BENJAMIN IDINI

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Research Interests

Solar System Exploration · Planetary Interiors and Evolution · Ocean Worlds · Tidal Interactions · Extraterrestrial Seismology· Planet Formation · Gravity Radio Science · Earthquake Mechanics · Earthquake Ground Motion · Tectonic Deformation

Education

PhD in Planetary Science, Caltech 2022
"Earthquakes and the new paradigm of diluted cores in gas giant planets" (Advisor: David Stevenson)
MS in Geophysics, Caltech 2019
MS in Earthquake Engineering, Universidad de Chile 2016
"Curvas de atenuación para terremotos intraplaca e interplaca en la zona de subducción chilena" (Advisors: Fabián Rojas and Sergio Ruiz)
BS in Structural Engineering, Universidad de Chile 2013

Academic Appointments

Vera Rubin Postdoctoral Fellow, UC Santa Cruz, CA Sep. 2024 — August 2025
UC President's Postdoctoral Fellow, UC Santa Cruz, CA Sep. 2022 — August 2024
Graduate R/T Assistant, Caltech, Pasadena, CA June 2017 — August 2022
Research Geophysicist, Universidad de Chile, Santiago, Chile Mar. 2016 — June 2017

Refereed Publications

14. Tulekeyev, A., et al., including **Idini, B.** (2024). Constraints on the long-term existence of dilute cores in giant planets. The Planetary Science Journal, 5(8), 190. [10.3847/PSJ/ad6571]
13. Flores-Cuba, J., et al., including **Idini, B.** (2024). Mechanisms and seismological signatures of rupture complexity induced by fault damage zones in fully-dynamic earthquake cycle models. Geophysical Research Letters, 51(11), e2024GL108792. [10.1029/2024GL108792]
12. Idini, B. & Nimmo, F. (2024). Resonant stratification in Titan's global ocean. The Planetary Science Journal, 5(1), 15. [10.3847/PSJ/ad11ef]
11. Idini, B., et al. (2024). Double distance dependence in high–frequency ground motion along the plate boundary in Northern Chile. Journal of South American Earth Sciences, 133. [10.1016/j.jsames.2023.104699]
10. Howard, S., et al., including **Idini, B.** (2023). Jupiter's interior from Juno: Equation-of-state uncertainties and dilute core extent. Astronomy and Astrophysics, 672. [10.1051/0004-6361/202245625]

9. Idini, B. & Stevenson D.J. (2022). The gravitational imprint of an interior–orbital resonance in Jupiter–Io. The Planetary Science Journal, 3(4), 89. [10.3847/PSJ/ac6179]
8. Idini, B. & Stevenson D.J. (2022). The lost meaning of Jupiter's high–degree Love numbers. The Planetary Science Journal, 3(1), 11. [10.3847/PSJ/ac4248]
7. Idini, B. & Stevenson D.J. (2021). Dynamical tides in Jupiter as revealed by Juno. The Planetary Science Journal, 2(2), 69. [10.3847/PSJ/abe715]
6. Idini, B. & Ampuero J-.P. (2020). Fault-zone damage promotes pulse-like rupture and back-propagating fronts via quasi-static effects. Geophysical Research Letters, 47(23), e2020GL090736. [10.1029/2020GL090736]
5. Erickson, B., et al., including **Idini, B.** (2020). The community code verification exercise for simulating sequences of earthquakes and aseismic slip (SEAS). Seismological Research Letters, 91(2A), 874-890. [10.1785/0220190248]
4. Ross, Z., **Idini, B.**, et al. (2019). Hierarchical interlocked orthogonal faulting in the 2019 Ridgecrest earthquake sequence. Science, 366, 6463. [10.1126/science.aaz0109]
3. Gurnis, M., et al., including **Idini, B.** (2019). Incipient subduction at the contact with stretched continental crust: The Puysegur Trench. Earth and Planetary Science Letters, 520, 212-219. [10.1016/j.epsl.2019.05.044]
2. Leyton, F., et al., including **Idini, B.** (2018). Empirical site classification of CSN network using strong-motion records. Seismological Research Letters, 89(2A), 512-518. [10.1785/0220170167]
1. Idini, B., et al. (2017). Ground motion prediction equations for the Chilean subduction zone, Bulletin of Earthquake Engineering, 15, 5. [10.1007/s10518-016-0050-1]

Invited Seminars and Colloquia

Southwest Research Institute, Boulder, CO Colloquium	October 29, 2024
San Francisco State University, Physics and Astronomy Colloquium	September 30, 2024
Lawrence Livermore National Laboratory, HEDS Seminar Series	September 19, 2024
UC Santa Cruz, Astronomy and Astrophysics Colloquium	May 15, 2024
Stanford University, Geophysics Seminar	May 9, 2024
UC Merced, Physics Colloquium	February 9, 2024
UC Berkeley, Earth and Planetary Science Department Seminar	January 18, 2024
MIT, Earth, Atmospheric, and Planetary Science Department Lecture Series	May 17, 2023
UC Santa Cruz, Geophysical and Astrophysical Fluid Dynamics Seminar	May 12, 2023
UC Davis, Earth and Planetary Science Department Seminar	April 19, 2023
UC Santa Cruz, EPS Department Whole Earth Seminar	April 18, 2023
UC San Diego & San Diego State University, Astrophysics Seminar	March 1, 2023
UC San Diego, Scripps Institution of Oceanography, IGPP Seminar	February 28, 2023
UC Berkeley, Center for Integrative Planetary Science Seminar	February 1, 2023
Rice University, EEPS Department Colloquium	January 19, 2023
UCLA, Earth, Planetary, and Space Sciences Department Colloquium	October 11, 2022
UC Santa Cruz, Astronomy and Astrophysics Planetary Lunch Seminar	November 7, 2022
Universidad de Chile, Department of Geophysics Seminar (virtual)	June 17, 2022
Caltech, DIX Planetary Science Seminar	April 27, 2021
Caltech, DIX Planetary Science Seminar	June 2, 2020

Software Publications

2. Idini, B (2023). Interiorize: Simple Models of Planetary Tides (github.com/bidini/interiorize).
1. Luo, Y., Ampuero, J.P., et al., including **Idini, B.** (2017). QDYN: a Quasi-DYNamic earthquake simulator (v1. 1). Zenodo.(doi: 10.5281/zenodo. 322459).

Selected Conference Presentations (O: Oral, P: Poster)

14. Resonant stratification in Titan's global ocean and other large ocean worlds, AGU Fall Meeting, San Francisco, 2023 (O).
13. The Case for SmallSats: Enhancing the Uranus Mission, LPI Contributions 2808:8158, Uranus Flagship: Investigations and Instruments for Cross-Discipline Science Workshop, Pasadena CA, 2023 (P).
12. Resonant stratification in Titan and other icy satellites with global oceans, DPS-EPSC Annual Meeting, San Antonio TX, 2023 (O).
11. Future investigations of ocean dynamics in ocean worlds using orbiting spacecraft, Bay Area Planetary Science Conference, Santa Cruz CA, 2023 (O).
10. A tale of two planets: dilute cores in Jupiter and Saturn from in-situ spacecraft observations, UC Santa Cruz Postdocs Association Symposium, Santa Cruz CA, 2023 (O).
9. A tale of two planets: dilute cores in Jupiter and Saturn from in-situ spacecraft observations, UC PPFP Annual Meeting, Lake Arrowhead CA, 2023 (O).
8. The gravitational imprint of dynamical tides in Jupiter (invited), AGU Fall Meeting, Chicago IL, 2022 (O).
7. Tidal constraints on the radial extension and static stability of Jupiter's dilute core, AGU Fall Meeting, New Orleans LA, 2021 (P).
6. Dynamical tides in the Jovian System as revealed by Juno, AGU Fall Meeting, remote, 2020 (P).
5. The first three days of the 2019 Ridgecrest earthquake sequence, SCEC Annual meeting, Palm Springs CA, 2019 (P).
4. A Bayesian Image of the 2017 Kermanshah Seismic Sequence in the Northwestern Zagros, AGU Fall Meeting, Washington DC, 2018 (O).
3. Rupture Complexity Promoted by Damaged Fault Zones in Earthquake Cycle Models. In AGU Fall Meeting, New Orleans LA, 2017 (P).
2. Empirical dynamic amplification factors for sites based on seismic noise, 16th World Conference on Earthquake Engineering, Santiago, Chile, 2017 (O).
1. Ground motion prediction equations for the Chilean subduction zone, 2nd Geophysical Signatures of Earthquakes and Volcanoes - 2GSEV, Santiago, Chile, 2016 (P).

Students Supervised

Dallin Nelson, Southern Utah University undergraduate (NASA ICONS) Summer 2024
Dating Europa's terrain with deep learning
Tyler Yuen, San Jose State University undergraduate (NASA ICONS) Summer 2024
Tidal modeling of Europa's ocean
Richard Truong, San Francisco State University undergraduate (Lamat) 2023 — Present
Planet engulfment and stellar structure

Rafael Cottom, UC Santa Cruz undergraduate 2024 — Present
Thermomechanical modeling of Europa's ice shell
Diego González, University of Chile undergraduate (co-sup. with F. Rojas) 2016 — 2017
Ground motion spectra of earthquakes in Chile

Mentorship, Leadership, and Outreach

Mentor in *Lamat* undegraduate research program, UC Santa Cruz 2023 — Present
Speaker in *La Noche de las Estrellas* outreach event, San Francisco State University 2024
Primary convener at AGU Fall Meeting, session: Giant Planet Interiors 2022 — 2024
Mentor in Europa Clipper ICONS undergraduate research program, NASA Summer 2024
Panelist at Europa Clipper's educational event for high school students, Puerto Rico 2023
Guide in *La Noche de las Estrellas* outreach event, Lick Observatory 2023
Mentor in the Eugene Cota-Robles Fellowship program, UC Santa Cruz 2022 — 2023
Invited speaker at NASA's Hyperwall Exhibition, AGU Fall Meeting, Chicago IL 2022
Invited speaker at Science Journeys, Caltech (youtube.com/user/caltech) 2021 — 2022
Mentor in the EPS/ESCI Undergraduate program, UC Santa Cruz 2022
Speaker in Urban Math Collaborative program, Long Beach Unified School District 2021
Host in Caltech's *Astronomía en el Bar* (Astronomy on tap hosted in Spanish; youtube.com/c/CaltechAstro) 2021
Mentor in Caltech's International Graduate Student Buddy Program 2020 — 2021
Judge in Caltech's Summer Undergraduate Research poster competition 2020 — 2021
Panelist at Science for March Seismological Laboratory booth, Caltech 2018
Director in Student Federation Board, Universidad de Chile 2014
Director in Engineering Student Council Board, Universidad de Chile 2013

Grants, Honors, and Awards

NASA's Juno mission, Interior Working Group cochair ($65,815 USD) 2024
Vera Rubin Postdoctoral Fellowship, UC Santa Cruz ($55,620 USD) 2024
NASA's Europa Clipper ICONS undergraduate research mentor ($15,017 USD) 2024
Travel award, EPSC-DPS joint meeting ($2,000 USD) 2023
Travel award, USRA-LPI Uranus Flagship Workshop ($2,500 USD) 2023
Travel award, NASA Outer Planets Assessment Group ($1,000 USD) 2022
UC President's Postdoctoral Fellowship ($552,760 USD) 2022
AGU Outstanding Student Presentation Award ($500 USD) 2021
Division of Geological and Planetary Sciences Fellowship, Caltech ($70,000 USD) 2017
Highest Distinction Major Graduate, Universidad de Chile 2016
CONICYT Master of Science Fellowship, Ministry of Education, Chile ($17,000 USD) 2014
Bicentenario Scholarship, Ministry of Education, Chile ($10,000 USD) 2012
TOTAL: $792,212 USD

Teaching Experience

Teaching Assistant
Planetary Physics, Caltech 2022
Planetary Structure and Evolution, Caltech 2021

Geodynamics, Caltech 2020
Freshman Seminar: Earthquakes, Caltech 2019
Advanced Structural Dynamics, Universidad de Chile 2015
Seismic Design of Structures, Universidad de Chile 2015

Planetary Exploration

Europa Clipper Mission, Science Team Affiliate April 2023 — Present
NASA United States

Juno Mission, Science Team Member and IWG Cochairman
NASA January 2020 — Present
United States

KISS Study: Determining the Interior Structure of Uranus
Keck Institute for Space Studies September 11-15, 2023
Pasadena, CA

Planetary Science Summer School May 2022 — Aug 2022
NASA – Jet Propulsion Laboratory Remote, United States

Magnus G. Langseth Transoceanic Research Vessel, Science Crew March 2018
Lamont-Doherty Earth Observatory Puysegur Trench, Pacific Ocean

Professional Organizations

American Astronomical Society (AAS) 2023 — Present
Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) 2021 — Present
Affiliate to the Keck Institute for Space Studies (KISS) 2019 — Present
American Geophysical Union (AGU) 2017 — Present

Appearances in Press and Media

Podcast episodes
(El Universo curioso de la NASA) Un viaje poético a la luna Europa, NASA en español
October 1, 2024

Recorded outreach talks
Viaje al Centro de Júpiter, Science Journeys, Caltech November 4, 2022
A Journey to Jupiter's Core, Science Journeys, Caltech May 20, 2022

YouTube Live shows
(NASA Europa Clipper Launch Broadcast) Lanzamiento de Europa Clipper, NASA en Español October 15, 2024
(NASA Science Live) ¿Podría la luna Europa de Júpiter sustentar la vida? NASA en Español October 3, 2024
(Caltech Astro) Ciencia con el Telescopio James Webb de la NASA, Astronomía en el Bar
November 17, 2021
(Caltech Astro) Enanas Marrones y Mini Agujeros Negros, Astronomía en el Bar
May 11, 2021

Newspapers and magazines
Image of 'violent' earthly phenomenon captured on Jupiter, Ariana Bindman, SFGATE

June 20, 2023

#SoCaltech: Benjamin Idini, Caltech Magazine August 11, 2022

Universal Languages, Lori Dajose, Caltech Magazine November 29, 2021

The tides of Jupiter can help scientists understand the history of the Solar System, Passant Rabie, Inverse Magazine May 5, 2021

Weird 'boomerang' earthquake detected under the Atlantic Ocean, Maya Wei-Haas, National Geographic August 10, 2020

California: July earthquake caused fault to move for first time on record, Sam Levin, The Guardian October 18, 2019

Unprecedented movement detected on California earthquake fault capable of 8.0 temblor, Rong-Gong Lin II, LA Times October 17, 2019

Se detecta movimiento sin precedentes en una falla sísmica en California capaz de producir un temblor de 8.0, Rong-Gong Lin II, The San Diego Union-Tribune En Español October 17, 2019

Highlights

NASA Selects Students for Europa Clipper Intern Program, Patricia Talbert, NASA News May 02, 2024

Resonant Stratification In Titan's Global Ocean, Keith Cowing, Astrobiology December 11, 2023

Caltech Teams Up With Urban Math Collaborative, Andrew Moseman, Caltech News May 13, 2021

Raising Tides on Jupiter with Its Moons, Susanna Kohler, AAS Nova April 21, 2021

Lessons from Ridgecrest, Robert Perkins, AAAS EurekAlert! October 17, 2019

Caltech, NASA Find Web of Ruptures in Ridgecrest Quake, Anthony Greicius, NASA News Oct 17, 2019