

Ryushi Miyayama

Postdoctoral Scholar, Earth and Planetary Sciences, Stanford University

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RESEARCH

Interests – Atmospheric chemical alteration driven by shock waves generated both during meteorite atmospheric entry and upon planetary impact. My research covers the fragmentation of incoming meteoroids, shock propagation through the atmosphere and planetary surface, and the resulting chemical consequences.

Methodology – I use a multi-physics simulation framework: *Athena++* for modeling meteorite entry, bow shocks, and high-speed flow interactions; *iSALE* for simulating impact processes and shock transmission into planetary interiors; and *Cantera* for simulating the shock-induced chemistry.

EDUCATION

Apr 2023 – Mar 2026	Ph.D. in Physics, Nagoya University, Aichi, Japan <i>Supervised by Prof. Hiroshi Kobayashi</i>
Apr 2021 – Mar 2023	M.Sc. in Physics, Nagoya University, Aichi, Japan <i>Supervised by Prof. Hiroshi Kobayashi</i>
Apr 2017 – Mar 2021	B.Sc. in Physics, Nagoya University, Aichi, Japan <i>Supervised by Prof. Shu-ichiro Inutsuka</i>

RESEARCH EXPERIENCE

Oct 2024 – Sep 2025	Stanford University, CA, US Visiting Student Researcher, Earth and Planetary Sciences <i>“Modeling Atmospheric Alteration on Titan: Hydrodynamics and Shock-Induced Chemistry of Meteoroid Entry”</i> Advisor: Prof. Laura Schaefer
May 2026 – Present	Stanford University, CA, US Postdoctoral Scholar, Earth and Planetary Sciences <i>“Investigating meteor-driven chemistry in planetary atmospheres”</i> Advisor: Prof. Laura Schaefer

GRANTS

Apr 2023 – Mar 2026	Interdisciplinary Frontier Next-Generation Researcher Program of the Tokai Higher Education and Research System, Topic: “Understanding the role of planetary impacts on the habitable environment, <i>annual stipend: JPY 2,160,000</i>
Oct 2024 –Sep 2025	RECONNECT Kakenhi project “Diversity of prebiotic chemistry and molecular systems in planetary environment in Solar System”, JP22K21344, <i>annual stipend: JPY 1,200,000</i>
Oct 2023	2023-Overseas Research Travel Financial Support, Nagoya University, <i>JPY 250,000</i>
Mar 2024	Support program for research abroad –Graduate School of Science, Nagoya University, <i>JPY 300,000</i>
Sep 2024	2024-Overseas Research Travel Financial Support, Nagoya University, <i>JPY 300,000</i>
Sep 2025	2025-Overseas Research Travel Financial Support 1st Recruitment, Nagoya University, <i>JPY 500,000</i>
Apr 2026—Mar 2028	JSPS Overseas Research Fellowships, Japan Society for the Promotion of Science, <i>annual stipend: JPY 8,030,000</i>
Apr 2026—Mar 2027	RECONNECT Kakenhi project “Diversity of prebiotic chemistry and molecular systems in planetary environment in Solar System”, JP22K21344, <i>competitive research grant: JPY 1,500,000</i>

AWARDS

Mar 2023	<i>Dean’s Award of the Graduate School of Science</i> , Nagoya University <i>Thesis title: “Numerical modeling of vaporization and melting caused by meteorite impact on early Earth”</i>
Apr 2024	<i>Conducting pioneering studies</i> , THERS Make New Standards Program
Jun 2024	<i>High contributing research students</i> , THERS Make New Standards Program
Apr 2025	<i>Conducting pioneering studies</i> , THERS Make New Standards Program
Mar 2026	<i>Springer Thesis Award, Springer Physics (2026)</i> <i>Ph.D. thesis selected for publication in Springer Theses, Recognizing Outstanding Ph.D. Research. (forthcoming)</i>

PUBLICATION LIST

[2] “*Modeling Atmospheric Alteration on Titan: Hydrodynamics and Shock-Induced Chemistry of Meteoroid Entry*”, **Ryushi Miyayama**, Laura K Schaefer, Hiroshi Kobayashi, Andrea Zorzi, ApJ, 989, 210, 2025

[1] “*Formation of Planetary Atmospheres: Analytical Estimation of Vapor Production via Planetary Impacts*”, **Ryushi Miyayama**, Hiroshi Kobayashi, A&A, 688, A103, 2024

ACADEMIC SERVICE

Reviewer for Icarus (2025)

MEDIA COVERAGE

Interviewed by Live Science for coverage of Astrophysical Journal article on meteoroid-induced chemistry in Titan’s atmosphere (2025).

WORK EXPERIENCE

Oct 2022 – Mar 2023	<i>Teaching Assistant: “Introduction to Information of Science II”</i> Undergraduate School of Science, Nagoya University Teaching students programming skills in “C programming language, Python, gnuplot, and Latex”
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SKILLS

Technical Skills	C/C++: Advanced/intermediate experience, fluid dynamic simulations and teaching students Python: Advanced experience, mostly visualizing and analyzing simulation outputs and combustion chemistry simulation High-Performance Computing: Parallel simulations using MPI/OpenMP, experience running large-scale jobs on HPC clusters (Stanford Sherlock etc.)
Languages	English: Advanced, language exam IELTS (Reading 6.5, Listening 6.5, Writing 6.5, Speaking 6.0) and one-year studying abroad at Stanford University (Oct 2024 –Sep 2025) Japanese: Native speaker