Curriculum Vitae - Miki Nakajima

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Contact Information

Department of Earth and Environmental Sciences
Department of Physics and Astronomy
University of Rochester
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Education

California Institute of Technology — 2010 – 2016
Ph.D., Planetary Science (defended on Oct 30 2015)
Minor in Computational Science and Engineering
M.Sc., Planetary Science — 2010 – 2013
Advisor: D. J. Stevenson

Tokyo Institute of Technology — 2007 – 2009
M.Sc., Earth and Planetary Sciences
Advisors: S. Ida and H. Genda

University of California, Santa Cruz — 2007 – 2008
Exchange Program, Astronomy and Astrophysics
Advisors: E. Asphaug and D. N. C. Lin

Tokyo Institute of Technology — 2003 – 2007
B.Sc., Earth and Planetary Sciences
Advisors: S. Ida and M. Ikoma

Academic Employment

University of Rochester
Assistant Professor, Earth and Environmental Sciences — Jul 2018 –
Secondary appointment in Physics and Astronomy

Carnegie Institution for Science — Dec 2015 – Jun 2018
Carnegie Postdoctoral Fellow

Teaching Experience

Planetary interiors, University of Rochester	Fall 2020, Spring 2019
Designing Your Space Mission, University of Rochester	Fall 2021, Spring 2020
Geodynamics, University of Rochester	Spring 2021, Fall 2019
TA, Introduction to the Solar System, Caltech	Spring 2012, 2013
TA, Planetary Structure and Evolution, Caltech	Spring 2014, 2015

Mentoring

Scott Hull, UR graduate student	Aug 2019 –
Sarah Harter, UR graduate student (Provost fellow)	Aug 2021 –
Nicolas Litza, UR graduate student	Aug 2021 –
Victor Lherm, UR postdoctoral scholar	Oct 2021 –
Natalie Allen, UR undergraduate student	Jan 2020 –
Soren Helhoski, UR undergraduate student	Dec 2019 –
Arnav Sharma, UR undergraduate student	Oct 2019 –
Jeremy Atkins, UR undergraduate student	Aug 2018 –
Angel Paz, Research Experiences for Undergraduates (REU) student	June 2021 –

Pham Nguyen, UR graduate student Mar – Oct 2020
Nicolas Litza, Research Experiences for Undergraduates (REU) student May – Aug 2020
Tyler Labree, Research Experiences for Undergraduates (REU) student May – Aug 2019
Keegan Ryan, Caltech undergraduate student (with D. J. Stevenson) Jun – Sep 2013

Awards & grants

NASA Solar System Workings, 2020 (PI), Title: Exploring the early impact history of the Moon via numerical and experimental approaches, $499,971 Aug 2021 – Jul 2024
0.5 shot day at the OMEGA Laser Facility (PI), Title: EOS and conductivity of mantle materials Mar 2022
NSF CSEDI (PI), Title: Searching For Hadean Impacts: Clues From the Sudbury Impact Basin and Machine Learning Approaches, $361,878 Aug 2021 – Aug 2023
Blue Ribbon panel (High-Risk/High-Impact), NASA Emerging Worlds, 2020 (PI), Title: Moon Formation via Streaming Instability, $472,194 Jul 2021 – Jul 2024
The Sloan Research Foundation (Co-I), Title: AEThER: Atmospheric Empirical, Theoretical, and Experimental Research, $111,950 Jan 2021 – Dec 2023
NSF Physics Frontier Center (Senior personnel), Title: The Center for Matter at Atomic Pressures (CMAP), $12,960,000 Aug 2020 – Aug 2025
NASA Emerging Worlds, 2018 (PI), Title: Volatile Escape from Giant Impact Ejecta, $387,123 Feb 2019 – Feb 2022
Postdoctoral Innovation and Excellence Award 2017
Carnegie DTM Postdoctoral Fellowship, $62,000 annually 2015 – 2018
NASA Earth and Space Science Fellowship (NESSF), $30,000 annually 2014 – 2015
Murata Overseas Scholarship, $30,000 annually 2010 – 2012
Yoshida Scholarship (fellowship for studying abroad) (declined) 2010 – 2013
JSPS Research Fellowships for Young Scientists 2010
Moriyasu Graduate Student Scholarship 2009 – 2010
Study Abroad Scholarship, Japan Student Services Organizations 2007 – 2008

Professional Service

Member of the Mercury and the Moon panel of the Planetary Science and Astrobiology Decadal Survey 2023 – 2032, National Academy of Sciences, Engineering, and Medicine
Science Member of the Martian Moons eXploration Mission (MMX) (JAXA)
AGU Fall Meeting 2020 and 2021 Program Committee (FMPC)
Chair at Goldschmidt 2018, Chair at AGU 2017, 2018, Co-convener at AGU 2021, Chair at LPSC 2017
Referee for Nature, Nature Geoscience, Nature Astronomy, Nature Communications, Science, Philosophical Transactions of the Royal Society A, Earth and Planetary Science Letters, Astrophysical Journal, Icarus, Journal of Geophysical Research, Astronomy and Astrophysics
Review Panelist and Executive Secretary for NASA programs, Review panelist for an NSF program

Thesis committee

PhD defense: Zaarah Mohamed (2021), Linda Crandall (2021), Ian Szumila (2021), Robert Fine (2020), Hongzhe Zhou (2020), Mario Cabrera (2019)
Oral exam: Ziqi (Evan) Zhang (2021), Scott Hull (2021), Tinghong Zhou (2020)
Master's thesis: Chayut Teeraratkul (2019)

Qualifying exam: Ziqi (Evan) Zhang (2021), Scott Hull (2020), Tinghong Zhou (2019), Esteban Wright (2019)

Outreach Activities

Society of Asian Scientists and Engineers (SASE) Professionalism Panel	Apr 2021
Speaker at the Society of Women in Astronomy and Physics (SWAP) meeting	Oct 2020
Panelist at an event for Japanese students studying in USA	Aug 2020
Organizer for Student Presentations on Space Missions at Rochester Museum and Science Center	Apr 2020
Speaker at Astronomy Club Stargazing Night for Girl Scouts	Nov 2019
Speaker at STANYS (Science Teachers New York State) Conference	Nov 2019
Panelist at a STEM event by the Society of Asian Scientists and Engineers	Apr 2019
Organizer of USA Science and Engineering Festival	Apr 2018
Public lecture at the Virginia Astronomy Club	Mar 2018
Organizer of Science Outreach Program: Planet Hunting in Tokyo	Oct 2016
Presenter of Workshop on Studying Abroad at Tokyo Tech	Jun 2016
Organizer of USA Science and Engineering Festival	Apr 2016
Organizer of Community Science Event at Caltech	Feb 2015
Organizer of Japanese Students' Visit at Caltech	2013 – 2015

Publications

Mentee contributions are indicated by underline

Atkins, J., **Nakajima, M.**, Simon, J. B., and Quillen, A. Lunar formation by streaming instability. Science Advances, in prep.

Allen, N., **Nakajima, M.**, Helhoski, S., Wünnemann, K., Trail, D. Modeling the Vredefort Crater impact with iSALE. Journal of Geophysical Letters: Solid Earth, in prep. Conference abstract (Lunar and Planetary Science Conference, LPSC 2021).

Helhoski, S., **Nakajima, M.**, Gagne, J., Trail, D. A numerical model to constrain the origin of lunar impact ejecta, in prep. Conference abstract (LPSC 2021).

Nakajima, M., and Stevenson, D. J., Dynamical mixing of planetary cores by giant impacts. in prep.

Lichtenberg, T., Schaefer, L., **Nakajima, M.**, and Fischer, R. A., Geophysical evolution during rocky planet formation. Protostars and Planets VII., submitted.

Szumila, I., Trail, D., Erickson, T., Simon, J. I., Wielicki, M. M., Lapen, T., **Nakajima, M.**, and Fries, M. Microstructural and isotopic characterization of synthetically-shocked sanidine-zircon mixture: implications for planetary impact chronology. American Mineralogist, in review.

Nakajima, M., and Genda, H., Asphaug, E. I., and Ida, S., Large planets may not form fractionally large moons. Nature Communications, accepted.

Canup, R., Righter, K., Dauphas, N., Pahlevan, K., Ćuk, M., Lock, S. J., Stewart, S. T., Salmon, J., Rufu, R., **Nakajima, M.**, Magna, T. Origin of the Moon, New Views of the Moon II. in press.

Tarduno, J. A., Cottrell, R. D., Lawrence, K., Bono, R. K., Huang, W., Johnson, C. L., Blackman, E. G., Smirnov, A. V., **Nakajima, M.**, Neal, C. R., Zhou, T., Ibanez-Mejia, M., Oda, H., and Crummins, B., 2021. Absence of a long-lived lunar paleomagnetosphere. Science Advances, 7, eabi7647. 10.1126/sciadv.abi7647

Nakajima, M., Golabek, G. J., Wünnemann, K., Rubie, D. C., Burger, Melosh, H. J., Jacobson, S. A., C., Manske, L., and Hull, S. D., 2021. Scaling laws for the geometry of an impact-induced magma ocean. Earth and Planetary Science Letters, 568, 116983. 10.1016/j.epsl.2021.116983

Quillen, A. C., Zaidouni, F., **Nakajima, M.**, Wright, E., 2021. Accretion of Ornamental Equatorial Ridges on Pan, Atlas and Daphnis. Icarus, 357, 114260. 10.1016/j.icarus.2020.114260

Wright, E., Quillen, A., South, J., Nelson, R. C., Sanchez, P., Siu, J., Askari, H., **Nakajima, M.**, and Schwartz, S. R., 2020. Ricochets on Asteroids: Experimental study of low velocity grazing impacts into granular media. Icarus, 351, 113963. doi: 10.1016/j.icarus.2020.113963

Wright, E., Quillen, A. C., South, J., Nelson, R. C., Sanchez, P., Martini, L., Schwartz, S., **Nakajima, M.**, Asphaug, E., 2020. Boulder Stranding in Ejecta Launched by an Impact Generated Seismic Pulse. Icarus, 337, 113424. doi: 10.1016/j.icarus.2019.113424

Quillen, A. C., Lane, M., **Nakajima, M.**, and Wright, E., 2020. Excitation of Tumbling in Phobos and Deimos. Icarus, 340, 113641. doi: 10.1016/j.icarus.2020.113641

Quillen, A. C., Martini, L., and **Nakajima, M.**, 2019. Near/far side asymmetry in the tidally heated Moon. Icarus, 329, 182-196. doi: 10.1016/j.icarus.2019.04.010

Nakajima, M., and Stevenson, D. J., 2018. Inefficient volatile loss from the Moon-forming disk: reconciling the giant impact hypothesis and a wet Moon. Earth and Planetary Science Letters, 487, 117-126. doi: 10.1016/j.epsl.2018.01.026

Hauri, E. H., Saal, A. E., **Nakajima, M.**, Anand, M., Rutherford, M. J., Van Orman, J. A., and Le Voyer, M., 2017. Origin and Evolution of Water in the Moon's Interior. Annual Review of Earth and Planetary Sciences, 45, 89-111. doi: 10.1146/annurev-earth-063016-020239

Jacobson, S. A., Rubie, D. C., Hernlund, J., Morbidellie, A., and **Nakajima, M.**, 2017. Formation, Stratification and Mixing of the Cores of Earth and Venus. Earth and Planetary Science Letters, 474, 375-386. doi: 10.1016/j.epsl.2017.06.023

Nakajima, M., 2016. Core Science: Stratified by a Sunken Impactor. Nature Geoscience, News & Views, 9, 734 - 735. doi: 10.1038/ngeo2815

Nakajima, M., and Ingersoll, A. P., 2016. Controlled boiling on Enceladus. 1. Model of the vapor-driven jets. Icarus, 272, 309-318. doi: 10.1016/j.icarus.2016.02.027

Ingersoll, A. P., and **Nakajima, M.**, 2016. Controlled boiling on Enceladus. 2. Model of the liquid-filled cracks, 272, 319-326. doi: 10.1016/j.icarus.2015.12.040

Nakajima, M., and Stevenson, D. J., 2015. Melting and Mixing States of the Earth's Mantle after the Moon-Forming Impact. Earth and Planetary Science Letters, 427, 286-295. doi: 10.1016/j.epsl.2015.06.023

Nakajima, M., and Stevenson, D. J., 2014. Investigation of the Initial State of the Moon-Forming Disk: Bridging SPH Simulations and Hydrostatic Models. Icarus, 233, 259-267. doi: 10.1016/j.icarus.2014.01.008

Invited Seminars

Feb 2021 Origin of Earth, the Moon, and exomoons. APS Colloquia, University of Colorado, Boulder, Boulder, CO, USA.

Oct 2020 Origin of Earth, the Moon, and exomoons. Colloquium at the Physics Department, University of Albany, Albany, NY, USA.

Jul 2020 Consequences of Giant Impacts. IGPP Seminar, University of California, Santa Cruz Cruz, Santa Cruz, CA, USA.

Feb 2020 Origin of the Earth and Moon. Seminar, Ohio State University, Colombus, CA, USA.

Nov 2019 Origin of the Earth and Moon. AST Colloquium, Stanford University, Stanford, CA, USA.

Sep 2019 Origin of the Earth and Moon. AST Colloquium, Rochester Institute of Technology, Rochester, NY, USA.

Sep 2019 Origin of the Earth and Moon. Seminar, Vassar College, Poughkeepsie, NY, USA.

Sep 2019 Origin of the Earth and Moon. Department Colloquium Series, Department of Earth and Planetary Sciences, Harvard University, Boston, MA, USA.

June 2019 Origin of the Earth and Moon. Seminar, Institute de Physique du Globe de Paris (IPGP), Paris, France.

Apr 2019 Origin of the Earth and Moon. Nelson Lecture, Syracuse University, Syracuse, NY, USA.

Sep 2018 Origin of the Earth and Moon. Astronomy and Space Sciences, Cornell University, Ithaca, NY, USA.

Sep 2018 Origin of the Earth and Moon. EPS Seminar, The University of Edinburgh, Edinburgh, UK.

Sep 2018 Origin of the Earth and Moon. Seminar, Max Planck Institute for Solar System Research, Göttingen, Germany.

Jun 2018 Origin of the Earth, Moon, and Martian Moons. Seminar, Tohoku University, Sendai, Japan.

Jun 2018 Origin of the Earth, Moon, and Martian Moons. Seminar, University of Tokyo, Tokyo, Japan.

May 2018 Origin of the Earth, Moon and Martian Moons. Seminar, NASA Goddard Space Flight Center, Lanham, MA, USA.

Apr 2018 Origin of the Earth, Moon and Martian Moons. Geoscience seminar, Scripps Institution of Oceanography, University of California, San Diego, CA, USA.

Mar 2018 Origin of the Earth, Moon and Martian Moons. Seminar, Smithsonian Institution, Washington, DC, USA.

Feb 2018 Origin of the Earth, Moon and Martian Moons. Department colloquium, Case Western Reserve University, Cleveland, OH, USA.

Nov 2017 Origin of the Earth and Moon. USNO Seminar, US Naval Observatory, Washington, DC, USA.

Oct 2017 Origin of the Martian Moons and Exomoons. Fall 2017 Colloquium, University of Rochester, Rochester, NY, USA.

Sep 2017 Origin of the Earth, Moon, and Martian Moons. Special Seminar, Physics & Geological Sciences, University of Colorado, Boulder, CO, USA.

May 2017 Origin of the Earth and Moon. TRR170 Seminar, Freie Universität Berlin, Berlin, Germany.

May 2017 Origin of the Earth and Moon. Seminar Series, University of Münster, Münster, Germany.

Mar 2017 Exploring Moons in the Solar System and Beyond. Special Seminar, University of Rochester, Rochester, NY, USA.

Mar 2017 Origin of the Earth and Moon. Special Seminar, University of Rochester, Rochester, NY, USA.

Feb 2017 Origin of the Earth and Moon. Special Seminar, University of Oxford, Oxford, UK.

Nov 2016 Origin of the Earth, the Moon, and exomoons. Astrophysics, Gravitation, and Cosmology Seminar, University of Illinois at Urbana-Champaign, Champaign, IL, USA.

Nov 2016 Implications of the Moon Formation for the Earth's Mantle and Magnetic Field. Geochemistry Seminar, University of Maryland, College Park, MA, USA.

Mar 2016 Controlled boiling on Enceladus: Model of the vapor-driven jets. Enceladus workshop, University of California, Berkeley, Berkeley, CA, USA.

Mar 2016 Origin of the Earth and Moon. Solar System Exploration Winter Seminar Series, NASA/Goddard Space Flight Center, Greenbelt, MA, USA.

Feb 2016 Origin of the Earth and Moon. Earth and Planetary Sciences Randolph Bromery Spring 2016 Seminar Series, Johns Hopkins University, Baltimore, MA, USA.

Feb 2016 Origin of the Earth and Moon. GeoSci Seminar, University of Chicago, Chicago, USA.

Nov 2015 Origin of the Earth and Moon. Plunch talk, University of California, Santa Cruz (UCSC), Santa Cruz, USA.

Sep 2015 Effects of giant impacts on planetary magnetic fields and exomoon formation. GFD Seminar, ETH Zurich, Zurich, Switzerland.

May 2015 Implications for mantle melting and the magnetic field from giant impact simulations. 2015 ACCRETE Group Meeting, Bayerisches Geoinstitut (BGI), Bayreuth, Germany.

May 2015 Implications for mantle melting, volatile loss, and the magnetic field from giant impact simulations, Brown University, Providence, RI, USA.

May 2015 Origin of the Earth and Moon, DEEPS Colloquia Series, Brown University, Providence, RI, USA.

Feb 2015 Moon formation recipes. iPLEX Lunch Talk, University of California, Los Angeles (UCLA), Los Angeles CA, USA.

Jan 2015 Origin of the Earth and Moon. DTM Weekly Seminar Series, Carnegie Institution of Washington DTM, Washington, DC, USA.

Nov 2014 Origin of the Earth and Moon and its implications for exomoon formation. Southwest Research Institute (SwRI), Boulder CO, USA.

Sep 2014 Initial states of the Earth's mantle and Moon-forming disk. GFD Seminar, ETH Zurich, Zurich, Switzerland.

Apr 2014 Do we understand the origin of the Moon? Woman in Aerospace Symposium, Massachusetts Institute of Technology (MIT), Boston MA, USA.

Selected Conference Talks

Nakajima, M., Genda, H., Asphaug, E., and Ida, S., 2020. Constraints on formation of the Moon and exomoons. AGU Fall Meeting, 2020, Zoom.

Nakajima, M., 2020. Origin of the Moon. Inaugural Prebiotic Chemistry and Early Earth Environments (PCE3) Community Workshop. Zoom Session (*Invited*).

Nakajima, M., 2020. Interdisciplinary investigations on planetary impacts and interiors. Gordon Research Conference. Holderness, NH, USA (*Invited*) (cancelled due to COVID-19).

Nakajima, M., 2019. Consequences of giant impacts. COMPRESS 2019, Big Sky, Montana, USA (*Keynote*).

Nakajima, M., 2019. Consequences of planetary impacts: mantle melting and core formation. European Week of Astronomy and Space Science (EWASS), Lyon, France (*Invited*).

Nakajima, M., and van Keken, P. E., 2018. Effects of plate tectonic simulations on mantle convection and mixing. 2018 AGU Fall Meeting, Washington, DC, USA.

Nakajima, M., and Canup, R. M., 2018. Origin of the Martian Moons and Their Water Abudances. Goldshcmidt 2018, Boston, MA, USA.

Nakajima, M., and Canup, R. M., 2017. Origin of the Martian Moons and Their Water Abudances. 48th Lunar and Planetary Science Conference, 2900, The Woodlands TX, USA.

Nakajima, M., and Hauri, E. H., 2017. Initial Water Abundance of the Bulk Silicate Moon. 48th Lunar and Planetary Science Conference, 2858, The Woodlands TX, USA.

Nakajima, M., Rubie, D., Melosh, H. J., Nimmo, F., Jacobson, S. A., Morbidelli, A., 2016. Extent of Mantle Melting by Giant Impacts. Magma Oceanology Workshop, Atami, Japan. (*Invited*)

Nakajima, M., and Stevenson, D. J., 2016, Dynamical mixing of planetary cores by giant impacts. 47th Lunar and Planetary Science Conference, 2053, The Woodlands TX, USA.

Nakajima, M., and Stevenson, D. J., 2015. The state of the Earth's mantle after the giant impact. 2015 AGU Fall Meeting, San Francisco, USA (*Invited*).

Nakajima, M., and Ingersoll, A. P., 2015. Controlled boiling on Enceladus: Model of the vapor-driven jets. 2015 AGU Fall Meeting, San Francisco, USA.

Nakajima, M., and Genda, H., Asphaug, E. I., and Ida, S., 2014. Constraints on Exomoon Formation. 46th DPS Meeting, Tucson AZ, USA.

Nakajima, M., and Stevenson, D. J., 2014. The Initial State of Earth's Mantle after the Moon-Forming Impact. International interdisciplinary workshop, Accretion and Early Differentiation of the Earth and Terrestrial Planets (ACCRETE), Nice, France.

Nakajima, M., and Stevenson, D. J., 2014. Moon-forming Disk - Formation and Water Loss. The proto-lunar disk splinter session, Accretion and Early Differentiation of the Earth and Terrestrial Planets (ACCRETE), Nice, France (*Invited*).

Nakajima, M., and Stevenson, D. J., 2014. Hydrodynamic Escape does not Prevent the "Wet" Moon Formation. 45th Lunar and Planetary Science Conference, 2770, The Woodlands TX, USA.

Nakajima, M., and Stevenson, D. J., 2013, Thermodynamic Processes During the Moon-Forming Impact. 44th Lunar and Planetary Science Meeting, The Woodlands TX, USA.

Nakajima, M., and Stevenson, D. J., 2012, The Initial State of the Moon Forming Disk and the Earth's Mantle. 43rd Lunar and Planetary Science Meeting, The Woodlands TX, USA.