

Yoshinori Miyazaki, Ph.D.

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Appointments

2020 - 2024 **Stanback Postdoctoral Fellow in Caltech Center for Comparative Planetary Evolution**
California Institute of Technology (Pasadena, CA)
Advisor: David J. Stevenson

Education

2014 - 2020 **Yale University** (New Haven, CT)
Ph.D., Earth and Planetary Sciences (December 2020)
M.Phil., Geology and Geophysics (December 2016)
Dissertation: “Developing a unified theory for the formation and evolution of terrestrial planets”
Advisor: Jun Korenaga

2010 - 2014 **The University of Tokyo** (Tokyo, Japan)
B.Sc. with honors, Earth and Planetary Physics (March 2014)
Thesis: “Convective instability of partially molten layer”
Advisor: Yutaka Abe

Publications

(12 first/second-author papers)

1. **Miyazaki, Y.**, and D. J. Stevenson “The stability of dense crusts situated on small bodies,” *in revision in Planetary Science Journal*
2. Grewal, D., **Y. Miyazaki**, and N. X. Nie, “Limited contribution of the Moon-forming impactor the volatile budget of the bulk silicate Earth,” *in revision in Icarus*
3. Deng, J*, **Y. Miyazaki***, and Z. Du* (equal contribution), “Formation of deep mantle heterogeneities through basal exsolution contaminated magma ocean,” *in review in Nature Geoscience*
4. Qian, Y., M. Li, S. Desch, B. Ko, H. Deng, E. Garnero, T. Gabriel, J. Kegerreis, **Y. Miyazaki**, V. Eke, and P. Asimow, “Moon-forming impactor as a source of Earth’s basal mantle anomalies,” *Nature*, 623, 95-99
(<https://doi.org/10.1038/s41586-023-06589-1>)

5. **Miyazaki, Y.**, and D. J. Stevenson, “A subsurface magma ocean on Io: Exploring the steady state of partially molten planetary bodies,” *Planetary Science Journal*, **3**, 256 (2022)
(<https://doi.org/10.3847/PSJ/ac9cd1>)
— Featured in *Science*, *The Daily Beast*, *Popular Science*
6. **Miyazaki, Y.**, and J. Korenaga, “Inefficient water degassing inhibits ocean formation on rocky planets: An insight from self-consistent mantle degassing models,” *Astrobiology*, **22**, 7, 713-734 (2022)
(<https://doi.org/10.1089/ast.2021.0126>)
7. **Miyazaki, Y.**, and J. Korenaga, “A wet heterogeneous mantle creates a habitable world in the Hadean,” *Nature*, **603**, 86-90 (2022)
(<https://doi.org/10.1038/s41586-021-04371-9>)
— Featured in *Yale News*
8. **Miyazaki, Y.**, and J. Korenaga, “Dynamic origin of enstatite chondrites and the evolutionary path to Earth formation,” *Icarus*, **361**, 114368 (2021)
(<https://doi.org/10.1016/j.icarus.2021.114368>)
9. Du, Z., J. Deng, **Y. Miyazaki**, H-K. Mao, B. B. Karki, and K. K. M. Lee, “Fate of hydrous Fe-rich silicate melt in Earth's deep mantle,” *Geophysical Research Letters*, **46**, 9466-9473 (2019)
(<https://doi.org/10.1029/2019GL083633>)
10. **Miyazaki, Y.**, and J. Korenaga, “On the timescale of magma ocean solidification and its chemical consequences, 1. Thermodynamic database for liquid at high pressures,” *Journal of Geophysical Research: Solid Earth*, **124**, 3382-3398 (2019)
(<https://doi.org/10.1029/2018JB016932>)
11. **Miyazaki, Y.**, and J. Korenaga, “On the timescale of magma ocean solidification and its chemical consequences, 2. Compositional differentiation under crystal accumulation and matrix compaction,” *Journal of Geophysical Research: Solid Earth*, **124**, 3399-3419 (2019)
(<https://doi.org/10.1029/2018JB016928>)
12. Deng, J., **Y. Miyazaki**, and K. K. M. Lee, “Implications for the melting phase relations in the MgO-FeO system at core-mantle boundary conditions,” *Journal of Geophysical Research: Solid Earth*, **124**, 1294-1304 (2019)
(<https://doi.org/10.1029/2018JB015499>)
13. **Miyazaki, Y.**, N. J. Planavsky, E. W. Bolton, and C. T. Reinhard, “Making sense of massive carbon isotope excursions with an inverse carbon cycle model,” *Journal of Geophysical Research: Biogeosciences*, **123**, 2485 (2018)
(<https://doi.org/10.1029/2018JG004416>)
14. **Miyazaki, Y.**, and J. Korenaga, “Chemical effects on vertical dust motion in early protoplanetary disks,” *The Astrophysical Journal*, **849**, 41 (2017)
(<https://doi.org/10.3847/1538-4357/aa8cd1>)

Awards

Fellowship:

2020 - 2024 Stanback Postdoctoral Fellowship in Comparative Planetary Evolution
Awarded by California Institute of Technology for three years support for stipend and research project
Proposal title: “The redox evolution during magma ocean and its implication for the surface environment and the emergence of life on terrestrial planets”

Honors:

2023 Japan Society for the Promotion of Science Overseas Fellow

2020 Elias Loomis Prize
Awarded by Yale University to distinguished graduate students in studies of physics of the Earth

2019 Karl K. Turekian Prize
Awarded by Yale University to a distinguished graduate student in geochemical or cosmochemical studies

2019 AbSciCon student travel grants

2013, 2014 The Dean’s award
Awarded by School of Science, The University of Tokyo to an undergraduate student with outstanding performance

Invited Seminars

1. Brown University (Feb 2024) TBA
2. UCLA (Nov 2023) *Geophysics Seminar*
“The physics of magma oceans in Io and early Earth”
3. The University of Tokyo (Oct 2023)
“Volatile degassing from the planetary interior and its implication for habitability”
4. Interior of the Earth - Gordon Research Conference (Jun 2023)
“Magma Ocean Solidification — Setting the initial conditions of planetary evolution”
5. NASA CLEVER Planets (November 2022) *Fall Seminar Series*
“Volatile degassing from the planetary interior and its implication for habitability”
6. NASA Prebiotic Chemistry and Early Earth Environments (April 2022) *PCE₃ Seminar Series*
“Ocean formation modulated by Hadean geodynamics”

7. Arizona State University (April 2022) *Geophysics Seminar*
“A wet heterogeneous mantle creates a habitable world in the Hadean”
8. UC Davis (April 2021) *Weekly Wednesday Seminar*
“The mode of geodynamics in the Hadean and its implication for habitability and early life”
9. UC Berkely/UCLA (February 2021) *Joint CIPS/UCLA Seminar*
“The mode of geodynamics in the Hadean and its implication for early life”
10. Rice University (January 2020) *Current Research in Earth, Environmental and Planetary Sciences*
“The early Earth evolution during and after the solidification of a magma ocean”

Conference Presentations

1. **Miyazaki, Y.**, *AGU Fall Meeting* (Poster, December 2023)
“Linking mantle heterogeneity and atmospheric formation during the early Earth”
“The stability of dense crust situated on small bodies”
2. **Miyazaki, Y.**, “The retention of water in the mantle during magma ocean solidification and its impact on planetary habitability,” *the Goldschmidt 2023 Conference* (Talk, July 2023)
3. **Miyazaki, Y.**, *AGU Fall Meeting* (Invited talks, December 2022)
“Water retention in the mantle during magma ocean solidification”
“Early drawdown of atmospheric CO₂ on terrestrial exoplanets and its implication on habitability”
4. **Miyazaki, Y.**, and D. J. Stevenson, “A subsurface magma ocean on Io,” *54th Annual Meeting of the Division of Planetary Sciences 2022* (Talk, October 2022)
5. **Miyazaki, Y.**, and J. Korenaga, “Mode of mantle dynamics determines the habitability of terrestrial planets,” *AbSciCon 2022* (Talk, May 2022)
6. **Miyazaki, Y.**, and J. Korenaga, “Inefficient degassing inhibits ocean formation on rocky planets,” *AGU Fall Meeting* (Poster, December 2021)
7. **Miyazaki, Y.**, and J. Korenaga, “Dynamic evolution of major element chemistry in protoplanetary disks,” *52th Lunar and Planetary Science Conference* (Talk, March 2021)
8. **Miyazaki, Y.**, and J. Korenaga, “Rapid change in surface environment during the Hadean is facilitated by the exposure of high-magnesium pyroxenites,” *AGU Fall Meeting* (Poster, December 2020)
9. **Miyazaki, Y.**, and J. Korenaga, “Serpentinization-driven evolution of the early mantle and atmosphere,” *AGU Fall Meeting* (Talk, December 2019)
10. **Miyazaki, Y.**, and J. Korenaga, “Solidification of magma ocean and its implication for early Earth environment,” *AbSciCon 2019* (Talk, June 2019)

11. **Miyazaki, Y.**, and J. Korenaga, “The chemical consequence of magma ocean solidification,” *AGU Fall Meeting* (Poster, December 2018)
12. **Miyazaki, Y.**, N. J. Planavsky, E. W. Bolton, and C. T. Reinhard, “Global carbon cycle in Proterozoic,” *Northeastern Geobiology Symposium* (Poster, April 2016)
13. **Miyazaki, Y.**, and J. Korenaga, “Chemical consequence of dust settling in protoplanetary disks,” *47th Lunar and Planetary Science Conference* (Poster, March 2016)

Outreach Articles

1. **Miyazaki, Y.**, and J. Korenaga, “How the early Earth evolved from a hellish to a habitable world,” *The Science Breaker* (2023)
(<https://doi.org/10.25250/thescbr.brk705>)

Mentorship

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| 2023-2024 | Frank Alas , Pasadena City College Class of 2026, for Caltech Connection program |
| 2022 | Juan Landi , Caltech Class of 2026, “Numerical modeling of early atmosphere formation” for the Freshman Summer Research Institute (FSRI) program |
| 2021 | Rohan Iyer , Caltech Class of 2024, “Evolution of major element chemistry in protoplanetary disks and its connection to planetesimal growth” for the Summer Undergraduate Research Fellowships (SURF) program |
| | Vibha Padmanabhan , Caltech Class of 2024, “Investigating the effect of magma ocean solidification rate on early atmosphere formation” for the Summer Undergraduate Research Fellowships (SURF) program |
| 2016-2017 | John McNamara , Yale Class of 2017, for a project on a two-phase modeling of protoplanetary disk with Professor David Bercovici |

Teaching Experience

Teaching Fellowship at Yale University

Fall 2019	G&G 274 Fossil Fuels and World Energy
Spring 2018	G&G 362 Observing Earth from the Space
Fall 2015, 2017	G&G 100 Natural Disaster
Fall 2016	AMATH 428 Science of Complex Systems

Service, Outreach

Served as a reviewer of
Nature Geoscience
Nature Communications
Scientific Reports
Journal of Geophysical Research: Solid Earth
The Astrophysical Journal
Reviews in Mineralogy and Geochemistry

Served on the review panel of
FINESST-22 (Future Investigators in NASA Earth and Space Science and Technology)

Session Convener for
AGU Fall meeting 2022 “From the Surface to the Deep Interior of the Early Earth”
AGU Fall meeting 2023 “Geology and Geophysics of Active Satellites and Small Bodies”

2016-2017	Treasurer of Dana Club in the Department of Geology and Geophysics
2016	Participated in International Earth Science Olympiad (IESO) as a leading student organizer in the 10 th IESO
2016	Judge at New Haven Science Fair
2010-2014	Student volunteer chair at Japan Earth Science Olympiad Committee

Skills

Programming:

C++, Python (PyTorch, Keras), R, MATLAB, and Fortran. Familiar with the UNIX system.

Language:

Japanese (native) and English (Oral Performance Assessment certified at Yale, December 2014)