

ANDREA M. SALAZAR

amjsalaza@mit.edu ◇ Website ◇ Google Scholar

RESEARCH AREAS

Planetary climate dynamics; cloud feedbacks; spin evolution; Solar System and exoplanet habitability; tides; nonlinear dynamics

ACADEMIC APPOINTMENTS

Houghton Distinguished Postdoctoral Fellow

September 2026 – Present

Massachusetts Institute of Technology

Department of Earth, Atmospheric, and Planetary Sciences

Faculty Host: Raymond Pierrehumbert

Postdoctoral Fellow

June 2026 – September 2026

Harvard University

Department of Earth and Planetary Sciences

Faculty Mentor: Robin Wordsworth

EDUCATION

Ph.D., Harvard University

June 2020 – June 2026

Department of Earth and Planetary Sciences

Thesis Advisors: Eli Tziperman and Robin Wordsworth

Thesis: “The Three Fates of Planetary Siblings: Nonlinear Cloud Feedbacks and Climate Evolution on Earth, Venus, and Mars”

B.A. Physics with Honors, University of Chicago

September 2016 – June 2020

Thesis Advisor: Dorian Abbot, Research Advisors: Thaddeus Komacek and Stephanie Olson

Thesis: “The effect of continent size on the ocean dynamics of tidally locked rocky exoplanets”
magna cum laude

PUBLICATIONS

Salazar, Andrea M., and Robin Wordsworth. “No recent long-lived habitable states on Venus due to spin-climate interaction.” *Nature Astronomy* (*in press*).

Salazar, Andrea M., Brian Medeiros, Jiang Zhu, and Eli Tziperman. “Investigating the Effects of a Subtropical Stratocumulus Cloud Breakup in Warm Climates Using Cloud-Locking Experiments.” *Journal of Climate* 38, no. 17 (2025): 4315–4330.

Salazar, Andrea M., and Robin Wordsworth. “The feasibility of asynchronous rotation via thermal tides for diverse atmospheric compositions.” *The Planetary Science Journal* 5, no. 10 (2024): 218.

Bin Algami, Adnan*, and **Andrea M. Salazar**. “Ocean, atmosphere, and cloud quantity on the surface conditions of tidally locked habitable-zone planets.” *Journal of Emerging Investigators* (2024).

Salazar, Andrea M., and Eli Tziperman. “Exploring subtropical stratocumulus multiple equilibria using a mixed-layer model.” *Journal of Climate* 36, no. 8 (2023): 2421–2437.

Herbert, Timothy D., Colleen A. Dalton, Zhonghui Liu, **Andrea M. Salazar**, Weimin Si, and Douglas S. Wilson. “Tectonic degassing drove global temperature trends since 20 Ma.” *Science* 377, no. 6601 (2022): 116–119.

Salazar, Andrea M., Stephanie L. Olson, Thaddeus D. Komacek, Haynes Stephens, and Dorian S. Abbot. “The effect of substellar continent size on ocean dynamics of Proxima Centauri b.” *The Astrophysical Journal Letters* 896, no. 1 (2020): L16.

Checlair, Jade H., **Andrea M. Salazar**, Adiv Paradise, Kristen Menou, and Dorian S. Abbot. “No snowball cycles at the outer edge of the habitable zone for habitable tidally locked planets.” *The Astrophysical Journal Letters* 887, no. 1 (2019): L3.

*Student advised

PUBLICATIONS IN PREPARATION

Salazar, Andrea M., and Robin Wordsworth. “High-altitude water clouds and cyclic habitability on early Mars ” (*in prep*).

Shimokobe, Taichi*, and **Andrea M. Salazar**. “Effects of High Obliquity at the Inner Edge of the Habitable Zone.” (*in prep*).

*Student advised

INVITED TALKS

Atmosphere, Oceans, and Climate Dynamics Seminar *October 2026*
Yale University

Title: “A Tale of Two Sisters: Nonlinear Cloud Feedbacks and Climate Evolution on Earth and Venus”

ECS & Cloud Feedback Virtual Symposia *December 2025*
Virtual

Title: “Maximum warming of a subtropical stratocumulus breakup limited by nonlocal stabilizing cloud feedbacks”

Astrophysical and Planetary Sciences Friday Seminar *October 2025*
University of Colorado, Boulder

Title: “Exploring self-consistent habitable Venus scenarios using a novel spin-climate evolution model”

Origins Seminar *September 2025*
University of Arizona & Steward Observatory

Title: “Exploring habitable Venus scenarios using a novel spin-climate evolution model”

SELECTED PRESENTATIONS

Harvard Origins of Life Initiative Chalk Talk *November 2025*
Harvard University

Talk title: “A new spin on planetary habitability: using rotation and climate co-evolution to probe Venus’s history”

ExoClimesVII *July 2025*
Université de Montréal

Poster title: “Exploring self-consistent habitable Venus scenarios using a novel spin-climate evolution model”

AGU Fall Meeting *December 2024*
Washington, DC

Talk title: “The feasibility of asynchronous rotation via thermal tides for diverse atmospheric compositions”

Boston Area Planetary Meeting *September 2024*
Cambridge, MA

Talk title: “The influence of cloud-rotation feedbacks on the habitability and evolution of rocky planets”

CESM Paleoclimate Working Group Meeting *February 2024*
CESM Paleo Working Group, NCAR

Talk title: “Investigating the role of subtropical stratocumulus break-up in a warm climate using cloud-locking in CESM2”

AWARDS, GRANTS, AND FELLOWSHIPS

Postdoctoral Fellow, Houghton Distinguished Postdoctoral Fellowship (MIT) *2026*
Project Title: “A New Spin on Venus: Constraining Climate History Using Rotation Evolution”

Project co-lead, NCAR Classroom Allocation *2025*
Project Title: “CLASSROOM: Climate Dynamics using a hierarchical modeling approach: from toy models to 3D simulations with CESM2”
Allocation: 1,500,000 core-hours

Project lead, NCAR Exploratory Research Allocation *2024*
Project Title: “Investigating the role of cloud feedbacks in warm climates”
Allocation: 1,000,000 core-hours

TEACHING EXPERIENCE

Teaching Fellow & Guest Lecturer *Spring 2022, 2023, and 2026*
EPS 101: Global Warming, *Harvard University*
Gave guest lectures on heat waves and sea ice.

Head Teaching Fellow, Guest Lecturer, and Course Developer *Spring 2025*
EPS 231: Climate Dynamics (graduate-level course), Harvard University
Collaborated with Prof. Eli Tziperman to develop and integrate hands-on CESM2 modeling exercises; delivered lectures on general circulation modeling and stratocumulus cloud dynamics.

Section Leader *Fall 2024*
GENED 1014: Confronting Climate Change, Harvard University
Developed and delivered lectures for weekly sections.

Head Teaching Fellow & Guest Lecturer *Spring 2024*
APM 120: Applied Linear Algebra and Big Data, Harvard University
Gave a guest lecture on self-organizing maps.

Teaching Fellow & Course Developer *Summer & Fall 2023*
ESE 160: Space Systems Science, Harvard University
Collaborated with Prof. Robin Wordsworth to redesign the course in a flipped-classroom format, developing new in-class activities and assignments.

SELECTED PROFESSIONAL TRAINING

CESM Tutorial, National Center for Atmospheric Research *July 2023*
Competitively selected participant from more than 200 applicants; completed intensive training in CESM configuration, execution, analysis, and use of NCAR computing resources.

Rossbypalooza, University of Chicago *July 2022*
Competitively selected as one of 25 participants from approximately 80 external applicants for a climate dynamics summer school and collaborative research hackathon.

MENTORING

Doyean Myeong, Undergraduate Researcher, MIT *October 2026 – Present*
Meet weekly with this student to guide them through an original research project using the LMD model to determine the minimum observational information needed to distinguish between a post-runaway greenhouse Venus-like planet with a sulfuric acid haze and a habitable Venus with strong water cloud cover. I will serve as the direct supervisor for this student’s UROP experience at MIT.

Taichi Shimokobe, Undergraduate Researcher, MIT

October 2025 – Present

Meet weekly with this student and mentor them through an original research project using CAM5 to explore the effect of obliquity on convective cloud feedbacks and the inner edge of the habitable zone. Helped the student obtain summer research funding through the Origins of Life Initiative at Harvard University. The student is currently preparing a first-author manuscript based on this work.

Jazmin Garza, Undergraduate Researcher, Harvard University

December 2025 – February 2026

Served as a research mentor during a J-term research program for first-year undergraduates. Through daily meetings, this student used a spin-climate evolution model to study whether a high-obliquity habitable Venus state may have occurred in the past. The student completed a written research report based on the project.

Adnan Bin Algami, High school researcher

December 2023 – September 2024

Served as a graduate research mentor for this student as they developed an energy balance model for tidally locked terrestrial exoplanets that explored the effects of ocean heat transport and clouds on surface temperature. The student was first-author on a research article that was published in the Journal of Emerging Investigators.

PROFESSIONAL SERVICE

Reviewer

September 2023–Present

Served as a peer reviewer for The Astrophysical Journal, The Planetary Science Journal, Geophysical Research Letters, EGU sphere, The Open Journal for Astrophysics, and Icarus.

Session Co-convenor, American Geophysical Union Annual Meeting

December 2025

Session title: “The Synergy Among Theoretical Methods, Laboratory Studies and Atmospheric Modeling: Chemistry, Photochemistry and Cloud Processes in Planetary Atmospheres”

Co-organizer, Boston Area Planetary Meeting

October 2024 – Present

President, Geoclub

September 2022 – September 2024

Led an EPS graduate student organization; organized departmental events, represented student interests to faculty, and communicated with university administrators.

Co-organizer, Graduate Student Field Trip

September 2022 – September 2023

Co-organized and co-led a fifty-person field trip to Iceland.

OUTREACH & PUBLIC ENGAGEMENT

Founder, Graduate Admissions Assistance Program

September 2022 – September 2025

Founded and ran an outreach initiative in EPS at Harvard University that matched prospective graduate students with current students for application support.

Invited Speaker, Astronomy on Tap Boston

December 2024

Talk title: “A New Spin on Venus: Was Our Sister Planet Ever Habitable?”

Speaker, Science in the News

October 2022

Talk title: “The Hunt for Earth 2.0: What Makes a Planet Good for Life?”

Undergraduate Mentor

June 2017 – August 2019

Innovators Developing Accessible Tools in Astronomy (IDATA)

Collaborated with Yerkes Observatory and GLAS Education to design and implement educational tools to teach observational astronomy to high school students with visual impairments.