# Benjamín Idini

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Planetary Geophysicist

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

## Education

**Doctor of Philosophy in Planetary Science**, *California Institute of Technology* — Jun 2022
**Master of Science in Geophysics**, *California Institute of Technology* — Jun 2019
**Master of Science in Earthquake Engineering**, *Universidad de Chile* — Mar 2016
**Bachelor of Science in Civil Engineering**, *Universidad de Chile* — Dec 2013

## Academic Appointments

**UC President's Postdoctoral Fellow**, *University of California, Santa Cruz, CA* — Sep 2022 — Present
**Graduate Research Associate**, *California Institute of Technology, Pasadena, CA* — Jun 2017 — Jun 2022

- NASA's Juno mission (Jan 2020 — Jun 2022): Interpreted data from the Juno mission to recognize the first direct evidence of dynamical tides in a gas giant planet. Revealed the gyrotidal effect that amplifies tides and reduces the attenuation of tesseral tidal torques. Interpreted data from the Juno mission to propose an interior–orbital resonance between Jupiter and the satellite Io.
- The 2019 Ridgecrest earthquake (Jul 2019 — Dec 2019): Trained a high dimensional fault slip model from spaceborne radar observations using parallel Markov Chain Monte Carlo sampling and High Performance Computing (AlTar: `github.com/AlTarFramework/altar`).
- The Earthquake Mechanics of Geological Faults (Jun 2017 — Jun 2019): Implemented tectonic fault damage as a new feature in an earthquake simulator to numerically simulate the tectonic activity of a fault model over millions of years. This implementation allowed us to access otherwise prohibitively expensive solutions to the equations describing earthquake mechanics (QDYN: `github.com/ydluo/qdyn`). Provided an explanation to earthquake pulses based on mathematical models and numerical simulations of earthquakes under the conditions observed in geological faults.

**Research Geophysicist**, *Universidad de Chile, Santiago, Chile* — Mar 2016 — Jun 2017

- Trained a linear model of the ground motion perceived during destructive earthquakes in Chile using local data, leading to a Ground-Motion Prediction Equation that is frequently used in seismic hazard studies in the area.

## Refereed Publications

**11.** Flores-Cuba, J., et al., including **Idini, B.** (in prep.). Mechanism and seismological signatures of rupture complexity induced by fault damage zones.

**10. Idini, B.**, Ruiz, S., et al. (in prep.). Double distance dependence in high–frequency ground motion along the plate boundary in Northern Chile.

**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.

**8. Idini, B.** & Stevenson D.J. (2022). The lost meaning of Jupiter's high–degree Love numbers. The Planetary Science Journal, 3(1), 11.

**7. Idini, B.** & Stevenson D.J. (2021). Dynamical tides in Jupiter as revealed by Juno. The Planetary Science Journal, 2(2), 69.

**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.

**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.

**4.** Ross, Z., **Idini, B.**, et al. (2019). Hierarchical interlocked orthogonal faulting in the 2019 Ridgecrest earthquake sequence. Science, 366, 6463.

**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.

**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.

**1. Idini, B.,** Rojas, F., et al. (2017). Ground motion prediction equations for the Chilean subduction zone, Bulletin of Earthquake Engineering, 15, 5.

## Software Publications

**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).

## Conference Presentations

**7.** Tidal constraints on the radial extension and static stability of Jupiter's dilute core, AGU Fall Meeting 2021, New Orleans LA, 2021.
**6.** Dynamical tides in the Jovian System as revealed by Juno, AGU Fall Meeting Abstracts (Vol. 2020, pp. P082-0004), remote, 2020.
**5.** The first three days of the 2019 Ridgecrest earthquake sequence, SCEC Annual meeting, Palm Springs CA, 2019.
**4.** A Bayesian Image of the 2017 Kermanshah Seismic Sequence in the Northwestern Zagros, AGU Fall Meeting Abstracts (Vol. 2018, pp. S41A-03), Washington DC, 2018.
**3.** Rupture Complexity Promoted by Damaged Fault Zones in Earthquake Cycle Models. In AGU Fall Meeting Abstracts (Vol. 2017, pp. T41C-0632), New Orleans LA, 2017.
**2.** Empirical dynamic amplification factors for sites based on seismic noise, 16th World Conference on Earthquake Engineering, Santiago, Chile, 2017.
**1.** Ground motion prediction equations for the Chilean subduction zone, 2nd Geophysical Signatures of Earthquakes and Volcanoes - 2GSEV, Santiago, Chile, 2016.

## Invited Talks, Seminars, and Colloquia

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| UC San Diego & San Diego State University, Astrophysics Seminar | 2023 |
| UC San Diego, Scripps Institution of Oceanography, Institute of Geophysics and Planetary Physics Seminar | 2023 |
| UC Berkeley, Center for Integrative Planetary Science Seminar | 2023 |
| Rice University, Department of Earth Environmental and Planetary Sciences Colloquium | 2023 |
| AGU Fall Meeting, Chicago, 2021 Outstanding Student Presentation Award Winners | 2022 |
| AGU Fall Meeting, Chicago, NASA's Hyperwall Exhibition | 2022 |
| UC Los Angeles, Department of Earth, Planetary, and Space Sciences Colloquium | 2022 |
| UC Santa Cruz, Other Worlds Laboratory, Planetary Lunch | 2022 |
| UC Santa Cruz, Department of Earth and Planetary Sciences, Planetary Group | 2022 |
| Universidad de Chile, Department of Geophysics Seminar | 2022 |
| Caltech, Science Journeys (online at youtube.com/user/caltech) | 2021 — 2022 |
| Long Beach Unified School District, Urban Math Collaborative program | 2021 |
| Southwest Research Institute, Interiors Working Group, NASA Juno mission | 2020 — 2021 |
| Caltech, DIX Planetary Science Seminar | 2020 — 2021 |

## Mentorship and Leadership

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| Mentor for the Eugene Cota-Robles Fellowship program, University of California Santa Cruz | 2022 — Present |
| Mentor for the EPS/ESCI Undergraduate program, University of California Santa Cruz | 2022 |
| Primary convener at AGU session P013: Giant Planet Interiors | 2022 |
| Host in Caltech's *Astronomía en el Bar* (Astronomy on tap hosted in Spanish), virtual (youtube.com/c/CaltechAstro) | 2021 |
| Mentor for Caltech's International Student Buddy Program | 2020 — 2021 |
| Judge for Caltech's Summer Undergraduate Research Fellow (SURF) poster competition | 2020 — 2021 |
| Caltech's Science for March, Seismological Laboratory booth | 2018 |
| Student Federation Board of Directors, Universidad de Chile | 2014 |
| Engineering Student Council Board of Directors, Universidad de Chile | 2013 |

## Honors and Awards

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| Travel award, NASA Outer Planets Assessment Group | 2022 |
| University of California President's Postdoctoral Fellowship | 2022 |
| AGU Outstanding Student Presentation Award | 2021 |
| Division of Geological and Planetary Sciences Fellowship, California Institute of Technology | 2017 |
| Highest Distinction Major Graduate, Universidad de Chile | 2016 |
| CONICYT Master of Science Fellowship, Ministry of Education, Chile | 2014 — 2015 |

Honored Undergraduate Student, Universidad de Chile 2011 – 2012

## Teaching Assistant Experience

**California Institute of Technology**

Planetary Physics 2022
Planetary Structure and Evolution 2021
Geodynamics 2020
Freshman Seminar: Earthquakes 2019

**Universidad de Chile**

Advanced Structural Dynamics 2015
Seismic Design of Structures 2015

## Planetary Exploration

**NASA's Juno Mission, Interiors Working Group** Jan 2020 — Present

- Provided interpretation to gravity data collected by the mission.

**Science Crew on the M. G. L. Research Vessel**, *Puysegur Trench, New Zealand* Mar 2018

- Assisted the deployment of instrumentation and acquisition of seismic, magnetic, and radar data while sailing the Pacific Ocean.

**NASA-JPL Planetary Science Summer School**, *Remote* May 2022 — Aug 2022

- Jointly formulated the strategic science goals, operation, and payload of a NASA New Frontiers mission concept to extract a surface sample from comet 67P/Churyumov–Gerasimenko and return it to Earth for laboratory analysis.

## Professional Organizations

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

## Appearences in News Articles

The tides of Jupiter can help scientists understand the history of the Solar System, Passant Rabie, Inverse Magazine May 5, 2021
Raising Tides on Jupiter with Its Moons, Susanna Kohler, AAS Nova Apr 21, 2021
Lessons from Ridgecrest, Robert Perkins, AAAS EurekAlert! Oct 17, 2019
Unprecedented movement detected on California earthquake fault capable of 8.0 temblor, Rong-Gong Lin II, LA Times Oct 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 Oct 17, 2019