Elizabeth Bailey

University of California, Santa Cruz
Department of Astronomy & Astrophysics
Department of Earth & Planetary Sciences (by courtesy)
email: lizbailey@ucsc.edu

EDUCATION

Ph.D. Planetary Science, California Institute of Technology **2020**
S.B. Mathematics, Massachusetts Institute of Technology **2014**

ACADEMIC APPOINTMENTS

Heising-Simons Foundation 51 Pegasi b postdoctoral fellow
University of California, Santa Cruz -
Department of Astronomy & Astrophysics, Department of Earth & Planetary Sciences (by courtesy) **2020-present**
NASA FINESST graduate fellow
California Institute of Technology - Division of Geological and Planetary Sciences **2019-2020**
Graduate research assistant
California Institute of Technology - Division of Geological and Planetary Sciences **2014-2019**
Undergraduate research assistant
Massachusetts Institute of Technology - Department of Earth, Atmospheric, and Planetary Sciences **2012-2014**

SELECTED HONORS AND AWARDS

Steck Family Award mentor (*student advisee - Eva Zlimen*)
Conceived of and advised research project chosen as the best undergraduate thesis across all humanities and sciences divisions at UC Santa Cruz. Co-advised with Prof. Ruth Murray-Clay **2024**
Heising-Simons Foundation 51 Pegasi b Postdoctoral Fellowship in Planetary Astronomy **2020**
NASA FINESST Graduate Fellowship **2019**
Raynor Duncombe Prize for Outstanding Research in Dynamical Astronomy, AAS/DDA **2018**
Earth-Life Science Institute (ELSI) travel award, Tokyo Institute of Technology **2016**

PUBLICATIONS

***** denotes student mentee

11. **Bailey, E.**, Telus, M., Lam, P., & Webb, S. (*submitted*), Iron XANES measurements of calcite and dolomite in CM chondrites: A record of redox conditions during aqueous alteration.

10. **Bailey, E.**, Ehrlich, H., Nowacki, K., & Jesionowski, T. (*submitted*), Chitin in trilobites: Confirmed.

9. **Bailey, E.**, (*submitted*), A call to determine the skeletal contribution to Ediacaran carbonates: Potential implications for the Shuram excursion.

8. Zlimen, E.*****, **Bailey, E.** & Murray-Clay, R., (2024), Extensive ice pollution of Uranus and Neptune's atmospheres by upsweep of icy material during the Nice Model migration. *The Astronomical Journal* 68(2) 64 https://doi.org/10.3847/1538-3881/ad4c6a

7. Ehrlich, H., **Bailey, E.**, Wysokowski, M., & Jesionowski, T. (2021). Forced biomineralization: A review. *Biomimetics*, 6(3), 46 https://doi.org/10.3390/biomimetics6030046

6. **Bailey, E.** & D. J. Stevenson, (2021). Thermodynamically governed interior models of Uranus and Neptune, *The Planetary Science Journal*, 2 64 https://doi.org/10.3847/PSJ/abd1e0

5. Martin, C. R., O. Jagoutz, R. Upadhyay, L. H. Royden, M. P. Eddy, **E. Bailey**, C. I. O. Nichols, B. P. Weiss (2020). Paleocene latitude of the Kohistan-Ladakh arc indicates multi-stage India-Eurasia collision. *PNAS*

117:47; pp. 29487-29494 https://doi.org/10.1073/pnas.2009039117

4. **Bailey, E.**, K. Batygin (2018), The hot Jupiter period-mass distribution as a signature of in situ formation, *The Astrophysical Journal Letters*, 866:1, L2 https://doi.org/10.3847/2041-8213/aade90

3. **Bailey, E.**, M. E. Brown, K. Batygin (2018), Feasibility of a resonance-based Planet Nine search, *The Astronomical Journal*, 156:2 https://doi.org/10.3847/1538-3881/aaccf4

2. Black, B. A., J. T. Perron, D. Hemingway, **E. Bailey**, F. Nimmo, and H. Zebker (2017), Global drainage patterns and the origins of topographic relief on Earth, Mars, and Titan, *Science*, 356:6339, 727-731 https://doi.org/10.1126/science.aag0171

1. **Bailey, E.**, K. Batygin, & M. E. Brown (2016), Solar obliquity induced by Planet Nine, *The Astronomical Journal*, 152:5 https://doi.org/10.3847/0004-6256/152/5/126

TEACHING EXPERIENCE

Graduate Teaching Assistant, Caltech
Astrobiology [Geo/Astro 159]. Graduate level course.
Designed and supervised student research projects. **Spring 2018**

Planetary Structure and Evolution [Geo 131]. Graduate level course.
Graded assignments and led office hour discussions. **Spring 2018**

Planetary Physics [Geo/Astro 137]. Graduate level course.
Graded assignments and led office hour discussions. **Winter 2017**

Introduction to Earth and Environment [Geo 1]. Undergraduate level course.
Graded assignments, ran hands-on laboratory demonstrations,
Carried out 1-on-1 instruction in the field. **Spring 2016**

Undergraduate Teaching Assistant, MIT
6.163 Strobe Project Lab. (high-speed imaging)
Ran hands-on student lab-based classes in the outreach-focused MIT Edgerton Center. **Spring 2013**

INVITED LECTURES

SETI Institute Planetary Astronomy Theory at SETI (PATHS) seminar **November 1, 2024**
Bay Area Planetary Science Conference **October 16, 2024**
Yale Department of Astronomy, Exoplanet and Stellar Astrophysics Seminar **May 4, 2021**
International Space Science Institute, Bern, 2nd Ice Giants Workshop **March 2, 2020**
University of California, Santa Cruz, Planetary Lunch Seminar **December 2, 2019**
University of California, Los Angeles, Planetary Science Seminar **June 7, 2019**
Exoplanetary Science Initiative (ESI) Symposium, NASA Jet Propulsion Laboratory **March 25, 2019**
Interstellar Probe Exploration Workshop, Explorers Club, NYC **October 11, 2018**

SELECTED OUTREACH

Seymour Marine Discovery Center exhibit guide Communicating marine science to the public in an aquarium setting, overseeing hands-on exhibits with marine invertebrates and sharks. **January 2022 - Spring 2024**
Lamat Institute Research mentor to Zarina Dhillon, co-advised with Prof. Ruth Murray-Clay. **Summer 2021**
SkypeAScientist Skype presentation to secondary school classroom. **Fall 2020**
Caltech FUTURE of Physics symposium - Presentation to undergraduate women considering applying to graduate programs in the physical sciences - "Dynamics of Planetary Systems" **Fall 2019**
SMARTnight, Hamilton Elementary, Pasadena Unified School District - Presentation to k-12 students, "Planet Nine and the Solar System" **Spring 2019**

Presentation to Girl Scout Troop 775 - "Planetary Tour" - received honorary troop membership **Spring 2018**
Lunch talk to fellow tenants of San Gabriel Valley Management - "All About Planet Nine" **Summer 2017**
Exhibit Docent - Memphis Zoo, Memphis, Tennessee. Designed and performed regular public lectures focusing on specific planet-scale impacts of human activity on biodiversity, with a focus on individual actions. **2008-2009**
Exhibit Docent - Pink Palace Museum of cultural and natural history, Memphis, Tennessee. **2007**

CAMPUS ENGAGEMENT

AIP TEAM-UP Departmental team member, UCSC Astronomy & Astrophysics **January 2021**
Co-organizer, UC Santa Cruz Planetary Lunch Seminar ("Plunch") **2020-2021**
Student representative, Caltech Student Life & Housing Faculty Board Committee **2017-2018**

PROFESSIONAL SERVICE

Panelist for NASA's Exoplanets Research Program (XRP)
Referee for *Monthly Notices of the Royal Astronomical Society (MNRAS)*, *Astronomy & Astrophysics (A&A)*, *The Planetary Science Journal*, *The Astrophysical Journal (ApJ)*, *Icarus*
Reviewer for National Research, Development and Innovation Office (NRDI), Hungary

SELECTED PRESS

"Scientists Question Popular Planet Formation Theory" - Sky and Telescope **Winter 2019**
"'Hot Jupiter' Exoplanets May be Born Uncomfortably Close to Their Stars"- Discover Magazine **Winter 2019**
"The mysterious 'Planet Nine' might be causing the whole solar system to wobble"- Washington Post **Summer 2016**
"Planet Nine may have tilted entire solar system except the sun"- New Scientist **Summer 2016**

FACILITY TIME AWARDED

Constraining geochemical evolution of asteroids with XANES mapping of calcite and dolomite in carbonaceous chondrites. SLAC National Accelerator Laboratory - SSRL Synchrotron. Beam Line 2-3. Proposal S-XV-ST-6080. 33 shifts requested, 23.8 shifts assigned to date.

CONFERENCE ABSTRACTS

*denotes student mentee

E. Bailey, M. Telus, P. Lam, S. Webb. Fe XANES Analysis of Carbonates in CM Chondrites Reveals Varying Redox States During Aqueous Alteration. Meteoritical Society Conference, Brussels, Belgium, July-August 2024.

*E. Zlimen, **E. Bailey**, R. Murray-Clay. Extensive Ice Pollution of Uranus and Neptune's Atmospheres by Upsweep of Material During the Nice Model Migration. American Astronomical Society, AAS Meeting 243, February 2024.

E. Bailey, M. Telus, P. Lam, S. Webb. Fe XANES Spectroscopy of Carbonate Minerals in CM Chondrites: A record of Redox Conditions During Aqueous Alteration. AGU Fall Meeting, San Francisco, CA, December 2023.

E. Bailey, M. Telus, P. Lam, S. Webb. Distinct Episodes of Early Calcite Growth in Two CM Chondrites: A Record of Evolving Redox Conditions. Lunar and Planetary Science Conference, The Woodlands, TX, March 2022.

E. Bailey. The Shuram Excursion as Burial of Biomineralized Calcium Carbonate. Geological Society of America 2021 Annual Meeting, Oral Presentation 32-10, Portland, Oregon.

C. Martin, O. E. Jagoutz, R. Upadhyay, L. Royden, M. P. Eddy, **E. Bailey**, C. I. O. Nichols, B. P. Weiss. Paleocene latitude of the Kohistan-Ladakh Arc indicates multi-stage India-Eurasia Collision. Geological Society of America 2020 Annual Meeting.

E. Bailey. Investigating the Possible Role of Chitin Deposition in the Shuram-Wonoka $\delta^{13}C$ Excursion. AGU Fall Meeting, San Francisco, CA/Zoom, December 2020.

C. Martin, O. E. Jagoutz, R. Upadhyay, L. Royden, M. P. Eddy, **E. Bailey**, C. I. O. Nichols, B. P. Weiss. Paleocene Latitude of the Kohistan-Ladakh Arc Indicates Multi-Stage India-Eurasia Collision. AGU Fall Meeting, San Francisco, CA/Zoom, December 2020.

E. Bailey, D. J. Stevenson. Hydrogen-water demixing in the deep interiors of Uranus and Neptune: Implications for heat flow and atmospheric composition. Bay Area Planetary Science Meeting, 2020.

E. Bailey, D. J. Stevenson. Thermodynamically Governed Interior Models of Uranus and Neptune. AGU Fall Meeting, San Francisco, CA, USA, December 2019.

E. Bailey, K. Batygin, S. Naoz. The Multiple Origins of Hot Jupiters. EPSC-DPS Joint Meeting, Geneva, Switzerland, September 2019.

E. Bailey, D. J. Stevenson. Thermodynamically Governed Interior Models of Uranus and Neptune. EPSC-DPS Joint Meeting, Geneva, Switzerland, September 2019.

E. Bailey, K. Batygin. The hot Jupiter period-mass distribution as a signature of in-situ formation. AAS/Division on Dynamical Astronomy (DDA) Meeting, Boulder, CO, USA, June 2019.

E. Bailey, K. Batygin. The hot Jupiter period-mass distribution as a signature of in-situ formation. Meeting of the American Astronomical Society (AAS), Seattle, WA, USA, January 2019.

P. C. Brandt, R. L. McNutt Jr, K. Mandt, [and 83 others, including **E. Bailey**]. Interstellar Probe: The Compelling Science Case, Strawman Payload and Resources. AGU Fall Meeting, Washington, DC, USA, December 2018.

E. Bailey, K. Batygin. The hot Jupiter period-mass distribution as a signature of in-situ formation. AAS/Division for Planetary Science (DPS) Meeting, Knoxville, TN, USA, October 2018.

E. Bailey, S. Naoz, K. Batygin. Probing the parameters of the HAT-P-2 system. AAS/Division on Dynamical Astronomy (DDA) Meeting, San Jose, CA, USA, April 2018.

E. Bailey, D. J. Stevenson. Impactor-Delivered Versus Home-Grown Amino Acids in the Prebiotic Earth Environment. AGU Fall Meeting, New Orleans, LA, USA, December 2017.

E. Bailey, M. E. Brown, K. Batygin. Mean-Motion Resonances and the Search for Planet Nine. AAS/Division for Planetary Science (DPS) Meeting, Provo, UT, USA, October 2017.

E. Bailey, M. E. Brown, K. Batygin. The Role of Resonances in the Search for Planet Nine. AAS Division on Dynamical Astronomy (DDA) Meeting, London, June 2017.

E. Bailey, K. Batygin, M. E. Brown. Solar Obliquity Induced by Planet Nine. AAS/Division for Planetary Sciences (DPS) Meeting, Pasadena, CA, USA, October 2016.

E. Bailey, D. J. Stevenson. Quantifying impactor delivery of amino acids during the timespan relevant to emergence of life. Fourth ELSI International Symposium, Tokyo, Japan, January 2016.

E. Bailey, D. J. Stevenson. Modeling Ice Giant Interiors Using Constraints on the H_2-H_2O Critical Curve. AGU Fall Meeting, San Francisco, CA, USA, December 2015.

E. Bailey, S. Tikoo, O. Jagoutz, L. Royden, B. P. Weiss. New paleomagnetic results from Ladakh, Western Himalaya support multi-stage collision scenario between India and Eurasia. AGU Fall Meeting, San Francisco, CA, USA, December 2014.

M. Sori, **E. Bailey**, J. T. Perron, P. J. Huybers, O. Aharonson, A. Limaye. Ages and Accumulation Rates of the Martian Polar Layered Deposits Estimated From Orbital Tuning. AGU Fall Meeting, San Francisco, CA, USA, December 2013.