Ian Vandevert

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Summary

Data scientist and software engineer completing a PhD in seismology (defending June 2026), specializing in building analysis pipelines for large scientific datasets (∼775,000 events and ∼12 million records). Experience spans the full stack of scientific computing: ingesting and cleaning messy real-world data, designing efficient numerical algorithms, and building analysis and visualization workflows. Comfortable working across Python (NumPy, pandas, SciPy, ObsPy, GeoPandas), high-performance computing environments, Linux, and real-time data streams. Author of peer-reviewed publications and open-source scientific tools.

Education

IGPP, Scripps Institution of Oceanography, UC San Diego — San Diego, California, USA
Ph.D. in Seismology — *2021–2026 (defending June)*

- Dissertation: "Spatial Variations in Earthquake Source Properties"
- Advisors: Profs. Peter M. Shearer and Wenyuan Fan

University of California, Santa Barbara — Santa Barbara, California, USA
B.S. in Earth Science (Geophysics emphasis) — *2016–2019*

Technical Skills

Languages: Python (primary), MATLAB, Fortran
Python Libraries: NumPy, pandas, SciPy, Matplotlib
Geoscience & Geospatial: ObsPy, PyGMT, GeoPandas
Data Engineering: Concurrent and parallel processing, pipelines for large datasets (10M+ records)
Environment: Linux, remote workflows
Methods: Spectral analysis, time-series analysis, signal processing, spatial statistics, inversion methods

Software

py-nfi — 2025 – present
End-to-end pipeline for computing the normalized frequency index (nFI) across large seismic catalogs — *Python, ObsPy, NumPy, pandas, PyGMT, GeoPandas*

- Processes 30 years of California seismicity: ∼775,000 events and ∼12 million seismograms, from raw waveform download through source-property estimation
- Concurrent FDSN metadata and waveform ingestion, frequency-domain instrument response correction, noise analysis, and spectral computation; vectorized NumPy for efficient processing at catalog scale
- Geospatial analysis of source-property variations across California fault systems using PyGMT and GeoPandas
- Open source: github.com/ivandevert/py-nfi

seisplot — 2022
Interactive seismogram visualization and analysis tool — *Python, ObsPy, Tkinter*

- GUI application for exploring, filtering, and quality-controlling seismogram data, with built-in record section, PSD, spectrogram, and filter response plotting
- Plugin architecture enabling extensible analysis workflows (e.g., phase arrival overlays, seismogram stacking) without modifying the core codebase
- Open source: github.com/ivandevert/seisplot

sdpy 2024

Teaching materials for spectral decomposition workshop at the SCEC Annual Meeting Python, ObsPy, Jupyter

- Three-notebook didactic pipeline: waveform download, spectral computation, and spectral decomposition for source parameters
- Designed as a hands-on starting point for workshop attendees learning spectral decomposition methods
- Open source: github.com/ivandevert/sdpy

Research Experience

Graduate Student Researcher 2021 – Present

Scripps Institution of Oceanography, UC San Diego *San Diego, California, USA*

- Developed methods for characterizing earthquake source properties, applied to catalogs of ∼775,000 events and ∼12 million seismograms
- Introduced the normalized frequency index (nFI), a metric distinguishing spatial variations in earthquake source physics; released as an open-source end-to-end Python pipeline (see `py-nfi` under Software)
- Contributed to the SCEC/USGS Community Stress Drop Validation Study, a multi-institution comparison of stress-drop estimation methods applied to the 2019 Ridgecrest sequence
- Participated in the SCEC Array of Arrays field deployment (2024), assisting in the installation of ∼400 temporary geophones across five Southern California sites (poster)
- 4 peer-reviewed publications and 10 conference presentations (AGU, SCEC, SSA, EGU); see Publications and Presentations

Undergraduate Research Assistant 2018 – 2019

University of California, Santa Barbara *Santa Barbara, California, USA*

- Worked with Prof. Toshiro Tanimoto on cross-correlation of seismic noise in the Los Angeles basin
- Worked with Prof. Robin Matoza on elastic wave propagation simulation
- Presented results as a poster at the SCEC Annual Meeting (2018)

Relevant Work Experience

C2Earth, Inc. 2019 – 2020

Geotechnical Associate *Campbell, California, USA*

- Built an internal project-tracking web application (custom HTML/JS frontend, MySQL backend) deployed on the company's local network; replaced a single overloaded spreadsheet of thousands of projects with searchable, editable records adopted by the firm
- Supported residential and commercial construction projects through field and laboratory work: conducted soil compaction and soil analysis tests, and generated settlement contour maps from hydrostatic level surveys of existing buildings

Publications

1. **Vandevert, I.**, Shearer, P.M., Fan, W. "Distinguishing Spatial Variations in California Earthquake Dynamics Using a High- to Low-Frequency Spectral Ratio"; in progress.
2. **Vandevert, I.**, Shearer, P.M., Fan, W. "Using a High- to Low-Frequency Spectral Ratio to Distinguish Variations in Earthquake Source Properties" *BSSA*; accepted.
3. Abercrombie, R. E., [...], **Vandevert, I.**, et al. "Overview of the SCEC/USGS Community Stress Drop Validation Study Using the 2019 Ridgecrest Earthquake Sequence." *BSSA*, 2025. [doi.org/10.1785/0120240158]

4. **Vandevert, I.**, Shearer, P.M., Fan, W. "Ridgecrest Aftershock Stress Drops from P- and S-Wave Spectral Decomposition" *BSSA*, 2024. [doi.org/10.1785/0120240133]

5. Shearer, P.M., **Vandevert, I.**, Fan, W., et al. "Earthquake Source Spectra Estimates Vary Widely for Two Ridgecrest Aftershocks Because of Differences in Attenuation Corrections" *BSSA*, 2024. [doi.org/10.1785/0120240134]

Presentations

Oral:

1. 2025 AGU, New Orleans. "Distinguishing Spatial Variations in California Earthquake Dynamics Using a High- to Low-Frequency Spectral Ratio."

2. 2023 AGU, San Francisco. "Estimating Earthquake Source Parameters from S-Wave Maximum Amplitudes: Application to the 2019 Ridgecrest Sequence."

Posters: 10 posters presented at AGU, SCEC, SSA, and EGU annual meetings (2018, 2022–2026). Full list available at ianvandevert.com or on request.

Teaching Experience

Teaching Assistant Fall 2025
Natural Disasters, UC San Diego *San Diego, CA*

- Led two local field trips for undergraduates
- Graded assignments and held office hours

Teaching Assistant Spring 2025
Geology of the National Parks, UC San Diego *San Diego, CA*

- Led weekly discussion sections and a field trip
- Graded assignments and exams

Workshop Presenter September 2024
SCEC Annual Meeting *Palm Springs, CA*

- Presented a half-hour tutorial on computing stress drop using spectral decomposition, with accompanying open-source Python materials (`sdpy`)

K-12 Outreach Speaker 2023
My Montessori School of Coronado *San Diego, CA*

- Gave a guest presentation on geology and earthquakes to an elementary-school class (∼25 students)

Awards & Honors

- **Outstanding Student Presentation Award**, American Geophysical Union (AGU), 2024. *Seismology section; awarded to the top 3–5% of student presenters.*
- **Student Travel Grant**, Scripps Institution of Oceanography, 2026. *For 2026 EGU General Assembly.*
- **Student Travel Grant**, Seismological Society of America (SSA), 2023. *For 2023 SSA Annual Meeting.*

Service

- **Peer Reviewer:** *The Seismic Record* (2024); *BSSA* (2024–2025).