JOSEPH GHILARDUCCI O'ROURKE CURRICULUM VITAE

ASU School of Earth and Space Exploration
PO Box 876004
Tempe, AZ 85287

Cell: (574) 274-9015
Email: jgorourk@asu.edu
www.josephgorourke.com

RESEARCH INTERESTS

Interior dynamics in planetary bodies made of metal, rock, and ice
Histories of planetary magnetic fields generated by dynamos
Applying Solar System discoveries to exoplanet characterization
Mission and instrument development for spacecraft exploration

EDUCATION

2017 Ph.D. in Planetary Science, California Institute of Technology
2014 M.S. in Planetary Science, California Institute of Technology
2012 B.S. in Astronomy & Physics and Geology & Geophysics, Yale University

APPOINTMENTS

Starting 2020 Assistant Professor, Arizona State University
2017–2019 SESE Exploration Postdoctoral Fellow, Arizona State University
2017 Postdoctoral Scholar in Planetary Science, California Institute of Technology
2012–2016 Graduate Research Fellow, California Institute of Technology

HONORS AND AWARDS

2016 Outstanding Student Presentation Award, AGU Planetary Science
2016 Graduate Research Award, AGU Study of Earth's Deep Interior
2016 Antarctica Service Medal, National Science Foundation
2013 Hertz Foundation Fellowship Finalist
2012 Beckwith Prize for excellence in astronomy, Yale University
2012 Belknap Prize for excellence in geological studies, Yale University
2012 Bateman Science Prize for academic excellence in Silliman College, Yale University
2012 Hammer Prize for excellent oral presentation of the senior thesis, Yale University
2011 Penfield Prize for proficiency in mineralogy, Yale University

FELLOWSHIPS AND GRANTS

2018 Co-Investigator, NASA Solar System Workings, PI: Suzanne Smrekar (JPL)
2013–2016 NSF Graduate Research Fellowship
2009–2012 NASA CT Space Grant Undergraduate Fellowships
2010–2011 Silliman College George J. Schulz Fellowships, Yale University
2010 NASA Planetary Geology & Geophysics Undergraduate Research Program
2009 Perspectives on Science and Engineering Fellowship, Yale University

2008 Office of Naval Research Scholarship
2008 National Merit Scholarship

PROFESSIONAL SERVICE

2017–Present NASA VEXAG Steering Committee and Early Career Scholars Group
2017–Present NASA Review Panelist: CDAP/NDAP, LDAP, InSight PSP, DALI/MatISSE
2017–Present Reviewer for Icarus and Geophysical Research Letters
2019–Present NASA External Reviewer: DDAP/RDAP
2018 Lead Session Convener, American Geophysical Union, Fall Meeting
2017 NASA Executive Secretary for SSW

TEACHING, MENTORING, AND POLICY

2013–2017 Resident Associate for Undergraduates, California Institute of Technology
2016 Teaching Assistant, Planetary Structure and Evolution, Prof. David Stevenson
2013–2014 Teaching Assistant, Formation and Evolution of Planetary Systems, Prof. Heather Knutson
2016 FAA Certified Flight Instructor (Airplane)
2013–2014 Vice President, Science and Engineering Policy at Caltech
2012–2014 Author, Astrobites: The Astro-ph Reader's Digest
2012 Berkner Space Policy Intern, National Research Council, Washington, D.C.
2008 Congressional Intern, Representative Joe Donnelly, Washington, D.C.

PUBLICATIONS (FIRST-AUTHOR)

2019 O'Rourke, J. G., J. Buz, R. R. Fu, and R. J. Lillis, "Detectability of remanent magnetism in the crust of Venus," *Geophysical Research Letters*, in review.
2019 O'Rourke, J. G., and S.-H. Shim, "Suppressing the Martian dynamo with hydrogenation of the core by hydrated silicates," *Journal of Geophysical Research: Planets*, in revision.
2018 O'Rourke, J. G., C. Gillmann, and P. Tackley, "Prospects for an ancient dynamo and modern crustal remanent magnetism on Venus," *Earth and Planetary Science Letters*, 502, 46–56, doi:10.1016/j.epsl.2018.08.055.
2018 O'Rourke, J. G., and S. E. Smrekar, "Signatures of lithospheric flexure and elevated heat flow in stereo topography at coronae on Venus," *Journal of Geophysical Research: Planets*, 123, 369-389, doi:10.1002/2017JE005358.
2017 O'Rourke, J. G., J. Korenaga, and D. J. Stevenson, "Thermal evolution of Earth with magnesium precipitation in the core," *Earth and Planetary Science Letters*, 458, 263-272 doi:10.1016/j.epsl.2016.10.057.
2016 O'Rourke, J. G., and D. J. Stevenson, "Powering Earth's dynamo with magnesium precipitation from the core," *Nature*, 529, 387-389, doi:10.1038/nature16495.
2015 O'Rourke, J. G., and J. Korenaga, "Thermal evolution of Venus with argon degassing," *Icarus*, 260, 128-140, doi:10.1016/j.icarus.2015.07.009.
2014 O'Rourke, J. G., A. S. Wolf, and B. L. Ehlmann, "Venus: Interpreting the spatial distribution of volcanically modified craters," *Geophysical Research Letters*, 41, 8252-8260, doi:10.1002/2014GL062121.

2014 O'Rourke, J. G., H. A. Knutson, M. Zhao, J. J. Fortney, A. Burrows, E. Agol, D. Deming, J.-M. Désert, A. W. Howard, N. K. Lewis, A. P. Showman, and K. O. Todorov, "Warm *Spitzer* and Palomar near-IR secondary eclipse photometry of two hot Jupiters: WASP-48b and HAT-P-23b," *The Astrophysical Journal*, 781, 109, doi:10.1088/0004-637X/781/2/109.

2014 O'Rourke, J. G., and D. J. Stevenson, "Stability of ice/rock mixtures with application to a partially differentiated Titan," *Icarus,* 227, 67-77, doi:10.1016/j.icarus.2013.09.010.

2012 O'Rourke, J. G., and J. Korenaga, "Terrestrial planet evolution in the stagnant-lid regime: Size effects and the formation of self-destabilizing crust," *Icarus*, 221, 1043-1060, doi:10.1016/j.icarus.2012.10.015.

2012 O'Rourke, J. G., A. J. E. Riggs, C. A. Guertler, P. W. Miller C. M. Padhi, M. M. Popelka, A. J. Wells, A. C. West, J.-Q. Zhong, and J. S. Wettlaufer, "Mushy layer dynamics in micro and hyper gravity," *Physics of Fluids*, 24, doi:10.1063/1.4760256.

PUBLICATIONS (CO-AUTHOR)

2019 Desch, S. J., J. G. O'Rourke, D. L. Schrader, L. K. Schaefer, T. G. Sharp, "Ureilite Diamonds from Mars's Core: A Tale of Three Planets, None of Them Lost," *Meteoritics & Planetary Science*, in revision.

2019 Mitchell, R., J. G. O'Rourke, G. Cox, Z.-X. Li, C. Spencer, U. Kirscher, N. Zhang, J. B. Murphy, A. Nordsvan, L. S. Doucet, P. Asimow, "Birth of supercontinents and the Proterozoic planetary state shift," *Journal of Geophysical Research: Solid Earth*, in revision.

2017 Stefansson, G., S. Mahadevan, L. Hebb, J. Wisniewski, J. Huehnerhoff, B. Morris, S. Halverson, M. Zhao, J. Wright, J. G. O'Rourke, H. Knutson, S. Hawley, S. Kanodia, Y. Li, L. M. Z. Hagen, L. J. Liu, T. Beatty, C. Bender, P. Robertson, J. Dembicky, C. Gray, W. Ketzeback, R. Mcmillan, T. Rudyk, "Towards Space-Like Photometric Precision from the Ground with Beam Shaping Diffusers," *The Astrophysical Journal*, 848, 9, doi:10.3847/1538-4357/aa88aa.

2016 MacKenzie, S. M., T. E. Caswell, C. M. Phillips-Lander, E. N. Stavros, J. D. Hofgartner, V. Z. Sun, K. E. Powell, C. J. Steuer, J. G. O'Rourke, J. K. Dhaliwal, C. W. S. Leung, E. M. Petro, J. J. Wynne, S. Phan, M. Crismani, A. Krishnamurthy, K. K. John, K. DeBruin, C. J. Budney, K. L. Mitchell, "THEO Concept Mission: Testing the Habitability of Enceladus's Ocean," *Advances in Space Research*, 58, 6, 1117–1137, doi:10.1016/j.asr.2016.05.037.

2014 Zhao, M., J. G. O'Rourke, J. T. Wright, H. A. Knutson, A. Burrows, J. Fortney, H. Ngo, S. Hinkley, P. S. Muirhead, C. Baranec, R. Riddle, N. M. Law, B. J. Fulton, A. P. Showman, J. Curtis, and R. Burruss, "Characterization of the Atmosphere of the Hot Jupiter HAT-P-32Ab and the M-Dwarf Companion HAT-P-32B," *The Astrophysical Journal*, 796, 115, doi:10.1088/0004-637X/796/2/115.

2014 Shporer, A., J. G. O'Rourke, H. A. Knutson, G. M. Szabo, M. Zhao, A. Burrows, J. Fortney, E. Agol, N. B. Cowan, J.-M. Désert, A. W. Howard, H. Isaacson, N. A. Lewis, A. P. Showman, and K. A. Todorov, "Atmospheric Characterization of the Hot Jupiter Kepler-13Ab," *The Astrophysical Journal*, 788, 92, doi:10.1088/0004-637X/788/1/92.

INVITED TALKS AND WORKSHOPS

2019 Seminar, School of Earth and Space Exploration, Arizona State University
2019 Seminar, Department of Geological Sciences, University of Idaho
2019 Department Seminar, Department of Earth and Planetary Sciences, Rutgers University
2019 Seminar, Department of Earth and Atmospheric Sciences, University of Houston
2019 EAS Seminar, Department of Earth and Atmospheric Sciences, Georgia Institute of Technology
2018 Geophysics Seminar, Scripps Institution of Oceanography
2017 American Geophysical Union Fall Meeting, New Orleans, LA
2017 Goldschmidt, Paris, France
2017 Accretion and Early Differentiation of the Earth and Terrestrial Planets (ACCRETE) Workshop, Nice, France
2017 Geophysical Fluid Dynamics Seminar, ETH Zurich
2017 Venus Modeling Workshop, Universities Space Research Association
2017 iPLEX Lunch Seminar, University of California Los Angeles
2017 Special Planetary Science Seminar, Massachusetts Institute of Technology
2016 Planetary Science Seminar, University of California Los Angeles
2015 Early Planetary Dynamo Workshop, Tokyo Institute of Technology, Earth-Life Science Institute
2015 NASA Planetary Science Summer School, Jet Propulsion Laboratory
2014 Venus Seismology Workshop, Keck Institute for Space Studies
2012 Yuk Lunch Seminar, California Institute of Technology
2012 Titan Geophysics Workshop, California Institute of Technology

CONTRIBUTED TALKS

2019 O'Rourke, J. G., C. Gillmann, P. Tackley, J. Buz, R. R. Fu, and R. J. Lillis, "Detectability and scientific implications of crustal remanent magnetism on Venus," International Venus Conference.
2019 O'Rourke, J. G., C. Gillmann, P. Tackley, J. Buz, R. R. Fu, and R. J. Lillis, "Detectability and scientific implications of crustal remanent magnetism on the surface of Venus," LPSC XLX #2222.
2018 O'Rourke, J. G., C. Gillmann, P. Tackley, and S.-H. Shim, "Chemistry controls dynamos in metallic cores: New perspectives from Venus and Mars," AGU Fall Meeting #GP12A-01.
2018 O'Rourke, J. G., S. E. Smrekar, "Signatures of lithospheric flexure and elevated heat flow in stereo topography at coronae on Venus," International Venus Conference.
2018 O'Rourke, J. G., and S.-H. Shim, "Suppressing the Martian dynamo with ongoing hydrogenation of the core by hydrated mantle minerals," LPSC XLIX #2390.
2017 O'Rourke, J. G., S. E. Smrekar, and L.-N. Moresi, "Constraints on Lithospheric Rheology and Volatile Content from Observations of Coronae on Venus," LPSC XLVIII #2388.
2016 O'Rourke, J. G., J. Korenaga, and D. J. Stevenson, "Sustaining a global magnetic field on Earth but not Venus with mantle dynamics," AGU Fall Meeting #P44B-05.
2016 O'Rourke, J. G., and D. J. Stevenson, "Powering Earth's Dynamo with Magnesium

Precipitation from the Core," Goldschmidt #198.

2015 O'Rourke, J. G., and D. J. Stevenson, "Statistical Constraints from Siderophile Elements on Earth's Accretion, Differentiation, and Initial Core Stratification," AGU Fall Meeting #P13C-07.

2015 O'Rourke, J. G., and J. Korenaga, "Constraints on the Geodynamical History of Venus from Argon Degassing and the Cratering Record," LPI: Comparative Tectonics and Geodynamics #5007.

2014 O'Rourke, J. G., and D. J. Stevenson, "Thermochemical evolution of Earth's core with magnesium precipitation," AGU Fall Meeting #DI14A-01.

2012 O'Rourke, J. G., and J. Korenaga, "Terrestrial planet evolution in the stagnant-lid regime: Size effects and the formation of self-destabilizing crust," AGU Fall Meeting #P13E-01.

2011 O'Rourke, J. G., A. J. E. Riggs, C. A. Guertler, P. W. Miller, C. M. Padhi, M. M. Popelka, A. C. West, J.-Q. Zhong, and J. S. Wettlaufer, "Mushy layer dynamics in micro and hyper gravity," APS Division of Fluid Dynamics Meeting.

2011 O'Rourke, J. G., and D. J. Stevenson, "Stability of ice/rock mixtures with application to Titan," LPSC XLII #1629.

2009 O'Rourke, J. G., and K. K. M. Lee, "Melting curve of dense potassium," AGU Fall Meeting #MR34A-06.

CONTRIBUTED POSTERS

2019 O'Rourke, J. G., C. Gillmann, and P. Tackley, "Prospects for an ancient dynamo and modern crustal remanent magnetism on Venus," EGU 2019, #18876.

2019 O'Rourke, J. G., J. Castillo-Rogez, L. T. Elkins-Tanton, R. R. Fu, T. N. Harrison, S. Marchi, R. Park, B. E. Schmidt, D. A. Williams, C. C. Seybold, R. N. Schindhelm, J. D. Weinberg, "Athena: The First-Ever Encounter of (2) Pallas with a SmallSat," LPSC XLX #2225.

2018 O'Rourke, J. G., "Detecting Crustal Remanent Magnetism on the Surface of Venus: Required Instrument Performance and Mission Design," VEXAG 16 #8053.

2018 O'Rourke, J. G., C. Gillmann, and P. Tackley, "Prospects for an ancient dynamo and modern crustal remanent magnetism on Venus," International Venus Conference.

2018 O'Rourke, J. G., C. Gillmann, and P. Tackley, "Prospects for an ancient dynamo and modern crustal remanent magnetism on Venus," LPSC XLIX #2284.

2017 O'Rourke, J. G., and D. J. Stevenson, "Influence of precipitating light elements on stable stratification below the core/mantle boundary," AGU Fall Meeting #287617.

2016 O'Rourke, J. G., S. E. Smrekar, and L.-N. Moresi, "Constraints on Lithospheric Rheology and Volatile Content from Observations of Coronae on Venus," DPS 48/EPSC 11 #216.19.

2014 O'Rourke, J. G., and D. J. Stevenson, "Magnesium Partitioning and Precipitation in Earth's Core?" Accretion and Early Differentiation of the Earth and Terrestrial Planets (ACCRETE) Workshop, Nice, France.

2014 O'Rourke, J. G., H. A. Knutson, M. Zhao, J. J. Fortney, A. Burrows, E. Agol, D. Deming, J.-M. Désert, A. W. Howard, N. K. Lewis, A. P. Showman, and K. O. Todorov, "A Secondary Eclipse Survey of the Hottest Exoplanets with Palomar and Spitzer," Exoclimes III, Davos, Switzerland.