97-113.
6. **Soderlund, K.M.**, E.M. King, J.M. Aurnou (2012), The influence of magnetic fields in planetary dynamo models, *Earth Planet. Sci. Lett.* 333, 9-20.
5. **Soderlund, K.M.** (2011), Investigating transitions in planetary dynamo models, Ph.D. thesis, University of California, Los Angeles.
4. Schubert, G. and **K.M. Soderlund** (2011), Planetary magnetic fields: Observations and models, *Phys. Earth Planet. Int.* 187, 92-108.
3. King, E.M., **K.M. Soderlund**, U.R. Christensen, J. Wicht, J.M. Aurnou (2010), Convective heat transfer in planetary dynamo models, *Geochemistry, Geophysics, Geosystems* 11, Q06016.
2. Buratti, B.J., **K.M. Soderlund**, A. Bauer, J.A. Mosher, M.D. Hicks, D.P. Simonelli, J. Jaumann, R.N. Clark, R.H. Brown, D.P. Cruikshank, T. Momary (2008), Infrared (0.83-5.1 μm) Photometry of Phoebe from the Cassini VIMS, *Icarus*, 193, 309-322.
1. Buratti, B.J., D.P. Cruikshank, R.H. Brown, R.N. Clark, J.M. Bauer, R. Jaumann, T.B. McCord, D.P. Simonelli, C.A. Hibbitts, G.B. Hansen, T.C. Owen, K.H. Baines, G. Bellucci, J.-P. Bibring, F. Capaccioni, P. Cerroni, A. Coradini, P. Drossart, V. Formisano, Y. Langevin, D.L. Matson, V. Mennella, R.M. Nelson, P.D. Nicholson, B. Sicardy, C. Sotin, T.L. Roush, **K.M. Soderlund**, A. Muradyan (2005), Cassini VIMS observations of Iapetus: Detection of CO₂, *Astrophys. J.*, 622.2, 149-152.

Book Chapters

Wieczorek, M. **et al.**, Origin and evolution of the Moon's dynamo, In "New Views of the Moon 2", In review.

Other Publications

Rymer, A., **et al.** (2018), Solar System Ice Giants: Exoplanets in our Backyard. *The National Academies Exoplanet Science Strategy*.

Hofstadter, M., **et al.** (2017), Ice Giants Pre-Decadal Mission Study Final Report.

Pappalardo, R.T. **et al.** (2017), Addressing the habitability of Europa with the Europa Clipper mission, *The National Academies Astrobiology Science Strategy for the Search for Life in the Universe*.

Senske, D. and the **Europa Science Team** (2017), Voyage to Europa: Exploring Icy Moon Habitability, *Lunar and Planetary Information Bulletin* 148.

Conference and Meeting Abstracts and Presentations

2018

Blankenship, D.D., **et al.**, An ensemble approach for science verification and validation of REASON radar studies of Europa, *2018 American Geophysical Union Fall Meeting*, Washington, D.C.

Soderlund, K.M., Convective Dynamics of Icy Ocean Worlds, *2018 American Geophysical Union Fall Meeting*, Washington, D.C., *Invited*.

Soderlund, K.M., **et al.**, Basal Magma Ocean Dynamo as the Origin of the Ancient Lunar Magnetic Field, *2018 American Geophysical Union Fall Meeting*, Washington, D.C., *Invited*.

Weller, M.B., **et al.**, Convection in Thin Shells of Icy Satellites Affected by Surface Temperature Variations, *2018 American Geophysical Union Fall Meeting*, Washington, D.C.

Young, D.A., **et al.**, REASON for Europa: Data products and algorithms, *2018 American Geophysical Union Fall Meeting*, Washington, D.C.

Soderlund, K.M., Ocean Dynamics of Outer Solar System Satellites, *2018 AAS / Division for Planetary Sciences Meeting*, Knoxville, TN.

Chan, K.F., **et al.**, Dielectric Brine-Ice Mixtures on Europa, and the Need for New Experiments, *Europa Deep Dive 2: Composition Workshop*, Lunar and Planetary Institute, Houston, TX.

Wolfenbarger, N.S., **et al.**, Leveraging Terrestrial Marine Ice Cores to Constrain the Composition of Ice on Europa, *Europa Deep Dive 2: Composition Workshop*, Lunar and Planetary Institute, Houston, TX.

Soderlund, K.M., Dynamos of ice giant planets, *Waves, Turbulence, and Large-scale Structures in Rotating Magnetic Fluids: Above & Beyond Geophysical Fluid Dynamics*, NCAR High Altitude Observatory, Boulder, CO (oral).

Soderlund, K.M., Convective Dynamics of Icy Ocean Worlds, *Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers*, Kavli Institute for Theoretical Physics, Santa Barbara, CA (oral), *Invited*.

Weller, M.B., **et al.**, Towards Understanding Hemispheric Variations in Enceladus' Ice Shell: Effects of Variable Insolation on Convection and Yielding, *2018 Study of Earth's Deep Interior Conference*, Edmonton, Alberta, Canada.

Blankenship, D.D., **et al.**, REASON for Europa, *2018 COSPAR Assembly*, Pasadena, CA.

Hofstadter, M., **et al.**, A Study on Exploring Uranus and Neptune: Science Objectives and Mission Requirements, *2018 COSPAR Assembly*, Pasadena, CA.

Schmidt, B.E., **et al.**, A Geophysical Perspective on Planetary Protection for Europa, *2018 COSPAR Assembly*, Pasadena, CA.

Soderlund, K.M., Numerical Modeling of Ocean Dynamics in Icy Satellites, *ExoOceans: Science Strategy for Space Exploration of the Outer Solar System Icy Moons Oceans Workshop*, Bern, Switzerland (oral), *Invited*.

- Hofstadter, M., **et al.**, Exploring the Ice Giant Systems: Science Objectives and Mission Requirements, *2018 Asia Oceania Geosciences Society*, Honolulu, Hawaii.
- Hofstadter, M., **et al.**, Exploring the Ice Giant Systems: Science Objectives and Mission Requirements, *2018 European Geophysical Union Meeting*, Vienna, Austria.
- Weller, M.B., **et al.**, Towards Understanding Hemispheric Variations in Enceladus' Ice Shell: Variable Surface Temperature, Convection, and Yielding, *2018 Lunar and Planetary Science Conference*, The Woodlands, TX.

2017

- Soderlund, K.M.**, et al., Convection and Dynamo Action in Ice Giant Dynamo Models with Electrical Conductivity Stratification, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Aurnou, J.M., **et al.**, Scaling Up Planetary Dynamo Modeling to Massively Parallel Computing Systems: The Rayleigh at ALCF, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Grima, C., **et al.**, Surface and basal ice shelf mass balance processes of the Southern McMurdo Ice Shelf determined through radar statistical reconnaissance, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Greenbaum, J.S., **et al.**, Remote characterization of ice shelf surface and basal processes: Examples from East Antarctica, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA (oral), *Invited*.
- Hedman, M.M., **et al.**, Pathways towards Future Exploration of Ice Giants Uranus and Neptune, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Hospodarsky, G.B., **et al.**, Magnetospheric science at Uranus and Neptune, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Weller, M.B., **et al.**, Effects of Variable Surface Temperatures on the Dynamics of Convection within Enceladus' Ice Shell, *2017 American Geophysical Union Fall Meeting*, New Orleans, LA.
- Soderlund, K.M.**, et al., Ice-Ocean Exchange Processes Driven by Ocean Convection, *Europa Deep Dive 1: Ice Shell Exchange Processes Workshop*, Lunar and Planetary Institute, Houston, TX (oral).
- Chan, K., **et al.**, Mobilization of Near-Surface Brine on Europa, *Europa Deep Dive 1: Ice Shell Exchange Processes Workshop*, Lunar and Planetary Institute, Houston, TX.
- Soderlund, K.M.**, et al., Numerical Models of European Ocean Dynamics: Sensitivity to Fluid Properties, *2017 AAS / Division for Planetary Sciences Meeting*, Provo, UT.
- Soderlund, K.M.**, et al., Ice Giant Dynamo Models with Radially Varying Electrical Conductivity, *2017 IAPSO - IAMAS - IAGA Joint Assembly*, Cape Town, South Africa.
- Wieczorek, M., **et al.**, Recent advances in lunar magnetism, *New Views of the Moon 2*, Münster, Germany.
- Atkinson, D.H., **et al.**, The Saturn PRobe Interior and aTmosphere Explorer (SPRITE) mission concept, *2017 EGU General Assembly*, Vienna, Austria.
- Blankenship, D.D., **et al.**, Understanding Europa's ice shell and subsurface water through terrestrial analogs for flyby radar sounding, *2017 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 2888.
- Weller, M.B., **et al.**, Convection and dichotomies within Enceladus' ice shell: Effects of variable surface temperatures, *2017 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 1676.
- Lawrence, J.D., **et al.**, McMurdo Ice Shelf as an ocean world analog: supercooled water and ice mass balance, *2017 Astrobiology Science Conference*, Mesa, AZ.
- Hofstadter, M.D. **et al.**, A Vision for Ice Giant Exploration, *Planetary Science Vision 2050 Workshop*, Washington, DC (oral).

2016

- Soderlund, K.M.** and Aurnou, J.M., Interior Dynamics of Giant Planets: The Competing Influences of Rotation, Magnetic Fields, and Buoyancy, *2016 American Geophysical Union Fall Meeting*, San Francisco, CA (oral), *Invited*.
- Grima, C. **et al.**, Surface Density, Roughness, and Brine Infiltration Observed with Airborne Radar Statistical Reconnaissance at The McMurdo Ice Shelf, Antarctica, *2016 American Geophysical Union Fall Meeting*, San Francisco, CA.
- Lawrence, J.D., **et al.**, Insights into Ice-Ocean Interactions on Earth and Europa, *2016 American Geophysical Union Fall Meeting*, San Francisco, CA.
- Soderlund, K.M.** et al., Numerical Simulations of Ice Giant Interiors with Radially Varying Electrical Conductivity, *2016 AAS / Division for Planetary Sciences Meeting*, Pasadena, CA (oral).
- Kalousova, K. **et al.**, Radar attenuation in a convecting ice shell: obstacles and opportunities for constraining ice shell thickness and thermal structure of Europa, *2016 AAS / Division for Planetary Sciences Meeting*, Pasadena, CA.
- Tajeddine, R., **et al.**, Evidence for true polar wander on Enceladus from topographic data, *2016 AAS / Division for Planetary Sciences Meeting*, Pasadena, CA.
- Soderlund, K.M.**, Ocean Circulation Beyond Earth, *2nd Annual Ocean Worlds Meeting*, Woods Hole, MA (oral), *Invited*.
- Tajeddine, R., **et al.**, Evidence for true polar wander on Enceladus from topographic data, *2016 Enceladus and the Icy Moons of Saturn Conference*, Boulder, CO (oral).
- Soderlund, K.M.**, Ocean Dynamics of Europa and Implications for Ice-Ocean Coupling, *Europa Mission Project Science Group Meeting #4*, Ann Arbor, MI (oral), *Invited*.
- Soderlund, K.M.** et al., Convective dynamics of icy satellite oceans, *2016 Study of Earth's Deep Interior Conference*, Nantes, France.
- Soderlund, K.M.** et al., Simulating magnetic fields and zonal flows on ice giant planets, *2016 Computational Infrastructure for Geodynamics All-Hands Meeting*, Davis, CA.
- Tajeddine, R., **et al.**, Evidence for true polar wander on Enceladus, *2016 Geological Society of America, Rocky Mountain Section*, Moscow, ID, #275989 (oral).
- Soderlund, K.M.** and G. Schubert, Evolution of Mercury's Core Dynamo, *2016 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 2262 (oral).
- Lawrence, J.D., **et al.**, Insight into Ice-Ocean Interactions on Earth and Europa, *2016 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 2161.

2015

- Soderlund, K.M.**, et al., Parameterization of the Lorentz to Coriolis Force Ratio in Planetary Dynamos, *2015 American Geophysical Union Fall Meeting*, San Francisco, CA.
- Tajeddine, R., **et al.**, Topographic evidence of True Polar Wander on Enceladus, *2015 American Geophysical Union Fall Meeting*, San Francisco, CA (oral), *Invited*.
- Blankenship, D.D., **et al.**, Understanding Europa's Ice Shell and Subsurface Water Through Terrestrial Analogs for Flyby Radar Sounding, *2015 American Geophysical Union Fall Meeting*, San Francisco, CA (oral), *Invited*.
- Moussessian, A., **et al.**, REASON for Europa, *2015 American Geophysical Union Fall Meeting*, San Francisco, CA (oral).
- Grima, C., **et al.**, Surface Reflectometry and Ionosphere Sounding from the Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON), *2015 American Geophysical Union Fall Meeting*, San Francisco, CA.
- Gooch, B.T., **et al.**, Heterogeneous Heat Flow and Groundwater Effects on East Antarctic Ice Sheet Dynamics, *2015 American Geophysical Union Fall Meeting*, San Francisco, CA.
- Soderlund, K.M.**, et al., Thermal coupling between the ocean and mantle of Europa: Implications for ocean convection, *2015 AAS / Division for Planetary Sciences Meeting*, National Harbor, MD #405.08 (oral).

- Patterson, G.W., **et al.**, REASON for Europa, *2015 AAS / Division for Planetary Sciences Meeting*, National Harbor, MD #312.09.
- Blankenship, D.D., **et al.**, Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON), *2015 Europa Project Science Group Meeting #1*, Pasadena, CA.
- Blankenship, D.D., **et al.**, Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON), *2015 Outer Planets Assessment Group Meeting*, Laurel, MD.
- Soderlund, K.M.**, et al., Convective transport properties of icy satellite oceans and implications for habitability, *2015 Astrobiology Science Conference*, Chicago, IL.
- Blankenship, D.D., **et al.**, Revealing secrets of Europa's ice shell, hidden water and plume activity through flyby radar sounding, *2015 Astrobiology Science Conference*, Chicago, IL (oral), **Invited**.
- Schmidt, B.E., **et al.**, Sub-ice marine and planetary ecosystems: First results from below the McMurdo Ice Shelf, *2015 Astrobiology Science Conference*, Chicago, IL (oral).
- 2014**
- Soderlund, K.M.**, et al., Compositionally driven dynamos, *2014 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP54A-05 (oral).
- Cao, H., **et al.**, Symmetry and Symmetry Breaking in Planetary Magnetic Fields, *2014 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP54A-02 (oral), **Invited**.
- Soderlund, K.M.**, et al., Force balances in geodynamo models and the Earth's core, *2014 Study of Earth's Deep Interior symposium*, Kanagawa, Japan (oral), **Invited**.
- Soderlund, K.M.**, et al., Turbulent models of ice giant dynamos, *2014 Study of Earth's Deep Interior symposium*, Kanagawa, Japan.
- Cao, H., **et al.**, A dynamo explanation for Mercury's anomalous magnetic field, *2014 Study of Earth's Deep Interior symposium*, Kanagawa, Japan.
- Soderlund, K.M.** and J.M. Aurnou, Modeling the internal dynamics and magnetic fields of ice giant planets, *2014 Workshop on the Study of Ice Giant Planets*, Laurel, MD (oral).
- Soderlund, K.M.**, et al., The influence of heterogeneous mantle heating on ocean convection at Europa, *2014 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 2054 (oral).
- Cao, H., **et al.**, New insights into Mercury's core dynamics from numerical dynamo simulations, *2014 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 1559 (oral).
- Soderlund, K.M.**, et al., Convective processes in Europa's ocean and implications for ice-ocean coupling, *2014 Workshop on the Habitability of Icy Worlds*, Pasadena, CA (oral).
- Blankenship, D.D., **et al.**, Flyby sounding of Europa's icy shell: Radar investigations, analogs, and instruments for the Europa Clipper Mission, *2014 Workshop on the Habitability of Icy Worlds*, Pasadena, CA.
- Schmidt, B.E., **et al.**, A chaos conveyor belt? *2014 Workshop on the Habitability of Icy Worlds*, Pasadena, CA (oral).
- Schroeder, D.M. **et al.**, Icy world science and habitability in the National Science Olympiad for middle school students, *2014 Workshop on the Habitability of Icy Worlds*, Pasadena, CA.
- 2013**
- Soderlund, K.M.**, King, E.M., and Aurnou, J.M., The breakdown of dipolar magnetic field generation in planetary dynamo models, *2013 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP33A-08 (oral), **Invited**.
- Schmidt, B.E., **Soderlund, K.M.**, et al., Europa's shallow subsurface: lakes, layers and life?, *2013 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract P43E-01 (oral), **Invited**.
- Scheinberg, A. L., **Soderlund, K.M.**, and Schubert, G., Persistence of the lunar dynamo: The role of compositional convection, *2013 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP41D-1157.

- Cao, H., **et al.**, A dynamo explanation for Mercury's anomalous magnetic field, *2013 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP33A-05 (oral), **Invited**.
- Cheng, J.S., **et al.**, Extreme rotating convection experiments and implications for modeling the dynamo, *2013 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract GP51A-1070.
- Soderlund, K.M.**, et al., Dynamic coupling of magnetic fields, thermal emissions, and zonal flows in ice giant planets, *2013 AAS / Division for Planetary Sciences Meeting*, Denver, CO #312.24.
- Blankenship, D.D., **et al.**, Flyby sounding of Europa's icy shell: radar investigations, analogs and instruments for the Europa Clipper mission, *2013 International Symposium on Radioglaciology*, Abstract 67A072 (oral).
- Soderlund, K.M.**, King, E.M., and Aurnou, J.M., The influence of magnetic fields in planetary dynamo models, *2013 European Geophysical Union Meeting*, Vienna, Austria, Abstract EGU2013-469 (oral), **Invited**.
- Soderlund, K.M.**, et al., Dynamics of Europa's Ocean and Sensitivity to Water Properties, *2013 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 3009 (oral).
- Schmidt, B.E., **et al.**, Living on the Edge: Understanding the Habitability of Europa's Ice-Ocean Interface with Help from Earth, *2013 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 3054.

2012

- Soderlund, K.M.**, et al., European Ocean Dynamics Inferred from Surface Geology, *2012 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract 1503644 (oral).
- Soderlund, K.M.**, et al., Weakly-rotating Convective Dynamos: Application to Uranus and Neptune, *2012 American Geophysical Union Fall Meeting*, San Francisco, CA, Abstract 1496764.
- Soderlund, K.M.**, et al., Oceanography of Europa, *2012 AAS / Division for Planetary Sciences Meeting*, Reno, NV, #101.04 (oral).
- Schmidt, B.E., **et al.**, Shake, Rupture and Flow: Hydraulic Constraints on the Formation of Europa's Chaos, *2012 AAS / Division for Planetary Sciences Meeting*, Reno, NV, #112.20.
- Soderlund, K.M.**, et al., Convective Heat Transfer in Europa's Ocean and the Formation of Chaos Terrain, *2012 Lunar and Planetary Science Conference*, The Woodlands, TX, Abstract 2903.
- Greenbaum, J., **et al.**, Seafloor shapes of the floating portion of Totten Glacier and Moscow University Ice Shelf, East Antarctica, *2012 Forum for Research on Ice Shelf Processes* (oral).

2011 and prior

- Soderlund, K.M.**, King, E.M., and Aurnou, J.M., Convective Dynamics in Planetary Dynamo Models and the Secondary Role of Magnetic Fields, *2011 American Geophysical Union Meeting*, San Francisco, CA, Abstract GP11B-01 (oral).
- Soderlund, K.M.** and Aurnou, J.M., Simulation of an ice giant-style dynamo, *2010 American Geophysical Union*, San Francisco, CA, Abstract GP23B-1007.
- Soderlund, K.M.** and Aurnou, J.M., Modeling the Zonal Winds, Thermal Emissions, and Magnetic Fields of Ice Giants, *2010 AAS / Division for Planetary Sciences Meeting*, #11.28.
- King, E.M., **et al.**, Heat transfer and thermal mixing in planetary dynamo models, *2009 American Geophysical Union*, San Francisco, CA, Abstract P31C-1259.
- Soderlund, K.M.** and Aurnou, J.M., Effects of deep convective mixing on the ice giants, *2007 AAS / Division for Planetary Sciences Meeting*, #55.10.
- Likar, J.J., **et al.**, Mission Design Concept for in Situ Characterization of Saturnian Atmospheric Composition, *2006 American Geophysical Union*, San Francisco, CA, Abstract P41C-1297.
- Dawson, O.R., **et al.**, Comparative Planetology at Saturn: Mission Concept for a Flyby with Shallow Probes, *2006 AAS / Division for Planetary Sciences Meeting*, #45.21.
- Buratti, B.J., **et al.**, Visual and Infrared Photometry of the Icy Satellites of Saturn with the Cassini Visual Infrared Mapping Spectrometer (VIMS), *2006 AAS / Division for Planetary Sciences Meeting*, #69.06.

- Turner, N.E., **et al.**, Use and Evaluation of 3D GeoWall Visualizations in Undergrad. Space Science Classes, *2005 American Geophysical Union*, San Francisco, CA, Abstract ED31C-1227.
- Soderlund, K.M., et al., The Infrared Rotational Lightcurve of Phoebe from the Cassini Visual Infrared Mapping Spectrometer (VIMS), *2004 AAS / Division for Planetary Sciences Meeting*, #15.04.
- Buratti, B.J., **et al.**, Iapetus: First data from the Cassini Visual Mapping Spectrometer, *2004 AAS / Division for Planetary Sciences Meeting*, #04.09.

Professional Service

Reviewer, Proposals: Elsevier Space and Planetary Science Book Series, NASA Cassini Data Analysis Program, NASA Earth Space Science Fellowship Program, NASA Emerging Worlds Program, NASA Habitable Worlds Research Program, NASA Mars Fundamental Research Program, NASA Outer Planets Research Program, NASA Participating Scientist Program, NASA Solar System Workings Program, US-Israel Binational Science Foundation, ETH Research Commission, French National Research Agency, Swiss National Supercomputing Centre, UK's Science & Technologies Facilities Council

Reviewer, Journals: Astrophysical Journal Letters, Earth and Planetary Science Letters, Geophysical and Astrophysical Fluid Dynamics, Geophysical Research Letters, Icarus, Journal of Geophysical Research, Journal of Climate, Nature, Nature Astronomy

Reviewer, Books: Mercury: The View after MESSENGER, 2016

Panelist: Chemical Energy for Life on Icy Worlds, Workshop on Habitability of Icy Worlds, 2014
Foster Hewett Lecture series, Lehigh University, 2017
Ice Giant Flagship Study SDT Panel Discussion, 2017 AGU Fall Meeting, 2017

Session Chair: Workshop on the Study of Ice Giant Planets, 2014

Astrobiology Science Conference, 2015
American Astronomical Society Division of Planetary Science Conference, 2015
Lunar and Planetary Science Conference, 2016
Joint IAPSO-IAMAS-IAGA Assembly, 2017
American Geophysical Union Fall Meeting, 2017
NCAR GTP Workshop, 2018

Session Co-convenor: Earth's core dynamics and planetary dynamos, Joint IAPSO-IAMAS-IAGA Assembly, 2017
The Uranus and Neptune Systems, and their Relation to Other Planets, AGU, 2017, 2018
Multi-disciplinary approaches to investigate the interior structure and evolution of terrestrial bodies, EPSC, 2018

Discussion Leader: Study of Earth's Deep Interior Conference, 2016

Committees, External:

American Astronomical Society Division for Planetary Sciences Committee, 2018-2021
American Astronomical Society Division for Planetary Sciences 2018 Fall Meeting Science Organization Committee
Computational Infrastructure for Geodynamics Dynamo Working Group, 2017-present

Committees, Internal:

Jackson School of Geosciences UTIG Director Search Committee, 2018-present
Jackson School of Geosciences Diversity and Inclusion Committee, 2016-present
Jackson School of Geosciences Planetary Theme Executive Committee, 2013-present
Institute for Geophysics Seminar Committee, 2016-present (chair)
Institute for Geophysics Postdoc Committee, 2016-present
Institute for Geophysics Computational Scientist Search Committee, 2018-present
Institute for Geophysics Annual Performance Evaluation Committee, 2015, 2016, 2018

Institute for Geophysics Social Media (ad-hoc) Committee, 2017
Institute for Geophysics Strategic Planning Committee, 2015-2016

Contributor: Europa Study Report, NASA, Science Definition Team, 2012

Contributor: Ice Giant Mission Concept Study Report, NASA, Science Definition Team, 2017

Lead: Development of the UTIG Planetary Geophysics website, 2014

Lead: Development of the UTIG Polar and Planetary Research website, 2017

Lead: Recommendations on Restructuring Graduate Coursework, submitted to UCLA Faculty, 2008

Graduate Student Rep: UCLA Dept of Earth and Space Sciences Curriculum Committee, 2008

Judge: Astrobiology Science Conference Student Poster Competition, 2015

Judge: Jackson School of Geosciences Student Research Symposium, 2013, 2014

Judge: Lunar and Planetary Science Institute Dwornik Award, 2012, 2013

Judge: AGU Outstanding Student Paper Award, 2011, 2012, 2014

Mentoring Experience

Matthew Weller (UTIG postdoc), Convective dynamics of ice shells, 2016-present

Lukas Fuchs (UTIG postdoc), Convective dynamics of ice shells, 2016-present

Aaron Scheinberg (MIT graduate student, now Princeton Plasma Physics Laboratory postdoc), Lunar magnetic field generation, 2013-2018

Kristian Chan (UTIG graduate student), Europa analogs, 2018-present

Natalie Wolfenbarger (UTIG graduate student), Europa habitability, 2018-present

Reed Hopkins (Planetary Geology and Geophysics Undergraduate Research Program), Ocean dynamics of Europa, summer 2018

Erika Lopez Garcia (Brown University B.S. graduate), McMurdo Ice Shelf as a terrestrial analog for Europa, 2014-2016

Theo Lavier (LASA High School student), Icy satellite convection models, 2016

Teaching Experience

Introduction to the Cryosphere, Guest Lecturer on icy worlds in the solar system, University of Texas at Austin, November 2016

Planetary Science, Guest Lecturer on planetary dynamos and Europa, University of Texas at Austin, April 2014

Planetary Science, Guest Lecturer on giant planets, University of Texas at Austin, April 2012

Solar System and Planets, Teaching Assistant, UCLA Department of Earth & Space Sciences, 2010

Oceanography, Teaching Assistant, UCLA Department of Earth & Space Sciences, 2009

Outreach Activities

Contributor, EarthDate: Life on a Giant Magnetic; Geodynamo, 2017

Public presentation, POSSE (Planetary Organization for Space Sciences and Exploration) presentation, 2017

Podcast, Spacepod, Episode 43: The Ice Giants with Dr. Soderlund, 2016

Article Feature, Science News for Students, Cool Jobs: Careers on ice, 2016

Radio interview, Texas Standard, KUT, Austin, TX, 2015

Radio interview, "They Blinded me with Science", KVRX, Austin, TX, 2015

Podcast, "Water on Other Planets and Moons", Museum of Science, Boston, MA, 2014

Volunteer, Science Olympiad, 2014

Exhibitor, Hot Science-Cool Talks pre-lecture fair, 2013

Mentor, GeoFORCE, 2012

Public presentation, "Tour of the Solar System", Grace Lutheran Science Camp, 2009

Public presentation, "Life of a Scientist", "Antarctica", Cotton High School, 2006

Recent Press

Lunar Magma Ocean Dynamo, 2018:

ASU Press Release: Magma ocean may be responsible for the Moon's early magnetic field

Associated national and international press included articles in LPI Planetary News, Live Science, Science Daily, Phys.org, Futura-Sciences News

Ice Giant Mission Concept Study, 2017:

NASA Press Release: NASA Completes Study of Future 'Ice Giant' Mission Concepts

Associated national press included articles in New Scientist, The Verge, Gizmodo

Tajeddine et al., Icarus 295, 46-60, 2017:

Cornell/NASA Press Release: In a cosmic hit-and-run, icy Saturn moon may have flipped

Associated national press included articles in space.com, Science Daily, The Space Reporter, New Scientist, Gizmodo, Nature Worlds News, The Register, Science Times, National Geographic

Ocean Worlds Workshop, 2016:

Washington Post Article: Looking for aliens on ocean worlds: 'You'd be in denial to believe there isn't life out there'

Radar Instrument selection for the Europa Mission, 2015:

UT Press Release: Radar Techniques Used in Antarctica Will Scour Europa for Life-Supporting Environments

Associated local, national, and international press included articles in Texas Standard, Huffington Post, The Guardian, Ars Technica, AmericaSpace, space.com

Cao et al., Geophys. Res. Lett. 41(12), 4127-4134, 2014:

UCLA Press Release: Mercury's magnetic field tells scientists how its interior is different from Earth's

Associated national press included articles in Physics Today, Astrobiology Magazine, SciTechDaily.

Soderlund et al., Nature Geosci. 7(1), 16-19, 2014:

UT Press Release: Model Suggests Ocean Currents Shape Europa's Icy Shell in Ways Critical for Potential Habitats

Associated local, national, and international press included articles in Daily Texan, United Press International, New Scientist, Discovery News, French Tribune, Tehran Times, io9, Nature World News, space.com, Agencia Efe, Time, Astrobiology Magazine, Ars Technica.

Pappalardo et al., Astrobiology 13(8), 740-773, 2013:

UT Press Release: Scientists Helped Design NASA Mission Concept to Search for Life on Europa

JPL Press Release: If we landed on Europa, what would we want to know?

Associated local, national, and international press included articles in the Daily Texan, Austin-American Statesman, Houston Chronicle, Galveston Daily News, Los Angeles Times, Huffington Post, National Geographic, U.S. News and World Report, Der Tagesspiegel.

Affiliations

Member, American Geophysical Union (AGU), American Astronomical Society (AAS) Division of Planetary Sciences (DPS)