

Trent B. Thomas

National Science Foundation Graduate Research Fellow

Ph.D. Candidate at the University of Washington, Seattle

Email: tbthomas@uw.edu | Website: trentagon.github.io

EDUCATION

Dual-Title Ph.D., University of Washington, Seattle (UW). Sep 2020 - Present.

- *Titles:* Earth and Space Sciences (ESS), Astrobiology.
- *Advisor:* Prof. David Catling.

B.S., University of California, Los Angeles (UCLA). 2020.

- *Major:* Astrophysics.
- *Honors:* Phi Beta Kappa.

RESEARCH INTERESTS

I am interested in how the surface environment, atmosphere, and geochemistry of terrestrial planets change over time, specifically as it relates to astrobiology and planetary habitability.

RESEARCH EXPERIENCE

NSF Graduate Research Fellow, University of Washington. Sep 2020 – Present.

- *Advisor:* Prof. David Catling.
- *Topics:* geochemical cycles, environmental geochemistry, Earth atmospheric evolution, systems modeling.

Visiting Researcher, Massachusetts Institute of Technology (MIT). Mar 2024 – May 2024.

- *Advisors:* Prof. Gaia Stucky de Quay and Dr. W. Hamish Mitchell.
- *Topics:* machine learning, geographic information systems, Mars geomorphology, Mars paleoclimate.

Research Intern, NASA Jet Propulsion Laboratory (JPL). Oct 2018 – Mar 2023.

- *Advisor:* Dr. Renyu Hu.
- *Topics:* atmospheric escape, photochemistry, Mars atmospheric evolution, stable isotope geochemistry.

AWARDS AND FELLOWSHIPS

- 2024 Finalist, Student Poster Competition, Astrobiology Science Conference.
- **2023 Robert and Jenny Winglee Endowed Graduate Support Fund and Space Physics Fellowship, UW.**
- 2023 Best astrobiology talk, UW ESS Research Gala.
- 2023 NASA/Geochemical Society Planetary science travel grant.
- 2022 American Astronomical Society Hartmann travel grant.
- 2022 Lunar and Planetary Institute career development award.
- **2020 National Science Foundation Graduate Research Fellowship.**
- 2020 UCLA Dean's prize for excellence in undergraduate research.
- 2019 NASA Astrobiology early career collaboration award.
- 2019 UCLA Physics & Astronomy Rudnick-Abelmann Scholarship.

PEER-REVIEWED PUBLICATIONS

1. **Thomas, T.B.**, Hu, R., Lo, D.Y., (2023) "Constraints on the Size and Composition of the Ancient Martian Atmosphere from Coupled CO₂-N₂-Ar Isotopic Evolution Models". *The Planetary Science Journal*. DOI: doi.org/10.1038/s41561-021-00886-y

2. Hu R., and **Thomas, T.B.**, (2022) “A Nitrogen-Rich Atmosphere on Ancient Mars Consistent with Isotopic Evolution Models”. *Nature Geoscience*. DOI: doi.org/10.3847/PSJ/acb924

MANUSCRIPTS IN PREPARATION

1. **Thomas, T.B.**, and Catling, D.C., Three-stage Formation of Cap Carbonates after Marinoan Snowball Glaciations Consistent with Depositional Timescales and Geochemistry. *In press, Nature Communications*.
2. Adams, D., et al. (incl. **Thomas, T.B.**), Crustal Hydration Primed Early Mars with Warm and Habitable Conditions. *In revision, Nature Geoscience*.
3. **Thomas, T.B.**, Meadows, V.S., et al., Volcanic Outgassing of Water on the TRAPPIST-1 Exoplanets. *In preparation*.
4. **Thomas, T.B.**, Catling, D.C., et al., A model for the difference in Sturtian and Marinoan Snowball Earth durations. *In preparation*.

CONFERENCE PRESENTATIONS

9 Talks. 3 Posters.

1. **Thomas, T. B.**, and Catling, D. C., (2024) “A New Model for the Formation of Cap Carbonates after Neoproterozoic Glaciations”. Astrobiology Science Conference. Providence, Rhode Island. *Poster*.
2. **Thomas, T. B.**, et al., (2024) “Constraints on water outgassing rates on the TRAPPIST-1 planets from interior modeling”. Extreme Solar Systems V. Christchurch, New Zealand. *Poster*.
3. **Thomas, T. B.**, and Catling, D. C., (2023) “Untangling Planetary Processes in the Neoproterozoic with Cap Carbonates and a Geologic Carbon Cycle Model”. Goldschmidt Conference. Lyon, France. *Talk*.
4. **Thomas, T. B.**, (2023) “The 4 Billion Year History of Mars’s Atmospheric Evolution Revealed by Isotopic Evolution Models”. UW Earth and Space Science Research Gala. Seattle, Washington. *Talk*.
5. **Thomas, T. B.**, Hu, R., and Lo, D. Y., (2022) “Constraints on the Evolution and Ancient Composition of the Martian Atmosphere from Coupled CO₂-N₂-Ar Isotopic Evolution Models”. 54th Division for Planetary Science Conference. London, Ontario, Canada. *Talk*.
6. **Thomas, T. B.**, and Catling, D. C., (2022) “A Self-Consistent Model for Generating Marinoan Cap Carbonates and Constraining Neoproterozoic Climate”. Astrobiology Science Conference. Atlanta, Georgia. *Talk*.
7. **Thomas, T. B.**, (2022) “A Self-Consistent Model for Generating Marinoan Cap Carbonates and Constraining Neoproterozoic Climate”. UW Earth and Space Science Research Gala. Seattle, Washington. *Talk*.
8. **Thomas, T. B.**, Hu, R., and Lo, D. Y., (2022) “Joint Models for the Evolutionary History of Carbon, Nitrogen, and Argon in the Martian Atmosphere”. 53rd Lunar and Planetary and Science Conference. The Woodlands, Texas. *Talk*.
9. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution”. American Geophysical Union Fall Meeting. Virtual. *Talk*.
10. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution”. 52nd Division for Planetary Science Conference. Virtual. *Talk*.
11. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution”. UCLA Undergraduate Research Week. Virtual. *Talk*.
12. **Thomas, T. B.**, and Hu, R., (2019) “Evolutionary History of the Isotopic Composition of Nitrogen in the Martian Atmosphere”. 9th International Conference on Mars. Pasadena, California. *Poster*.

OTHER PRESENTATIONS

- 2024 Harvard University, Presentation to Wordsworth Research Group. *Talk*.
- 2024 MIT, Presentation to Stucky de Quay Research Group. *Talk*.

- 2023 UW Foundations Board, Discover UW. *Poster*.
- 2023 NASA Virtual Planetary Laboratory, Task C Group Meeting. *Talk*.
- 2022 NASA JPL, High Performance Computing User Group Meeting. *Talk*.
- 2022 NASA GISS, ROCKE-3D GCM Journal Club. *Talk*.
- 2020 Caltech, Mars Atmosphere Journal Club. *Talk*.

ADDITIONAL TRAINING

- 2023 Mars Analog Workshop, UW Astrobiology.
- 2023 Sagan Summer Workshop, NASA Exoplanet Science Institute.
- 2022 Origin of Life Workshop, UW Astrobiology.
- 2022 Storytelling Fellows Podcasting Workshop, UW Libraries.
- 2022 Planetary Exploration Mission Design Workshop, UW Astrobiology.
- 2021 VPlanet Developers Workshop, Virtual Planetary Laboratory.
- 2021 ROCKE-3D GCM Tutorial, NASA Goddard Institute for Space Science.
- 2020 Quantitative Habitability Workshop, NASA NExSS.
- 2019 Exoclimates Simulation Platform Summer School, University of Bern.

SERVICE

Council Member, UW College of the Environment Student Advisory Committee. May 2024 – Present.

- Representative for the Department of Earth and Space Science for discussions with the Dean's Office regarding College-level budgets, policies, DEI (diversity, equity and inclusion), and more.

Primary Convener & Session Chair, Astrobiology Science Conference. 2024.

- Session title: "Global Environmental Changes and Increased Biological Complexity in the Neoproterozoic and Paleozoic". Oral & Poster session. 14 abstracts submitted.

UW ESS Graduate Student Positions. 2020 – Present.

- Awards committee, computing committee, graduate-nominated speaker committee (x2), retreat committee, peer mentor.

TEACHING EXPERIENCE

Instructor, Coyote Central Youth Arts. Aug 2024.

- *Course Title*: "Generative Design: Creating Art with Code"
- Developed and taught a 20-hour course for 8 students aged 10-15 with no prior coding experience.
- Student final projects: <https://youtu.be/h2j7Wz74lHA?si=dqsuV41ywle0cF5B>

Instructor & Teaching Assistant, UW. Aug 2022 – Mar 2023.

- *Course Title*: "ESS 103 Earth's Origin and Transformation over 4.6 Billion Years".
- Developed ten 80-minute lectures, syllabus, and other course material.
- Guest lectured 1 time. Teaching assistant for 1 quarter. 61 students.

OUTREACH

Classroom Mentor, Coyote Central Youth Arts Organization. 2024.

- Mentored 8 K-12 students in 3D computer modeling.

Contributor, NASA NExSS & NASA NFO LD Science Communication group. 2022 – 2023.

- Created 1-slide science "[nuggets](#)" summarizing key new papers for NASA employees and the public.

Speaker, Astronomy on Tap, Seattle. 2022.

- Gave a [30-minute public facing talk](#) and answered questions about the exploration of Mars.

Volunteer Teacher, Nelson Middle School. 2022.

- Taught ~120 K-12 students about Mars with five 30-minute lessons via UW's [Rockin' Out](#) program.

Page Creator, Wikipedia. 2022.

- Created and maintained the Wikipedia page for "[Prebiotic atmosphere](#)".

Graduate Student Mentor, Geoscience Education and Mentorship Support. 2022.

- Mentored prospective PhD student through application process in [Mentor Match program](#).

Invited Speaker, Delran School System. 2022.

- Spoke about my journey through science at [K-12 STEM Family Engagement Night](#).

Social Media Manager, UW Astrobiology. 2021-2022.

- Managed official Twitter and Instagram pages to highlight department activity.

Creator, UW Astrobiology Public Science Panel Series. 2021.

- Organized, moderated, and spoke on [4 live-streamed panels](#) receiving 1600+ views.

Volunteer Guide, UCLA Planetarium. 2019-2020.

- Gave 10+ public and private facing planetarium shows of ~40 people each.

Volunteer Scientist, UCLA Exploring Your Universe. 2019.

- Taught K-12 students intro lesson on the science of Venus.