

# James Eguchi

## NASA Postdoctoral Program Fellow

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Department of Earth & Planetary Sciences • University of California, Riverside

• Riverside, CA • USA

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**Research Interests:** Cycling of volatiles between Earth and planetary interiors. I am particularly interested in how igneous and metamorphic processes in planetary interiors affect surface processes.

### **Current Appointment:**

- Postdoctoral Associate 2022-Present  
Rutgers University – Department of Earth & Planetary Sciences  
Supervisor: Benjamin Black

### **Past Appointments:**

- NASA Postdoctoral Program Fellow 2019-2022  
NASA Astrobiology Institute – Alternative Earths Team  
Supervisor: Timothy Lyons  
Project: Evolution of atmospheric O<sub>2</sub> and CO<sub>2</sub> driven by planetary tectonics

### **Education:**

- Ph.D. Rice University (Geology) 2019  
Thesis Advisor: Rajdeep Dasgupta  
Thesis: Carbon in graphite-saturated silicate melts – Implications for the oxidation state of Earth's surface and interior
- M.S. UCLA (Geology) 2014  
Thesis Advisor: Craig Manning  
Thesis: Calcite solubility in H<sub>2</sub>O-NaCl-KCl-LiCl solutions at elevated pressure and temperature.
- B.S. UCLA (Geology) 2012

### **Research Experience Prior to M.S.:**

- 2010-2012 Undergraduate Research Assistant in UCLA PTX Laboratory with Craig Manning
- 2012 Summer Intern at Institute for Study for Earth's Interior, Okayama University with Xianyu Xue and Kanzaki Masami

### **Awards:**

- 2019-2022 NASA Postdoctoral Program Fellowship – NASA
- 2019 Leroy Caleb Gibbon Award – Rice Earth, Environmental, & Planetary Sciences
- 2017-2018 Lodieska Stockbridge Vaughn Fellowship – Rice Office of Graduate & Postdoctoral studies
- 2018 Third Place Poster – Houston Geological Society Meeting

- 2016                      Torkild Rieber Award – Rice Earth Science
- 2014                      Additional stipend awarded to top candidates – Rice Earth Science
- 2013                      Truex fellowship – UCLA Earth & Space Science
- 2012                      Misasa Student Internship Program – Travel, housing, and daily stipend for research project at Institute for Study for Earth’s Interior, Okayama University
- 2012                      Clarence Hall Summer Field Award – UCLA Earth & Space Science

### **Teaching Experience**

- 2012                      Teaching Assistant - Earthquakes, UCLA
- 2013 & 2014            Teaching Assistant - Metamorphic Petrology, UCLA
- Summer 2018            Mentored summer high school intern – Rice University

### **Practical and Analytical Proficiency:**

Piston cylinder, Multi-anvil, FTIR, EPMA, Matlab, thermodynamic modeling (Perple\_X)

### **Peer-Reviewed Publications:**

1. **Eguchi, J.**, Dasgupta, R. (Under Review). Cycling of CO<sub>2</sub> and H<sub>2</sub>O constrained by experimental investigation of a model ophicarbonate at deep subduction zone conditions. *Earth and Planetary Science Letters*.
2. **Eguchi, J.**, Diamond, C.W, Lyon, T.W. (2022). Proterozoic supercontinent break-up as a driver for oxygenation events and subsequent carbon isotope excursions. *Proceedings of the National Academy of Sciences Nexus*
3. Rajdeep, D., Chowdhury, P., **Eguchi, J.**, Sun, C., Saha, S. (2022). Volatile-bearing partial melts in the lithospheric and sub-lithospheric mantle on Earth and other rocky planets. *Reviews in Mineralogy and Geochemistry*.
4. **Eguchi, J.**, Li, Y., Manning, C.E.. (2020). Experimental determination of calcite solubility in H<sub>2</sub>O-KCl-NaCl-LiCl solutions at 700 °C and 8 kbar. *AGU Monographs: Carbon in Earth’s Interior*. doi: 10.1002/9781119508229.ch21
5. **Eguchi, J.**, Seales, J., Dasgupta, R. (2020). Great Oxidation and Lomagundi events linked by deep cycling and enhanced degassing of carbon. *Nature Geoscience*. vol. 13. pp. 71-76. doi: 10.1038/s41561-019-0492-6.
6. **Eguchi, J.**, Dasgupta, R. (2018). Redox state of the convective mantle from CO<sub>2</sub>-trace element systematics of oceanic basalts. *Geochemical Perspectives Letters*. vol 8. pp. 17-21. doi: 10.7185/geochemlet.1823
7. **Eguchi, J.**, Dasgupta, R. (2018). A CO<sub>2</sub> solubility model for silicate melts from fluid saturation to graphite or diamond saturation. *Chemical Geology*. vol 487. pp. 23-28. doi: 10.1016/j.chemgeo.2018.04.012
8. Xue, X., Kanzaki, M., Flourey, P., Tobase, T., **Eguchi, J.** (2018). Carbonate speciation in depolymerized and polymerized (aluminosilicate) glasses: Constraints from <sup>13</sup>C MAS and static NMR measurements and ab initio calculation. *Chemical Geology*. vol. 479. pp. 151-165. doi: 10.1016/j.chemgeo.2018.01.005
9. **Eguchi, J.**, Dasgupta, R. (2017). CO<sub>2</sub> content of andesitic melts at graphite-saturated upper mantle conditions with implications for redox state of oceanic basalt source regions and remobilization of reduced carbon from subducted eclogite. *Contributions to Mineralogy and Petrology*. vol. 172. pp. 12. doi: 10.1007/s00410-017-1330-8

## **Other Publications:**

- Eguchi, James.** 2019. Carbon in graphite-saturated silicate melts – Implications for the oxidation state of Earth's surface and interior. Rice University Electronic Theses and Dissertations.
- Eguchi, James.** 2014. Experimental determination of calcite solubility in H<sub>2</sub>O-KCl-NaCl-LiCl solutions at 700 °C and 8 kbar. UCLA Electronic Theses and Dissertations.

## **Scientific Presentations:**

- Eguchi, J.,** Tu, C., Lyons, T.W. 2022. Proterozoic sulfur isotope excursions driven by systematic changes in sulfur isotopic composition of volcanic outgassing. Goldschmidt 2022.
- Eguchi, J.,** Diamond, C. W., Tu, C., Lyons, T.W. Reinterpreting the sedimentary carbon and sulfur isotope record in light of links between Earth's surface and interior carbon and sulfur cycles. AbSciCon 2022.
- Eguchi, J.,** Diamond, C. W., Lyons, T.W. 2021. Proterozoic Oxygenation events and carbon isotope excursions driven deep carbon cycling and supercontinent break-ups. AGU Fall Meeting 2021
- Eguchi, J.,** Diamond, C. W., Lyons, T.W. 2021. Supercontinent break-ups as driver for Proterozoic oxygenation events and carbon isotope excursions. AbGradCon 2021
- Eguchi, J.,** Diamond, C. W., Lyons, T.W. 2021. Proterozoic supercontinent break-ups as drivers for large oxygenation events and carbon isotope excursions. Southern California Geobiology Symposium 2021
- Eguchi, J.,** Dasgupta, R. 2019. Experimental investigation of a model ophicalcarbonate at deep subduction zone conditions – Implications for cycling of CO<sub>2</sub> and H<sub>2</sub>O. AGU Fall Meeting 2019.
- Eguchi, J.,** Seales, J., Dasgupta, R. 2019. Association of Large oxidation events and carbon isotope excursions – Increased CO<sub>2</sub> drawdown and deep recycling of organic carbon. Goldschmidt 2019.
- Eguchi, J.,** Seales, J., Dasgupta, R. 2018. Genetic link for Great Oxidation and Lomagundi Events: Tectonically driven increase of CO<sub>2</sub> emissions/drawdown and deep recycling of organic C. AGU Fall meeting 2018
- Eguchi, J.,** Dasgupta, R. 2017. Redox state of the recycled crustal lithologies in the convective upper mantle constrained using oceanic basalt CO<sub>2</sub>-trace element systematics. AGU Fall meeting 2017.
- Eguchi, J.,** Dasgupta, R. 2017. A new CO<sub>2</sub> solubility model for silicate melts from fluid-saturation to graphite-saturation: Implications for the redox state of oceanic basalt source regions. Goldschmidt 2017.
- Manning, C.E., **Eguchi, J.,** Galvez, M. 2015. Controls on calcite solubility in metamorphic and magmatic fluids. AGU Fall Meeting 2015.
- Eguchi, J.,** Dasgupta, R. 2015. Experimental determination of dissolved CO<sub>2</sub> content in nominally anhydrous andesitic melts at graphite/diamond saturation – Remobilization of

deeply subducted reduced carbon via partial melts of MORB-like eclogite. AGU Fall Meeting 2015.

**Eguchi, J.**, Li, Y., Manning, C.E. 2014. Calcite solubility in H<sub>2</sub>O-KCl-NaCl-LiCl solutions at 700°C and 8 kbar: Experimental determination and modeling. AGU Fall Meeting 2014

Manning, C.E., **Eguchi, J.**, Li, Y. 2013. Fluids, subduction, and deep carbon. Goldschmidt 2013

**Eguchi, J.**, Manning, C.E., Li, Y. 2013. Experimental determination of calcite solubility in H<sub>2</sub>O-KCl-NaCl-LiCl at 700°C and 8 kbar. AGU Fall Meeting 2013

Xianyu, X., Kanzaki, M., **Eguchi, J.** 2012 Water speciation in sodium silicate glasses (quenched melts): A comprehensive NMR study. AGU Fall Meeting 2012.

### **Invited Presentations:**

**Eguchi, J.**, Diamond, C. W., Lyons, T.W. 2021. Proterozoic oxygenations and carbon isotopic excursions driven by coupled surface-interior carbon cycling. GSA Fall Meeting 2021.

Zhejiang University: Linking Earth's surface and interior carbon cycles – Implications for the history of oxygen and carbon isotopes. September 2020

Earth2Earth Seminar (UK universities) (Invited by association with Rajdeep Dasgupta):

Mantle Melting, Deep Carbon Cycle, and the Rise of Atmospheric Oxygen. August 2020

University of Toronto: Linking Earth's surface and interior carbon cycles – Implications for the history of oxygen and carbon isotopes. April 2020

Florida State University: Linking Earth's surface and interior carbon cycles – Implications for the history of oxygen and carbon isotopes. February 2020

### **Field Mapping Experience:**

- Poleta Folds, White Mountains, California: One month of mapping as undergraduate.
- Diligencia Basin, Orocochia Mountains, California: Mapping over one quarter as undergraduate.
- Rainbow Basin, Barstow, California: Mapping over one quarter as undergraduate.

### **Departmental and External Service:**

- Reviewer for: Journal of Geophysical Research; Earth, Planetary & Science Letters; Geology; Geochimica et Cosmochimica Acta; Geophysical Research Letters; NSF Postdoctoral Fellowship
- Co-organizer of Graduate Interdisciplinary Earth Science Symposium – Rice University
- Co-organizer of Astrobiology Hour – University of California, Riverside
- Co-organizer of NASA Prebiotic Chemistry and Early Earth Environments seminar series

### **Membership in Professional Societies:**

American Geophysical Union, Mineralogical Society of America, Geochemical Society, Geological Society of America