

Contact Information	Rita Parai Assistant Professor Department of Earth and Planetary Sciences Washington University in St. Louis 1 Brookings Drive St. Louis, MO 63130	Ph: +1 (314) 935-3974 Email: parai@wustl.edu
Website	https://isotopic.wustl.edu	
Professional Experience	Assistant Professor, Washington University in St. Louis Carnegie Post-doctoral Fellow, Department of Terrestrial Magnetism (now the Earth and Planets Laboratory), Carnegie Institution for Science, Washington, D.C., 2014 – 2016 Post-doctoral Fellow, Harvard University	2016 – present 2014 – 2016 2014
Education	Ph.D., Harvard University, Earth and Planetary Sciences <i>Volatiles in the Earth and Moon: Constraints on planetary formation and evolution</i> A.M., Harvard University, Earth and Planetary Sciences A.B., Harvard University, cum laude in Earth and Planetary Sciences	May 2014 March 2012 June 2007
Research Interests	Origin of volatiles in terrestrial planets, early Earth environments, timing and mechanism of lunar formation, origin and evolution of Earth's atmosphere, chemical cycling between deep Earth and surface reservoirs, nature of mantle heterogeneities, chemical constraints on geodynamics. Numerical modeling techniques, development of next-generation high-precision multi-collector mass spectrometry techniques for terrestrial and planetary materials.	
Awards and Honors	NSF CAREER Award Carnegie Post-doctoral Fellowship NSF Graduate Research Fellowship Harvard University Graduate Merit Fellowship Stephen E. Dworkin Planetary Geoscience Student Paper Award, Geological Society of America AGU Volcanology, Geochemistry, Petrology Outstanding Student Paper Award (Oral Presentation) Shaler Teaching Award, Harvard Department of Earth and Planetary Sciences Harvard University Certificate of Distinction in Teaching National Merit Scholarship Winner Robert C. Byrd Honors Scholarship	2022-2027 2014-2016 2009-2013 2013 2013 2010 2010 2009, 2010 2003 2003

Professional Memberships

American Geophysical Union, Geochemical Society

Manuscripts in Review (*indicates first authors are students or post-docs in my group)

1. R. Parai. Primordial noble gas isotopes from immoderate crushing of an Icelandic basalt glass (in review at *Geochemical Perspectives Letters*).
2. M. H. Barickman*, S. J. Turner, J. Rodriguez, D. A. Fike, C. Jones, K. Wang, I. P. Savov, S. Agostini, **R. Parai**. Boron isotopes in Central American volcanics indicate a key role for the subducting oceanic crust (in review at *Earth and Planetary Science Letters*).
3. D. Weis, K. Harpp, L. Harrison, M. Boyet, C. Chauvel, C. Farnetani, V. Finlayson, K. Lee, **R. Parai**, A. Shahar, N. Williamson. The Importance of Mantle Plumes as Probes of Earth's Interior (invited, in review *Nature Reviews Earth & Environment*).

Publications

4. X. J. Zhang*, G. Avice, **R. Parai** (2023). Noble gas insights into early impact delivery and volcanic outgassing to Earth's atmosphere: a limited role for the continental crust. *Earth and Planetary Science Letters* 609, 118083.
5. G. Avice, **R. Parai**, S. Jacobson, J. Labidi, M.G. Trainor, M.P. Petkov (2022). Noble gases and stable isotopes track the origin and early evolution of the Venus atmosphere. *Space Science Reviews* 218, 60.
6. S. Cottaar, C. Martin, Z. Li, **R. Parai** (2022). The root to the Galápagos mantle plume on the core-mantle boundary. *Seismica* 1 (1). doi.org/10.26443/seismica.v1i1.197.
7. **R. Parai** (2022). A dry ancient plume mantle from noble gas isotopes. *Proceedings of the National Academy of Sciences* 119 (29) e2201815119.
8. **R. Parai** and S. Mukhopadhyay (2021). Heavy noble gas signatures of the North Atlantic Popping Rock 2ΠD43: Implications for mantle noble gas heterogeneity. *Geochimica et Cosmochimica Acta* 294, 89-105.
9. S. J. Lock, K.R. Bermingham, **R. Parai**, and M. Boyet (2020). Geochemical constraints on the origin of the Moon and preservation of ancient terrestrial heterogeneities. *Space Science Reviews* 216, 109.
10. **R. Parai** (2020). Primordial nitrogen variations in the mantle (News & Views). *Nature* 580, 324-325 (2020).
11. **R. Parai**, S. Mukhopadhyay, J.M. Tucker, M.K. Peto (2019). The emerging portrait of an ancient, heterogeneous and continuously evolving mantle plume source. *Lithos* 346-347, 105153.
12. S. Mukhopadhyay and **R. Parai** (2019). Noble Gases: A record of Earth's Evolution and Mantle Dynamics. *Annual Review of Earth and Planetary Sciences*. (47) 389-419.
13. **R. Parai** and S. Mukhopadhyay (2018). Xenon isotopic constraints on the history of volatile recycling. *Nature* 560 (7717): 223-227.
14. **R. Parai** and S. Mukhopadhyay (2015). The evolution of MORB and plume mantle volatile budgets: Constraints from fission Xe isotopes in Southwest Indian Ridge basalts. *Geochemistry Geophysics. Geosystems*, 16, 719-735.

15. **R. Parai**, S. Mukhopadhyay and J.J. Standish (2012). Heterogeneous upper mantle Ne, Ar and Xe isotopic compositions and a possible Dupal noble gas signature recorded in basalts from the Southwest Indian Ridge. *Earth and Planetary Science Letters*, 359-360, 227-239.
16. **R. Parai**, S. Mukhopadhyay (2012). How large is the subducted water flux? New constraints on mantle regassing rates. *Earth and Planetary Science Letters*, 317-318, 396-406.
17. **R. Parai**, S. Mukhopadhyay, J.C. Lassiter (2009). New constraints on the HIMU mantle from neon and helium isotopic compositions of basalts from the Cook-Austral Islands. *Earth and Planetary Science Letters* 277, 253-261.
18. S.P. Patel, R. Parai, **R. Parai**, D.L. Campbell (2004). Regulation of Kv4.3 voltage-dependent gating kinetics by KChIP2 isoforms. *Journal of Physiology*. 557, 19-41. (product of summer research experience; second author is my brother, who worked in the same lab)

Collaborative Scientific Activities

- Apollo Next Generation Sample Analysis (**ANGSA**) Science Team, co-investigator and Lead Scientist for analysis of gas extracted from lunar core 73001 (2018-present; PI Charles Shearer, University of New Mexico; WUSTL PI Bradley Jolliff)
- **VATMOS-R** Science Team Member, proposal for Venus atmospheric sample return mission (2019-present, PI Christophe Sotin, Université de Lorraine; formerly the “Cupid’s Arrow” mission concept)
- **Prometheus** Science Team Member, proposal for Io volcanic plume sample return mission (2022-present; PI Ryan Ogliore, WUSTL)

Field Work

Principle Investigator, sample collection from the Azores Archipelago, 2023

Collection of subaerially-erupted basalt samples to investigate mantle volatile origins and signatures of volcanic outgassing in the Azores mantle plume

Shipboard Scientist aboard the *R/V Knorr*, 2012

Dredging, core sampling and geophysical investigation of the Mid-Atlantic Ridge between the Kane and Atlantis Fracture Zones

Graduate student, sample collection from Mlöfell, Iceland, 2010

Collection of subglacially-erupted basalt glass samples to investigate primordial noble gas signatures

Detailed External Funding Information (Awarded)

	Grants as PI	Grants as Co-I	Total grants
to WUSTL	\$1,959,488	\$569,305	\$2,528,753
to Parai	\$1,624,756	\$47,879	\$1,672,635

- National Aeronautics and Space Administration. Consortium for the Advanced Analysis of Apollo Samples (Apollo Next Generation Sample Analysis).
Role: Co-Investigator
PI: Charles Shearer (University of New Mexico); **WUSTL PI:** Bradley Jolliff
Dates: 02/01/2019 to 05/01/2023
Total: \$4.8M to WUSTL: \$496,337 to Parai: \$23,556

- Department of Energy, National Nuclear Security Administration. Seeing through the fission: Multi-modal analyses of actinides and noble gas isotopes in geological samples (DE-NA0003911).
Role: Principal Investigator
Co-I: David Fike (WUSTL)
Dates: 06/15/2019 to 09/14/2022
Total: \$750,000 to WUSTL: \$750,000 to Parai: \$531,501
 - National Science Foundation, Division of Earth Sciences, Petrology and Geochemistry. EAGER: Collaborative Research: Development and application of Sr stable isotopes as a novel tracer of carbonate through subduction (1939189).
Role: Co-Principal Investigator
Co-PI: Stephen Turner (UMass Amherst)
Dates: 09/01/2019 to 08/31/2023
Total: \$123,053 to WUSTL: \$38,549 to Parai: \$38,549
 - National Aeronautics and Space Administration. A Gas Distribution Manifold for the Opening of Vacuum Sealed Apollo 17 Drive tube core 73001.
Role: Co- Investigator
PI: Bradley Jolliff (WUSTL)
Dates: 09/28/2020 to 08/31/2022
Total: \$72,968 to WUSTL: \$72,968 to Parai: \$24,323
 - National Science Foundation, Division of Earth Sciences, Petrology and Geochemistry. CAREER: Heavy Noble Gases in the Azores Archipelago (2145663).
Role: Principal Investigator
Dates: 06/01/2022 to 05/31/2027
Total: \$720,899 to WUSTL: \$720,899 to Parai: \$720,899
 - Department of Energy, National Nuclear Security Administration. Seeing through the fission phase 2: Multi-modal analyses of actinides and noble gas isotopes in geological samples (DE-NA0004094).
Role: Principal Investigator
Co-I: David Fike (WUSTL)
Dates: 06/15/2022 to 06/14/2025
Total: \$450,000 to WUSTL: \$450,000 to Parai: \$333,807
- PENDING PROPOSAL:
- National Aeronautics and Space Administration, Solar System Exploration Research Virtual Institute Program. SAMPLE: Sample Analysis of Materials in Preparation for Lunar Exploration.
Role: Co-Investigator
PI: Stephen Elardo (University of Florida)
Duration: 5 years
Total: \$7.5M to WUSTL: \$149,033 to Parai: \$149,033

Invited Talks and Seminars (39 total)

- 2023 Developments in Noble Gas Understand and Expertise VIII (invited talk)
- 2023 Gordon Research Conference: Interior of the Earth (invited discussion leader)
- 2023 Michigan State University, Department Colloquium
- 2022 American Geophysical Union Fall Meeting
- 2021 Physical Research Laboratory (Ahmedabad, India)
- 2021 Woods Hole Oceanographic Institution, Department Colloquium
- 2021 V. M. Goldschmidt Conference (**Keynote** at session honoring Prof. Yuji Sano)
- 2021 Arizona State University, Geophysics Seminar Series
- 2021 NASEM Planetary Science and Astrobiology Decadal Survey Panel: Venus
- 2020 American Geophysical Union Fall Meeting
- 2020 University of Nevada, Reno, Department Colloquium
- 2020 University of Kentucky, Geophysics and Tectonics Seminar
- 2020 Lamont Doherty Earth Observatory, Geodynamics Seminar (canceled; COVID)
- 2019 American Geophysical Union Fall Meeting
- 2019 Fondation Des Treilles, Seminar: Planetary Atmospheres (Cannes, France)
- 2019 University of Chicago, Department Colloquium
- 2019 Yale University, Department Colloquium
- 2019 UCLA, Department Colloquium
- 2018 American Geophysical Union Fall Meeting
- 2018 ISSI Workshop, Early Solar System (Bern, Switzerland)
- 2018 Northwestern University, Department Colloquium
- 2018 Cooperative Institute for Dynamic Earth Research, Lecturer
- 2017 American Geophysical Union Fall Meeting
- 2017 V. M. Goldschmidt Conference
- 2017 Gordon Research Conference: Interior of the Earth (invited speaker)
- 2017 McGill University, Department Colloquium
- 2016 American Geophysical Union Fall Meeting
- 2016 V. M. Goldschmidt Conference
- 2016 Johns Hopkins University, Department Colloquium
- 2015 American Geophysical Union Fall Meeting
- 2015 Brown University, Department Colloquium
- 2015 Princeton University, Solid Earth Seminar
- 2015 Washington University in St. Louis, Department Colloquium
- 2015 University of Maryland, Department Colloquium
- 2014 MIT, Chemical Oceanography and Biogeochemistry Seminar
- 2013 American Geophysical Union Fall Meeting
- 2013 Brown University, Lunch Bunch Seminar
- 2012 Boston University, Solid Earth Seminar
- 2012 V. M. Goldschmidt Conference

Conference Proceedings (60 total; *indicates the first author is a student or post-doc in my group)

1. R. C. Ogliore, R. M. C. Lopes, A. E. Hofmann, N. J. Turner, S. J. Bolton, K. R. de Kleer, W. A. Hoey, J. Kargel, J. T. Keane, Y. Liu, W. B. McKinnon, K. L. Mitchell, A. V. Oza, **R. Parai**, W. D. Smythe, Z. Váci, L. Vanderkluisen, D. A. Williams, R. Wright, and M. Yu. Zolotov. The Science Case for Io Sample Return. 54th Lunar and Planetary Science Conference, 2023.
2. **R. Parai**. A Dry Plume Mantle at the End of Accretion. American Geophysical Union Fall Meeting 2022 (*invited talk*).

3. S. Patzkowsky* and **R. Parai**. The Impact of Ancient Mantle Xe Archives on Geodynamic Evolution Models. American Geophysical Union Fall Meeting 2022.
4. X. J. Zhang*, **R. Parai**, J.C. Lassiter. Noble Gas Isotopic Insights into Primordial and Recycled Volatiles in the Cook-Austral HIMU Mantle. American Geophysical Union Fall Meeting 2022.
5. K.A. Woody* and **R. Parai**. Plume-ridge interaction and the nature of the Easter-Salas y Gomez Hotspot from heavy noble gas isotopic measurements. American Geophysical Union Fall Meeting 2022.
6. A. Hammerstrom, **R. Parai**, R.W. Carlson, S.J. Turner. Stable Sr Isotope ($\delta^{88}\text{Sr}$) Constraints on Nicaraguan Arc Subduction Fluxes and Carbonate Recycling. American Geophysical Union Fall Meeting 2022.
7. A. Borner, J. Rabinovitch, M.A. Gallis, **R. Parai**, M.P. Petkov, G. Avice and C. Sotin. The VATMOS-SR Mission Concept: DSMC Studies of the Gas Sampling. 32nd International Symposium on Rarefied Gas Dynamics. Seoul, South Korea, 2022.
8. A. Borner, J. Rabinovitch, M.A. Gallis, **R. Parai**, M.P. Petkov, G. Avice and C. Sotin. Direct Simulation Monte Carlo Studies of the Gas Sampling for the VATMOS-SR Mission Concept. 2nd International Conference on Flight Vehicles, Aerothermodynamics and Re-entry Missions & Engineering. Heilbronn, Germany, 2022.
9. Z.D. Sharp, C. K. Shearer, A. Meshik, **R. Parai**, O. Pravdivtseva, W. Cassata, J. Gross, F.M. McCubbin, R.A. Zeigler, B. Jolliff and F. McDonald. Major Element Gas Composition of the Apollo 73001 Inner (CSV) and Outer Containers. Apollo 17 ANGSA Workshop 2022.
10. T. Schild, F. McDonald, P. de Medeiros, M. Apolloni, N. Bamsey, R. Biella, Y. Butenko, A. Dowson, A. Cowley, R. Lindner, A. Makaya, F. Scharnhözl, S. Eckley, J. Gross, B. Jolliff, F. McCubbin, A. Meshik, **R. Parai**, O. Pravdivtseva, Z. Sharp, C. K. Shearer, R.A. Zeigler. Piercing Device for Gas Extraction from Apollo 17 Sample Container: Final Design and Key Learnings. Apollo 17 ANGSA Workshop 2022.
11. **R. Parai**, J. Rodriguez, S. Patzkowsky, N. Solari, K. A. Woody, A. Meshik, O. Pravdivtseva, B. L. Jolliff, C. K. Shearer, Z. D. Sharp, W. Cassata, R. Zeigler, J. Gross, F. M. McCubbin, F. McDonald, and the ANGSA Science Team. Noble Gas Isotopes in the Apollo 17 73001 Core Sample Vacuum Container Gas. Apollo 17 ANGSA Workshop 2022.
12. F. McDonald, T. Schild, N. Bamsey, M. Apolloni, R. Biella, Y. Butenko, A. Dowson, S. Eckley, J. Gross, B. Jolliff, R. Lindner, A. Makaya, F. McCubbin, A. Meshik, **R. Parai**, O. Pravdivtseva, Z. Sharp, C. K. Shearer, R. Zeigler, and the ANGSA Science Team. A unique lunar gas extraction event as part of the ANGSA Program and the lessons learned for a new generation of sample return missions, EPSC2022-1117. Europlanet Science Congress 2022.
13. F.M. McCubbin, C. K. Shearer, R. A. Zeigler, J. Gross, C. Krysher, R. Parai, O. Pravdivtseva, A. Meshik, F. McDonald, Z.D. Sharp, S. Eckley, R.D. Hanna, R.A. Ketcham, J. Mitchell, K.C. Welten, J.J. Barnes, M.D. Dyar, K. Burgess, N.M. Curran, J.E. Elsila, J. Gillis-Davis, A. Sehlke, B.A. Cohen and the ANGSA Science Team. Overview of Progress for the Apollo Next Generation Sample Analysis (ANGSA). 85th Annual Meeting of The Meteoritical Society, 2022.

14. G. Avice, **R. Parai**, S. Jacobson, J. Labidi, M. G. Trainer, M. P. Petkov. Noble Gases and Stable Isotopes Track the Origin and Early Evolution of the Venus Atmosphere. Lunar and Planetary Institute – Ancient Venus Conference 2022.
15. X. J. Zhang*, G. Avice and **R. Parai**. The coupled evolution of Earth's upper mantle, continental crust, and atmosphere from noble gas isotopes. American Geophysical Union Fall Meeting 2021.
16. J. Rodriguez and **R. Parai**. Development of new high-precision noble gas methods for the study of terrestrial volatile origins and evolution. American Geophysical Union Fall Meeting 2021.
17. S. Patzkowsky* and **R. Parai**. Investigation of the effect of episodic outgassing on mantle xenon isotopes. American Geophysical Union Fall Meeting 2021.
18. **R. Parai**. Accretion of a volatile-poor plume mantle from noble gas isotopes. V.M. Goldschmidt Conference 2021 (*invited keynote talk*).
19. **R. Parai**, J. Rodriguez, A. Meshik, O. Pravdivtseva, P. Will, B. L. Jolliff, W. S. Cassata, Z. Sharp, C. K. Shearer, S. B. Simon, and the ANGSA Science Team. A gas extraction manifold for the Apollo 17 73001 Core Sample Vacuum Container. 52nd Lunar and Planetary Science Conference, 2021.
20. **R. Parai**. Mantle plume source volatile accretion, degassing and regassing. American Geophysical Union Fall Meeting 2020 (*invited talk*).
21. S. Mukhopadhyay, C.D. Williams, **R. Parai**, J.M. Tucker, M.L. Rudolph and B. Romanowicz. The Record of Early-Formed Heterogeneities Preserved in the Modern-day Mantle. V.M. Goldschmidt Conference 2020.
22. **R. Parai**, S. Mukhopadhyay, J.M. Tucker and M.K. Pető. Superimposed Signatures of Ancient Heterogeneity and Long-term Volatile Transport from Noble Gases. American Geophysical Union Fall Meeting 2019 (*invited talk*).
23. M. H. Barickman*, S. J. Turner, **R. Parai**, D. A. Fike, M. Krawczynski and K. Wang. Boron isotopic constraints on slab and mantle-derived fluid and melt sources of Nicaraguan volcanics. American Geophysical Union Fall Meeting 2019.
24. **R. Parai**. Injection of atmospheric xenon into the deep Earth. Fondation Des Treilles Seminar: Origin and evolution of planetary atmospheres - Earth, Mars, Venus. Tourtour, France, 2019.
25. **R. Parai**, S. Mukhopadhyay. Xe Isotopic Constraints on the History of Deep Earth Volatile Recycling. American Geophysical Union Fall Meeting 2018 (*invited talk*).
26. **R. Parai**. Noble gas constraints on Earth formation and early evolution including magma oceans. ISSI Workshop: Reading Terrestrial Planet Evolution in Isotopes and Element Measurements. Bern, Switzerland, 2018 (*invited talk*).
27. A.G. Grima, R. Citron, M. T. Escobar, X. Lin, D. J. Louro Lourenço, A. Wilson, S. A. Wipperfurth, J. Yan, S. Cottaar, L. Montesi, S. Mukhopadhyay, **R. Parai** and M. L. Rudolph. Effects of heat-producing elements on the long-term evolution of thermochemical piles at the base of the mantle. American Geophysical Union Fall Meeting 2018.
28. **R. Parai** and S. Mukhopadhyay. Terrestrial upper mantle I-Pu-Xe and the age of the Moon. V.M. Goldschmidt Conference 2017 (*invited talk*).

29. **R. Parai**. Ancient and relatively modern mantle heterogeneities from xenon isotopes in mantle rocks. Gordon Research Conference: Interior of the Earth 2017 (*invited talk*).
30. **R. Parai** and S. Mukhopadhyay. Xenon isotopic constraints on deep volatile cycling over Earth history. American Geophysical Union Fall Meeting 2016 (*invited talk*).
31. **R. Parai** and C.R.M. Jackson. Recycled and primordial noble gas components in the upper mantle. V. M. Goldschmidt Conference 2016 (*invited talk*).
32. S. Mukhopadhyay, **R. Parai**, J.M. Tucker, J.L. Middleton and C.H. Langmuir. Circumventing shallow air contamination in Mid Ocean Ridge Basalts. European Geosciences Union General Assembly 2016.
33. J.D. Gilmour and **R. Parai**. The Cosmochemistry of Terrestrial Xenon. 79th Annual Meeting of the Meteoritical Society, 2016.
34. R. Parai and S. Mukhopadhyay. Xenon isotopic constraints on the timing of atmospheric volatile recycling. American Geophysical Union Fall Meeting 2015.
35. S. Mukhopadhyay, **R. Parai**, J.M. Tucker, J.L. Middleton and C.H. Langmuir. Early and long-term mantle processing rates derived from xenon isotopes. American Geophysical Union Fall Meeting 2015.
36. S. Mukhopadhyay, **R. Parai**, J.M. Tucker, J.L. Middleton and C.H. Langmuir. The Noble Gas Anatomy of a Depleted MORB Popping Glass. V.M. Goldschmidt Conference 2015.
37. **R. Parai** and S. Mukhopadhyay. Constraints on the timing of the Moon-forming giant impact from MORB Xe isotopes. American Geophysical Union Fall Meeting 2014.
38. S. Mukhopadhyay, S.T. Stewart, S. Lock, **R. Parai** and J. Tucker. Late Impacts and the Origins of the Atmospheres on the Terrestrial Planets. American Geophysical Union Fall Meeting 2014.
39. S. Mukhopadhyay, S. Stewart, J. Tucker, **R. Parai** and S. Lock. Chemical Heterogeneities Survive Giant Impacts and Mantle Convection. V.M. Goldschmidt Conference 2014.
40. **R. Parai**, S. Huang and S.B. Jacobsen. The Initial $^{87}\text{Sr}/^{86}\text{Sr}$ of the Solar System and the Age of the Moon. 45th Lunar and Planetary Science Conference, 2014.
41. **R. Parai**, M.K. Pető, J.M. Tucker and S. Mukhopadhyay. The Emerging Portrait of an Ancient, Heterogeneous and Continuously Evolving Plume Source (*invited talk*). American Geophysical Union Fall Meeting 2013.
42. S. Mukhopadhyay, S.T. Stewart, S. Lock, **R. Parai**, M.K. Pető and J. Tucker. Sculpting the Volatile Content of the Earth through Giant Impact-induced Atmospheric Loss and Magma Oceans. American Geophysical Union Fall Meeting 2013.
43. S. Mukhopadhyay, **R. Parai**, J.M. Tucker and M.K. Pető. Of Ancient Reservoirs and Recycled Noble Gases. V.M. Goldschmidt Conference 2013.
44. **R. Parai**, S. Huang and S.B. Jacobsen. Early Solar System ^{87}Rb - ^{87}Sr Chronology. V.M. Goldschmidt Conference 2013.
45. **R. Parai**, S.B. Jacobsen, S. Huang. Strontium Isotopic Constraints on Early Solar System Chronology. 44th Lunar and Planetary Science Conference, 2013.
46. S. Mukhopadhyay, R. Parai, M.K. Pető, J.M. Tucker. The recycling efficiency of water and noble gases to the mantle. American Geophysical Union Fall Meeting 2012.

47. **R. Parai** and S. Mukhopadhyay. How Large is the Subducted Water Flux? New Constraints on Mantle Regassing Rates. V.M. Goldschmidt Conference 2012 (*invited talk*).
48. S. Mukhopadhyay, M.K. Pető, **R. Parai** and J.M. Tucker. Early Planetary Differentiation and Volatile Accretion Recorded in Deep Mantle Xenon Isotopes. V.M. Goldschmidt Conference 2012.
49. **R. Parai**, S. Huang and S.B. Jacobsen. Precise Determination of Calcium Isotope Variations in Meteoritic and Planetary Materials. 43rd Lunar and Planetary Science Conference, 2012.
50. **R. Parai**, S. Mukhopadhyay and J.J. Standish. A Spatial Gradient in Helium, Neon, and Argon Isotopes Along the Southwest Indian Ridge. American Geophysical Union Fall Meeting 2011.
51. **R. Parai** and S. Mukhopadhyay. Global Flux Balance in the Terrestrial H₂O Cycle: Reconsidering the Post-Arc Subducted H₂O Flux. American Geophysical Union Fall Meeting 2010.
52. W. F. McDonough, B. A. Buffett, V. F. Cormier, S. Cottaar, E. A. Day, S. Dou, S. W. French, J.C. Irving, A. Kavner, M. P. Panning, **R. Parai** and I. Rose. A stratified layer of light elements at the top of the outer core. American Geophysical Union Fall Meeting 2010.
53. **R. Parai**, S. Mukhopadhyay and J.J. Standish. Heavy Noble Gases from the Southwest Indian Ridge: Insights into Upper Mantle Heterogeneity. V.M. Goldschmidt Conference 2010.
54. S. B. Jacobsen, M. C. Ranen, R. Chakrabarti, J. Farkas, S. Huang, **R. Parai**, G. Yu, and A. Zindler. The Isotopic Composition of the Lunar Crust and the Age and Origin of the Moon: Evidence from Lunar Soils. 41st Lunar and Planetary Science Conference, 2010.
55. J.J. Standish, S. Mukhopadhyay and **R. Parai**. Correlations Between Helium Isotopes and Major Elements Along the Southwest Indian Ridge. American Geophysical Union Fall Meeting 2009.
56. **R. Parai**, S. Mukhopadhyay and J.J. Standish. Heavy Noble Gases from the Southwest Indian Ridge: Insights into the Nature and Distribution of Mantle Heterogeneities. American Geophysical Union Fall Meeting 2009.
57. **R. Parai** and S.B. Jacobsen. Precise Determination of Initial Solar System ⁸⁷Sr/⁸⁶Sr and Implications for Early Solar System Chronology. 40th Lunar and Planetary Science Conference, 2009.
58. A.M. Davis, I. Veryovkin, T. Stephan, M. Pellin, M. Savina, **R. Parai**, K. Knight and J. Levine. Construction of the Ion Nanoprobe: A Progress Report. V.M. Goldschmidt Conference 2008.
59. S. Mukhopadhyay, H. Gonnermann, and **R. Parai**. Preserving High ³He/⁴He Ratios in a Convective Mantle. V.M. Goldschmidt Conference 2008.
60. **R. Parai**, S. Mukhopadhyay and J.C. Lassiter. New Constraints on the HIMU Source from Helium and Neon Isotopic Compositions of Basalts from the Cook-Austral Islands. American Geophysical Union Fall Meeting 2006.

Academic Service

- Reviewer for: Nature, Science, Proceedings of the National Academy of Sciences, Nature Communications, Nature Geoscience, Philosophical Transactions of the Royal Society A, Earth and Planetary Science Letters, Geochemistry Geophysics Geosystems, Geochimica et Cosmochimica Acta, Icarus, Geochemical Perspectives Letters, Chemical Geology.
- Science Advisor, *Eos* (AGU publication; 2021 – present)
- Member, Executive Committee for the Study of Earth's Deep Interior Section, American Geophysical Union (*Eos* liaison; 2021 – present)
- Member, Canvassing Committee for the Volcanology, Geochemistry, Petrology Section, American Geophysical Union (2023 – present)
- Member, Clarke Award Selection Committee, Geochemical Society (2022 – present)

Department Service

- Member, Graduate Studies Committee (2018 – present)
- Member, Strategic Planning Committee (2023 – present)
- Chair, Building Space, Infrastructure and EHS Committee (2023 – present)
- Member, Fossett Postdoctoral Fellowship Committee (2017 – 2023)
- Member, Strategic Communications Committee (2016 – 2023)

University Service

Advisory Council, McDonnell Center for Space Sciences (2020 – present)

TEACHING AT WASHINGTON UNIVERSITY

EPSc 105: First Year Seminar - Habitable Planets (Fall 2016 – present)

EPSc 545: Radiogenic Isotope Geochemistry (Spring 2018 – present, alternate years)

EPSc 565: Mantle Geochemistry (Spring 2019 – present, alternate years)

Current Advising

Samuel Patzkowsky (PhD student)
Kelsey Woody (PhD student)
Becca Hahn (dissertation committee)
Henry Dawson (dissertation committee)
Rylan Gottron (major advisee)
Hannah Silverman (major advisee)
Kenzie Mounir (major advisee)
Allison Barker (major advisee)

Prior Advising

Dr. Stephen J. Turner (postdoc), now Lecturer at UMass Amherst
Mattison H. Barickman (M.A. 2020), now a Geologist at HDR
Nhia Solari (graduate advisee)
Dr. David Bekaert (dissertation committee, Université de Lorraine)
Dr. Josiah Lewis (dissertation committee)
Dr. Andrea Goltz (dissertation committee)
Xinmu (Judy) Zhang (undergraduate thesis, major advisee)
Julian Rodriguez (undergraduate thesis advisee)
Lea Cross (major advisee)
Benjamin Tiger (major advisee)
Hannah Bloom (major advisee)
Rowan Behnke (major advisee)