Ze-Wen Koh

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Education

Ph.D	Planetary Science	MIT	2023 - present
B.A.	Physics (*summa cum laude*), Computer Science	Cornell University	2019 - 2023

Publications

1. **Koh, Z.**, Nimmo, F., Lunine, J.I., Mazarico, E., Dombard, A.J. (2022), Assessing the Detectability of Europa's Seafloor Topography from Europa Clipper's Gravity Data, *The Planetary Science Journal*, 3 (8), DOI: 10.3847/PSJ/ac82aa
2. **Koh, Z.**, Poh, G., Fowler, C.M., Hanley, K.G., Ma, X., Gruesbeck, J. R., Kuruppuaratchi, D. C. P., Sun, W., DiBraccio, G. A., & Espley, J. R., Global Occurrence of Kelvin-Helmholtz Vortices at Mars (*in review,* Geophysical Research Letters, est. August 2025).
3. He, C., **Koh, Z.**, Turowski, J. M., Perron, J. T., Wordsworth, R., & Stucky de Quay, G., Persisting water cycles after Martian floods (*in prep.*).
4. **Koh, Z.**, Goudge, T., Mitchell, H., Stucky de Quay, G., Geomorphic constraints on Mars' early water cycle (*in prep.*).

Conference Abstracts

1. **Koh, Z.**, He, C., Goudge, T.A., & Stucky de Quay, G., Lake-breaching Flood Volumes and Early Mars Hydrology. AGU Fall Meeting, 2024. EP53E-1545
2. **Koh, Z.**, He, C., Stucky de Quay, G., Global Flood Volumes of Mars' Open-Basin Paleolakes. 10th International Conference on Mars, 2024. LPI Contributions No. 3007, p.3379
3. Abreu, M., Poh, G., **Koh, Z.**, Gruesbeck, J. R., DiBraccio, G. A., & Espley, J. R., Investigating the Vanishing Martian Magnetic Pile-up Boundary in MAVEN Measurements: A Machine Learning Approach. AGU Fall Meeting, P03-04.
4. **Koh, Z.**, Global MAVEN Distribution of Kelvin-Helmholtz Vortices from a Machine Learning and Statistical Approach. AOGS 20th Annual Meeting, 2023. D2-AM2
5. **Koh, Z.**, Poh, G., Fowler, C.M., Gruesbeck, J.R., DiBraccio, G.A., Espley, J.R., Identifying Kelvin-Helmholtz Vortices in MAVEN Observations with a Machine Learning and Statistical Analysis Framework. AGU Fall Meeting, 2022. SM32A-70
6. **Koh, Z.**, Nicholson, P.D., Hedman, M.M., French, R.G., Measuring the Amplitudes of Bending Waves in Saturn's Rings. 54th Annual DPS Meeting, 2022. #301.07
7. **Koh, Z.**, Nimmo, F., Lunine, J.I., Mazarico, E., Dombard, A.J., Assessing the Detectability of Europa's Seafloor Topography from Europa Clipper Gravity Data. 53rd LPSC, 2022. #1276

Invited Talks

1. **Koh, Z.**, Stucky de Quay, G., Geomorphic constriants on Mars' early water cycle. Imperial College London, Department of Earth Science and Engineering, 2025.
2. **Koh, Z.**, Nimmo, F., Lunine, J.I., Assessing the Detectability of Europa's Seafloor Topography from Europa Clipper's Gravity Data. NASA JPL Europa Clipper Lecture Series, 2023.

Research Experience

Ph.D Research — MIT EAPS, Gaia Stucky de Quay — Sept 2023 - present

- Developed flow routing workflow to create climate-driven surface discharge maps on Mars
- Implemented first observation-driven intercomparison of Mars paleoclimate models
- Analyzed Mars remote sensing data (MOLA, THEMIS) to create global database of lake-breaching flood volumes on Mars, as hydrological inputs for surface flow

Ph.D Research — MIT EAPS, Wanying Kang — Sept 2023 - present

- Developed simulation of circulation dynamics in methane-based seas on Titan using GPU-based numerical model *Oceananigans*
- Explored impacts of seasonal variations in precipitation and evaporation

CRESST II Internship — NASA Goddard & Catholic University — June 2022 - June 2023

- Identified Kelvin-Helmholtz vortices at Mars' induced magnetosphere boundary by analyzing remote sensing data (magnetometer and plasma measurements) from MAVEN spacecraft
- Built a recurrent neural network to survey for candidate events
- Results presented in first-author paper currently in review

Undergraduate Researcher — Cornell University, Jonathan Lunine — July 2021 - May 2022

- Evaluated Europa Clipper's ability to distinguish Europa's seafloor topography from its gravity science experiments, with a primary focus on geologic activity
- Developed suite of models in FORTRAN exploring different topographies, additionally using Earth, Venus, and (modelled) Io topography as analogs for tectonics and volcanism
- Results published in first-author paper, earning SETI Forward Award for habitability research

Undergraduate Researcher — Cornell University, Phil Nicholson — Aug 2020 - July 2021

- Analyzed bending waves in Saturn's rings from Cassini VIMS and RSS occultations
- Constructed amplitude profiles and local ring slopes of Titan -1:0 and Mimas 5:3 waves by inverting a model used for line-of-sight optical depth
- Presented results and observational trends in Division of Planetary Sciences (DPS) talk

Professional Experience

Teaching Assistant — Cornell University — Aug 2020 - Dec 2021

- Acted as project manager and advisor for final projects, and graded programming milestones
- Hosted office hours to aid student understanding

Backend Developer — AI-Learners, NY — March 2021 - May 2021

- Developed K-12 math and literacy games in Typescript for children of diverse abilities
- Built a frontend interface for an accessible website tour of learning modules available

Select Honors and Awards

Grayce B. Kerr Fellowship | *MIT* 2024
Ida M. Green Summer Fellowship | *MIT* 2023
Praecis Presidential Graduate Fellowship | *MIT* 2023
SETI Forward Award | *SETI Institute* 2022
John Mather Nobel Scholarship | *NASA Goddard Space Flight Centre* 2022

Cranson and Edna B. Shelley Prize for Undergraduate Research | *Cornell University* 2022
Phi Beta Kappa Honor Society | *Cornell University* 2022
Roger and Mary Lou West Fellowship in Astronomy | *Cornell University* 2021
Dean's List | *Cornell University* 2019, 2020, 2021

Relevant Coursework and Skills

Programming and Software: Python, Julia, Java, C, Fortran, MATLAB, ArcGIS, QGIS, Git, GDAL, Generic Mapping Tools (GMT), Linux scripting

Graduate Coursework: Geomorphology, Coastal Geomorphology, Essentials of Field Geophysics, Field Geophysics Analysis, Principles of Remote Sensing, Fluid Dynamics of the Atmosphere and Ocean, Fluid Dynamics in Planetary Systems (seminar), EAPS First Year Graduate Seminar

Community Organizations and Outreach

- Volunteer (2024 – present), Letters to a Pre-Scientist, USA
- Program Committee (2024 - present), Application Mentorship Program, MIT EAPS
- Mentor (2023 - present), Application Mentorship Program, MIT EAPS
- Marketing Officer (2024 - present), MIT EAPS Student Advisory Committee (E-SAC)
- Open House Officer (2023 - 2024), MIT EAPS Student Advisory Committee (E-SAC)
- Member (2023 - present), Women+ in Course 12 (WiXII), MIT EAPS (E-SAC)
- Vice President (2021 – 2023), Cornell Malaysian Association
- Member (2021-2023), Women in Physics, Cornell University