Nicolas Valencia

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Education

University of California, Berkeley August 2021 - May 2025
Bachelors of Arts, Geophysics and Astrophysics; GPA: 3.73

Undergraduate Thesis:
Constraining Azimuthal Anisotropy in the Southwest Pacific: Insights From Splitting Intensity.
Thesis Advisor: Barbara Romanowicz

Research Experience

Undergraduate Researcher, Berkeley Seismological Laboratory June 2023 - May 2025
Advisors: Barbara Romanowicz, Dorian Soergel, Jonathan Wolf

Investigated upper mantle azimuthal anisotropy in the southwest Pacific with shear wave splitting measurements from SKS and direct S phases. Developed scalable Python workflows with parallel computing for large-scale waveform processing and measurement of Splitting Intensity. Demonstrated that incorporating select S phases can improve azimuthal coverage for regions with limited source distributions, and merging both phase datasets with azimuthal binning yields better constrained anisotropic parameters. Established a novel workflow for using S splitting as a complementary tool with SKS measurements in constraining receiver-side anisotropy.

NSF REU Fellow, Brown Univeristy June 2024 - August 2024
Advisors: Karen Fischer, Sarah Brown

Measured Antarctic Ice Sheet structure and temporal variations using Ps receiver functions. Developed MATLAB time-series analysis codes for phase identification and noise reduction. Generated synthetic Ps receiver functions to test sensitivity to ice thickness and internal layering. Observed receiver functions that can resolve ice thickness variations of 200 m and velocity changes of 5%. Investigated lateral heterogeneities and potential long-term secular variations in ice structure. Applied genetic algorithms for forward modeling to optimize subsurface interpretations, providing a workflow with potential to constrain ice mass changes over decadal time scales.

Student Research Assistant, Eel River Critical Zone Observatory November 2022 - August 2023
Advisors: Katherine Elliot, Mielle Lee

Conducted multi-day field sampling campaigns within Angelo Coast Range Reserve to support studies of hydrology and subsurface weathering. Collected groundwater, soil, and tree core samples across steep terrain for geochemical analysis. Maintained a Vadose Zone Monitoring System for long-term, high-precision subsurface gas and fluid chemistry research. Supported logistics for equipment transport, sample preservation, and documentation. Contributed field datasets to ongoing research characterizing subsurface critical zone processes.

Technical Skills

Computational: Python (NumPy, SciPy, Obspy, Pandas, Matplotlib, PyGMT, PyTorch), MATLAB, Jupyter, Bash, Linux, Git, QGIS, SAC, objected-oriented programming, parallel computing.

Seismological Methods: Signal processing, waveform analysis, shear wave splitting, receiver functions, synthetic waveform modeling, geophysical inversion, forward modeling.

Field Skills: Field sampling, geological interpretation, sensor installation, field logistics.

Industry Experience:

Data Science Intern, SoundThinking October 2025 - Present
SafePointe R&D

Conducting magnetic modeling and physics simulations for AI-driven security applications on the SafePointe platform. Contributing to hardware design and testing of sensor systems. Collaborating with multi-disciplinary teams to validate results and achieve project objectives. Further strengthening geophysical data analysis skills through exposure to complex, real-world physics problems.

Conference Presentations

Oral Presentations:

Valencia, Nicolas, Sarah E. Brown, and Karen M. Fischer. "Investigating Antarctic Ice Sheet Properties Using Ps Receiver Functions." AGU Fall Meeting Abstracts. Vol. 2024. 2024.

Poster Presentations:

Valencia, Nicolas, Dorian Soergel, and Barbara Romanowicz. "Constraining Source and Station Side Azimuthal Anisotropy in the Southwest Pacific Using Shear Wave Splitting Measurements." AGU Fall Meeting Abstracts. Vol. 2024. No. 3183. 2024.

Valencia, Nicolas, Utpal Kumar, Dorian Soergel, and Barbara Romanowicz. "Refining Splitting Intensity Measurements of Shear Wave Splitting for Multi-Layer Anisotropy." SSA 2024 Annual Meeting. Seismological Research Letters 2024;; 95 (2B): 1113–1465.

Publications

Valencia, N., Soergel, D., Wolf, J., & Romanowicz, B. (in prep.). Constraining Azimuthal Anisotropy in the Southwest Pacific Using Splitting Intensity.

Awards and Fellowships

2025 Earth & Planetary Science Department Citation May 2025

Recipient of the award for contributions to the field of geophysics and outstanding undergraduate accomplishment in Earth and Planetary Science.

Charles H. Ramsden Endowed Fellowship 2022 - 2025 Academic Years

Four-time recipient of an undergraduate scholarship exclusive to students within the Berkeley Department of Earth & Planetary Science. Funding was used to support undergraduate research towards senior thesis.

NSF REU Fellowship June 2024 - August 2024

Recipient of fellowship for Brown University's "Dynamic Earth in the 21st Century" REU summer program. Funding used for stipend, housing, and conference attendance at AGU 2024.

MPS Scholars Travel Stipend April 2024

Recipient of the stipend to present undergraduate research at a scientific conference.
Funding used for poster presentation at the Seismological Society of America 2024 Annual Meeting.

Teaching and Mentoring Experience

President, Geological Association at Berkeley: August 2022 - May 2025

Three years of experience organizing weekly activities and fostering community between earth science undergraduates. Responsibilities included managing an annual budget, coordinating field trip logistics, and acting as a liaison between students and department administration. Expanded membership from 20 to 50 students during the course of my leadership.

Course Reader: September 2022 - May 2025

Graded weekly assignments and provided office hours for introductory and advanced earth science courses, including *EPS 50: The Planet Earth*, *EPS 12: The Planets*, *EPS 20: Earthquakes in Your Backyard*, and *EPS 108: Geodynamics.* Also assisted with field trips, including driving and logistics.

MPS Scholars Mentor: July 2024 - December 2024

Advised and mentored incoming freshmen interested in math and physical sciences. Assisted underclassmen with course selection, major interest, and provided avenues to research experience.

Be A Scientist Mentor: January 2024 - May 2024

Mentored 7th grade students in designing science fair projects during the semester. Guided students through the scientific process and introduced students to career pathwys in STEM fields.

Professional Membership

American Geophysical Union, Member (2024 - Present)

Seismological Society of America, Member (2023 - Present)