

Brynnna G. Downey
Postdoctoral Researcher
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Research interests

How tides affect the orbits and spin states of satellites in our solar system. Formation and evolution of Earth's Moon.

Employment

2024 – present **Postdoctoral researcher**, Southwest Research Institute
Advisor: Robin Canup

Education

2018 – 2024 **University of California, Santa Cruz**
Ph.D. in Earth and Planetary Sciences
Thesis: The Tidal Evolution of the Moon, Callisto, and Titan
Graduation date: June 2024
Advisor: Francis Nimmo

2013 – 2017 **Massachusetts Institute of Technology**
B.S. in Earth, Atmospheric, & Planetary Sciences & B.S. in Physics
Thesis: “Finding the location of Planet Nine”
Advisor: Jack Wisdom

Student research positions

2017 – 2018 **Research assistant**, Observatoire de la Cote d’Azur
Advisor: Alessandro Morbidelli

2016 **Undergraduate research assistant**, Laboratoire d’Astrophysique de Marseille
Advisor: Pierre Vernazza

2015 **Undergraduate research assistant**, Université Catholique de Louvain
Advisor: Eric Deleersnijder

2014-2016 **Undergraduate research assistant**, Massachusetts Institute of Technology
Advisors: Huapei Wang and Ben Weiss

Awards

2024 Best Presentation, UCSC Graduate Symposium

2023 UCSC Dissertation Year Fellowship, Fall Quarter

2021 Honorable Mention, Stephen E. Dworkin Planetary Geoscience Best Graduate Oral Presentation Award

2020-2023 National Science Foundation Graduate Research Fellowship Program

2018-2019 UCSC Chancellor’s Fellowship

2017 W.O. Crosby award for sustained excellence (MIT EAPS)

2016 Award for excellence as an undergraduate teaching assistant (MIT EAPS)

Publications

8. **Downey, B.G.** & Nimmo, F. (2025). Titan's spin state as a constraint on internal dissipation. *Science Advances*, 11, eadl4741. DOI:[10.1126/sciadv.adl4741](https://doi.org/10.1126/sciadv.adl4741).
7. Gyalay, S., Nimmo, F., & **Downey, B.G.** (2024). Effects of Transient Obliquity Tides Within Mimas' Warm, Icy Interior Preserved as a Frozen Fossil Figure. *Journal of Geophysical Research: Planets*, 129(5), e2023JE007903.
6. **Downey, B. G.**, Nimmo, F., & Matsuyama, I. (2023). The thermal–orbital evolution of the Earth–Moon system with a subsurface magma ocean and fossil figure. *Icarus*, 389, 115257.
5. Wisdom, J., Dbouk, R., Miltzer, B., Hubbard, W. B., Nimmo, F., **Downey, B. G.**, & French, R. G. (2022). Loss of a satellite could explain Saturn's obliquity and young rings. *Science*, 377(6612), 1285-1289.
4. **Downey, B. G.**, Nimmo, F., & Matsuyama, I. (2020). Inclination damping on Callisto. *Monthly Notices of the Royal Astronomical Society*, 499(1), 40-51.
3. **Downey, B. G.**, & Morbidelli, A. (2020). An attempt to constrain Planet Nine's orbit and position via resonant confinement of distant TNOs. *Monthly Notices of the Royal Astronomical Society*, 494(2), 2045-2052.
2. Weiss, B. P., Wang, H., Sharp, T. G., Gattacceca, J., Shuster, D. L., **Downey, B.**, ... & Wang, J. (2017). A nonmagnetic differentiated early planetary body. *Earth and Planetary Science Letters*, 468, 119-132.
1. Wang, H., Weiss, B. P., Bai, X. N., **Downey, B. G.**, Wang, J., Wang, J., ... & Zucolotto, M. E. (2017). Lifetime of the solar nebula constrained by meteorite paleomagnetism. *Science*, 355(6325), 623-627.

Teaching and mentorship

2023 – present	Geosciences Education & Mentorship Support (GEMS) mentor
2022 – 2023	Dept. of Earth & Planetary Sciences grad-undergrad mentorship program, UCSC
2022	Facilitator, GEOPATHS, <i>The Dynamic Earth</i> , UCSC
2019 – 2021	Facilitator, GEOPATHS, <i>Mathematical Methods in the Earth Sciences</i> , UCSC
2019 – 2021	Teaching assistant, <i>Mathematical Methods in the Earth Sciences</i> , UCSC

Trainings and education

2023	NASA Planetary Science Summer School, JPL
2021	Unlearning Racism in Geoscience (URGE), virtual program
2020 – 2021	Preparing for Inclusive Teaching, STEM TA training workshop, UCSC

Service

2020 – 2022	University of California Council on Student Fees, UCSC representative
2019 – 2022	Miscellaneous and Course Fees Advisory Committee, Student Representative, UCSC
2019 – 2022	Student Fee Advisory Committee, Chair & Graduate Student Representative, UCSC
2019 – 2020	Graduate Student Commons, Treasurer, UCSC
2018 – 2020	Graduate Student Association, Earth & Planetary Sciences representative, UCSC
2018 – 2020	Committee on Information Technology, Graduate Student Representative, UCSC