Benjamín Idini

Pasadena, CA
bidiniza@caltech.edu

Planetary Geophysicist

Website: bidini.github.io
LinkedIn: benja-rodo

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

Postdoctoral Scholar, *California Institute of Technology, Pasadena, CA* — Jun 2022 — Aug 2022
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

10. Idini, B., Ruiz, S., et al. (in prep.). High-frequency strong 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.

Exploration

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 designed a New Frontiers NASA mission concept for a comet sample return.

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

Leadership and Outreach

Primary convener at AGU session P013: Giant Planet Interiors	2022
Speaker at the Urban Math Collaborative program, Long Beach Unified School District	2021
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
Speaker at Caltech's Science Journeys (English and Spanish)	2020 — 2021
Judge for Caltech's Summer Undergraduate Research Fellow (SURF) poster competition	2020 — 2021
Caltech's Science for March, Seismological Laboratory booth	2018
Graduate Student Council Board of Directors, Universidad de Chile	Jan 2013 — Dec 2014

Fellowships, Honors, and Awards

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	Jun 2017 — Sep 2018
Highest Distinction Major Graduate, Universidad de Chile	Mar 2016
CONICYT Master of Science Fellowship, Ministry of Education, Chile	Mar 2014 — Dec 2015
Honored Undergraduate Student, Universidad de Chile	2011 – 2012

Invited Talks and Seminars

Mareas, misiones y muchos colores: el nuevo paradigma de núcleos difusos en planetas gigantes gaseosos, Geophysics Seminar, Universidad de Chile, 2022.
Viaje al centro de Jupiter, Science Journeys, Caltech, 2022.
Journey to the center of Jupiter, Science Journeys (youtube.com/user/caltech), Caltech, 2022.

Tides in Jupiter, Report #3, Interiors Working Group, NASA's Juno mission, 2021.
The tidal excitation of Jupiter's dilute core, Planetary Science Seminar, Caltech, 2021.
Dynamical tides in the Jovian system as revealed by Juno, Planetary Science Seminar, Caltech, 2020.
Tides in Jupiter, Reports #1 & #2, Interiors Working Group, NASA's Juno mission, 2020.
Simple estimates for the dynamical contribution to tidal gravity, Interiors Working Group, NASA's Juno mission, 2020.

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

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