

Education

- August 2016 Ph.D., University of Arizona, Tucson, AZ
Planetary Science, minor in Geoscience
Advisor: Dante Lauretta, Ph.D.
Dissertation: The R chondrite record of volatile-rich environments in the early Solar System
- M.S., University of Arizona, Tucson, AZ
Planetary Science
En route to Ph.D.
- May 2008 B. A., *cum laude*, Scripps College, Claremont, CA
Honors Chemistry, minor in East Asian studies
Advisors: Katie Purvis-Roberts, Ph.D., Mary Hatcher-Skeers, Ph.D.
Thesis topic: Effect of methylation on DNA backbone conformations

Awards and Honors

- 2023 San Antonio Business Journal “40 Under 40” honoree
- 2018 Recipient of NASA Group Achievement Award for Cassini Ion Neutral Mass Spectrometer Team during Solstice Mission
- 2017 Recipient of European Space Agency Group Achievement Award for Rosetta Mission
- 2016 Meteoritical Society Wiley Award for Student Presentation
- 2014 – 2016 NASA Earth and Space Sciences Fellow
- 2014 Galileo Circle Scholar

Currently Active Projects (excludes internal SwRI projects)

- “Carbon tracers of geologic activity on asteroid Benu,” Laboratory Analysis of Returned Samples, PI of team
- “Decomposition of complex organics in icy satellite interiors,” Solar System Workings, PI of team
- Calibration Lead for Europa Clipper MASPEX instrument
- Plumes Focus Group Co-Chair for Europa Clipper mission

Selected Research and Professional Experience

- 2020 - current Group Leader for In Situ Techniques Group, SwRI Division 15, Planetary Science Section
- 2019 - 2020 Technical Lead for In Situ Techniques Group, SwRI Division 15, Planetary Science Section
- 2017 – 2019 Research Scientist at Southwest Research Institute, San Antonio, TX
- 2016 – 2017 Postdoctoral Researcher at Southwest Research Institute, San Antonio, TX
Supervisor: Christopher R. Glein
- Utilizing Cassini and Rosetta data to understand the role of comets in building planetary bodies in the outer Solar System

Kelly E. Miller

6220 Culebra Rd
San Antonio, TX 78238

Curriculum Vitae

E-mail: kmiller@swri.edu
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- Studying the role of hydrothermal processes in the evolution of Enceladus, Titan, and other Ocean Worlds
 - Analysis of Cassini INMS data
 - Analysis of Rosetta ROSINA data
- 2011 – 2016 Research Assistant, LPL, University of Arizona, Tucson, AZ
Advisor: Dante Lauretta, Ph.D.
- Utilized EMPA, SIMS, and ICP-MS plus data from TEM for meteorite analyses
 - Developed thermodynamic models of meteorite formation
- 2008 Research Assistant, SETI, Mountain View, CA
Supervisor: Richard Quinn, Ph.D.
- Replicated electrochemical data from Phoenix Mars Lander in laboratory setting
 - Repaired and maintained laboratory equipment
- 2007 – 2008 Research Assistant, Joint Science Dept., Claremont Colleges, Claremont, CA
Advisor: Mary Hatcher-Skeers, Ph.D.
- Cleaned and prepared DNA samples
 - Collected and analyzed ³¹P NMR data on DNA backbone conformations
- 2007 (summer) REU Research Assistant, SETI, Mountain View, CA
Supervisor: Richard Quinn, Ph.D.
- Determined detection limits for Phoenix Mars Lander chronopotentiometry probes
- 2006 (summer) REU Research Assistant, Chemistry Dept., California State University, Los Angeles, CA
Supervisor: Alison McCurdy, Ph.D.
- Tested synthesis pathway for photo-responsive Ca²⁺ chelator

Peer-Reviewed Publications

h-index: 10 (Google Scholar Mar. 2023)

Johansson, F. L., Vigren, E., Waite, J. H., **Miller, K.**, Eriksson, A., Edberg, N., Dreyer, J. (2022) Implications from secondary emission from neutral impact on Cassini plasma and dust measurements. *Monthly Notices of the Royal Astronomical Society*.

Castillo-Rogez, J., Brophy, J., **Miller, K.**, Sori, M., Scully, J., et al. (2022) Concepts for the Future Exploration of Dwarf Planet Ceres' Habitability. *The Planetary Science Journal*, **3**.

Castillo-Rogez, J., Neveu, M., Vinogradoff, V., **Miller, K.**, Sori, M., et al. (2022) Science Drivers for the Future Exploration of Ceres: From Solar System Evolution to Ocean World Science. *The Planetary Science Journal*, **3**.

Blase, R. C., Libardoni, M. J., Miller, G. P., **Miller, K. E.**, Phillips-Lander, C. M., et al. (2022) MEMS GC column performance for analyzing organics and biological molecules for future landed planetary missions. *Frontiers in Astronomy and Space Sciences*, **9**.

Landis, M. E., Castillo-Rogez, J. C., Hayne, P. O., Hsieh, H., Hughson, K. H. G., et al. (2022) The case for a Themis asteroid family spacecraft mission. *Planetary and Space Science*, 105413.

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- Bouquet, A., **Miller, K. E.**, Glein, C. R., Mousis, O. (2021) Limits on the contribution of early endogenous radiolysis to oxidation in carbonaceous chondrites' parent bodies. *Astronomy and Astrophysics*, **653**.
- Bockelée-Morvan, D., Filacchione, G., Altwegg, K., Bianchi, E., Bizzarro, M., et al. (2021) AMBITION – comet nucleus cryogenic sample return. *Experimental Astronomy, Online First*.
- Buic, M. W., Keeney, B. A., Strauss, R. H., Blank, T. E., Moore, J. G., et al. (2021) Size and Shape of (11351) Leucus from Five Occultations. *The Planetary Science Journal*, **2**.
- Miller, K. E.**, Waite, J. H. , Perryman, R. S., Perry, M. E., Bouquet, A., et al. (2020) Cassini INMS constraints on the composition and latitudinal fractionation of ring rain material. *Icarus*, **339**, 113595.
- Blase, R. C., Libardoni, M. J., Miller, G. P., Miller, K. E., Phillips-Lander, C. M., et al. (2020) Experimental Coupling of a MEMS Gas Chromatograph and a Mass Spectrometer for Organic Analysis in Space Environments. *ACS Earth and Space Chemistry*, **4**, 1718.
- Castillo-Rogez, J. C., Neveu, M., Scully, J. E. C., House, C. H., Quick, L. C. et al. (2020) Ceres: Astrobiological Target and Possible Ocean World. *Astrobiology*, **20**.
- Miller, K. E.**, Glein, C., Waite, J. H. (2019) Contributions from accreted organics to Titan's atmosphere: New insights from cometary and chondritic data. *Astrophysical Journal*, **871**.
- Waite, J. H.*, Perryman, R. S.*, Perry, M. E.*, **Miller, K. E.***, Bell, J. et al. (2018) Chemical interactions between Saturn's atmosphere and rings. *Science*, **362**. *equally contributing authors
- Perry, M. E., Waite, J. H., Mitchell, D. G., **Miller, K. E.**, Cravens, T. E., et al. (2018) Material Flux From the Rings of Saturn Into Its Atmosphere. *Geophysical Research Letters*, **45**, 10093.
- Howell, S. M., Chou, L., Thompson, M. S., Bouchard, M. C., Cusson, S. et al. (2018) Camilla: A centaur reconnaissance and impact mission concept. *Planetary and Space Science*.
- Krot, A. N., Nagashima, K., Libourel, G. and **Miller, K. E.** (2018) Multiple mechanisms of transient heating events in the protoplanetary disk: Evidence from precursors of chondrules and igneous Ca,Al-rich inclusions. In *Chondrules*, eds. S. Russell, S. Krot, and H. Connolly.
- Miller, K. E.**, Lauretta, D. S., Connolly, H. C., Berger, E. L., Nagashima, K. et al. (2017) Formation of unequilibrated R chondrite chondrules and opaque phases. *Geochimica et Cosmochimica Acta*, **209**, 24-50.
- Waite, J. H., Glein, C. R., Perryman, R. S., Teolis, B. D., Magee, B. A., et al. (2017) Cassini finds molecular hydrogen in the Enceladus plume: Evidence for hydrothermal processes. *Science*, **356**, 155-159.
- Burton, A. S., McLain, H., Glavin, D. P., Elsila, J. E., Davidson, J., et al. (2015) Amino acid analyses of R and CK chondrites. *Meteoritics and Planetary Science*, **50**, 470-482.

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External Grants and Funding

NASA Laboratory Analysis of Returned Samples. “Carbon Tracers of Geologic Activity in Samples from Asteroid Bennu: Origins and Relationship of Carbonate and Organic Phases,” PI, \$275,597 to Miller (\$874,911 total award), 3/2023 – 3/2026

NASA Cassini Data Analysis Program. “Further Examination of Hydrogen from the Enceladus Plume by Cassini INMS,” Co-I, \$35k to Miller, 2/2021-2/2024

NASA Planetary Mission Concept Studies. “Assessing Dwarf Planet Ceres’ Past and Present Habitability Potential,” Co-I, \$9,365 to Miller, 1/2020 – 9/2020

NASA Solar System Workings. “Decomposition of complex organics in icy satellite interiors,” PI, \$182,201 to Miller (\$399,388 total award), 3/2019 – 3/2023

NASA Instrument Concepts for Europa Exploration 2. “MAss Spectrometer for Planetary EXploration-ORganic Composition Analyzer (MASPEX-ORCA) for Europa Lander,” Co-I, \$98k to Miller, 3/2019 – 11/2022

NASA Earth and Space Science Fellowship. “Tracing sulfur in the early Solar System with the Rumuruti chondrites,” Graduate Student Lead, \$90k total award, 9/2014 – 8/2016

Professional Development and Community Service

2022-2023	Member of search committee for Assistant Professor in Planetary Systems Modeling at Earth and Planetary Science Department Chair, University of Texas at San Antonio
2022	Member of ISSI team for Saturnian system Member of ISSI team for Titan habitability
2021	Member of search committee for Earth and Planetary Science Department Chair, University of Texas at San Antonio
2019	Member of ISSI team for Ring-Planet Interactions Member of EPSC/DPS Scientific Organizing Committee for Outer Planets Program Early Career Travel Recipient for Outer Planets Assessment Group spring meeting Completed SwRI Management Workshop and Performance Management courses directed at management of technical staff by technical staff
2018	Completed Bystander Intervention Training with Moses Milazzo at AGU meeting Secondary observer for Leucus occultation campaign for Lucy mission, Nov. 17, San Antonio, TX
2017	Systems engineer for Planetary Science Summer Seminar Centaurs mission design “Getting Started with IDL Programming” course, June 28-30, SwRI, San Antonio, TX

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- 2016 Early Career Travel Recipient for Small Bodies Assessment Group spring meeting
Establishing and Sustaining an Undergraduate Research Program, AGU Workshop, San Francisco, CA
- 2015 8th NAIC/NRAO School on Single Dish Radio Astronomy and 1st ALMA Interferometry School, Green Bank, WV
Grad Slam public speaking contestant, Tucson, AZ
ALMA Workshop, Star and Planet Formation Conference, Oracle, AZ
- 2014 Future Faculty Program, University of Tennessee, Knoxville, TN
LPL Conference coordinator, Tucson, AZ
- 2012 – 2014 Journal club student coordinator, LPL, University of Arizona, Tucson, AZ
- 2013 MELTS workshop, Goldschmidt Conference, Florence, Italy
- 2012 NASA Astrobiology Institute Scholar, Santander, Spain
- 2007 – 2008 President of Women in Science Club, Scripps College, Claremont, CA
- General Reviewer at *Meteoritics and Planetary Science*, *ACS Earth and Space Chemistry*, *Icarus*, *Planetary Science Journal*, and *Science*
Panel member for multiple NASA ROSES proposal reviews
Executive Secretary for multiple NASA ROSES proposal reviews
Judge for multiple rounds of GPSC Travel Grants at University of Arizona, Tucson, AZ
Judge for Stephen E. Dworkin Award at Lunar and Planetary Science Conference, The Woodlands, TX

Invited Talks

- 2022 Messages from the Deep: How Titan's Atmosphere Constrains Interior Conditions. *Carnegie Science Earth and Planets Laboratory General Seminar, November 21, 2022.*
- 2021 Sniffing Our Way Through the Solar System: Mass Spectrometry in Planetary Science. *Southwest Research Institute Tom Talks, October 28, 2021.*
Review of Current Constraints on the Origin of Titan's Atmosphere. *Titan Through Time 5 Workshop, August 11, 2021.*
CHONS Isotopes in the Search for Extraterrestrial Life. *Planetary Science Decadal Survey 2022-2032 Panel on Mars Meeting No. 10, February 16, 2021.*
- 2019 Cassini INMS Constraints on D Ring Volatile Influx Composition. *Cassini Rings Working Group Meeting, May 2019.*
- 2018 Cassini Ion Neutral Mass Spectrometer Measurements of D Ring Influx to Saturn's Atmosphere. *American Geophysical Union Fall Meeting 2018.*
Macromolecular Organics: From Primitive to Processed. *Carbon in the Solar System Panel Discussion, Division of Planetary Science 50th Meeting.*
Ion Neutral Mass Spectrometer Plenary Talk, *Cassini PSG #75*
- 2017 Origins of Planetary Volatiles: Stories from the Inner and Outer Solar System. *Jet Propulsion Laboratory, Pasadena, CA.*

Outreach Experience

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- 2022 Co-mentor for Brandeis High School Independent Study Mentorship program Judge for NWAY Lunar Cave Habitats Competition, March 2022
- 2021 Guest speaker for Space Club Career Chats (virtual), October 20, 2021
- 2020 Panelist for “R&D Opportunities in Aerospace,” hosted by Women of Aeronautics and Astronautics, September 14, 2020
Guest speaker for Space Club Career Chats (virtual), July 22, 2020;
December 2, 2020
- 2019 Guest speaker in Shannon Zavala’s 6th grade classroom at Briscoe Middle School, May 2019
Led the “Build a Comet” booth at Astronomy on Tap event at Witte Museum, February 2019
- 2018 Invited speaker for Lunar Cave Analog Test Sites 2018 kick-off event
Panelist for San Antonio Comic Con panel “Asteroids: Defending the Earth and the Future of Planetary Mining”
- 2017-2019 Founded monthly after-school STEM club for girls at Briscoe Middle School, San Antonio, TX
John Jay High School STEM Fest Volunteer, May 20, San Antonio, TX
Speaker for Powell Elementary School Summer STEM Program for Girls, June 21, San Antonio, TX
Speaker for Young Engineers and Scientists Program, August 2, San Antonio, TX
- 2015 Tucson Hebrew Academy STEM Festival Volunteer, Tucson, AZ
Speaker for Ms. Delgado’s middle school class, Tucson, AZ
Reviewer for undergraduate research conference talks, Tucson, AZ
- 2014 Art of Planetary Science volunteer, Tucson, AZ
Summer Science Saturday volunteer, Tucson, AZ
Updated descriptions for LPL impact and igneous samples outreach kit
Meteorite Outreach training, Tucson, AZ
Guest speaker at Tanque Verde High School, Tucson, AZ
- 2013 OSIRIS-REx Ambassador at Boys and Girls Club, Tucson, AZ
Co-founded Starlight Science Cinema summer series, Tucson, AZ
Science in the City volunteer, Tucson, AZ
- 2012 OSIRIS-REx Ambassador at Flandrau Science Center, Tucson, AZ
OSIRIS-REx Ambassador training, Tucson, AZ
Fun Fest volunteer, Tucson, AZ
- 2006 Guest teacher for 5th grade class at Chaparral Elementary School on a biweekly basis, Claremont, CA

Teaching Experience

- 2019 (fall) Guest lecturer for Planetary Science graduate level course, University of Texas San Antonio, TX
- 2013 (spring) Teaching Assistant, LPL, University of Arizona, Tucson, AZ
PTYS 214 Astrobiology: A Planetary Perspective
Supervisor: Ilaria Pascucci, Ph.D.
- 2012 (fall) Teaching Assistant, LPL, University of Arizona, Tucson, AZ
PTYS 206 Our Golden Age of Planetary Exploration

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2010 – 2011	Supervisor: Steve Kortenkamp, Ph.D. Native English Teacher, GEPIK, Jungang Elementary School, Pyeongtaek, South Korea
2009 – 2010	Native English Teacher, GEPIK, Seongho Middle School, Osan, South Korea
2007 – 2008	Teaching Assistant, Joint Science Dept., Claremont Colleges, Claremont, CA 116L – 117L Organic Chemistry Laboratory Supervisors: Kersey Black, Ph.D., Thomas Poon, Ph.D.
2005 – 2007	Teaching Assistant, Joint Science Dept., Claremont Colleges, Claremont, CA 14L – 15L General Chemistry Laboratory Supervisors: Anthony Fucaloro, Ph.D., Thomas Davis

Laboratory Techniques

Time of flight mass spectrometry	Vacuum systems
Electron microprobe analysis	Chronopotentiometry
Secondary Ion Mass Spectrometry	Cyclic voltammetry
Solution and laser ablation ICP-MS	NMR
Optical microscopy	Electron impact mass spectrometry

Software

IDL	Microsoft Excel
MATLAB	Microsoft Word
Mac OS	Microsoft Powerpoint
Windows OS	Endnote
Adobe Illustrator	HSC
Adobe Photoshop	MELTS (familiar)
Adobe Reader	

Professional Memberships

Geological Society of America	American Geophysical Union
Meteoritical Society	American Astronomical Society
Sigma Xi	

Field Experience

May 16-30, 2014	Volcano National Park, Hawai'i - Compared radar and visual remote sensing data sets with ground observations - Collected samples for geochemical analyses - Conducted comparative study of lava morphologies in IR
Sept. 26-30, 2013	Northern New Mexico and Southern Colorado - Studied lava flows in the El Malpais region and the K/T boundary
Mar. 28-31, 2013	Mojave Desert - Studied dunes and volcanic processes - Compared radar remote sensing data with ground observations
Oct. 26-28, 2012	Tucson local geology

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- Studied formation and evolution of mountain ranges surrounding Tucson
- Sept. 21-23, 2012 Surfaces class field trip, Northern Arizona
 - Studied SP Crater, Grand Falls, Meteor Crater as examples of topics discussed in lectures
- Sept. 23-25, 2011 Canyon de Chelly and Painted Desert
 - Studied sedimentary and metamorphic processes in northern Arizona