Eric Beaucé | Curriculum Vitae

61 Route 9W, 201J Seismology, Palisades, NY 10964 USA

✉ ebeauce@ldeo.columbia.edu • 🌐 ebeauce.github.io/

Academic Positions

Lamont-Doherty Earth Observatory, Columbia University   **New York, USA**
Postdoctoral Research Scientist (Brinson Fellow)   *02/2022 - present*

Massachusetts Institute of Technology   **Cambridge, USA**
Postdoctoral Researcher   *09/2021 - 01/2022*

Massachusetts Institute of Technology   **Cambridge, USA**
Research assistant/Teaching assistant   *2016 - 2021*

Ph.D. Thesis: Analyzing the Collective Behavior of Earthquakes to Understand Fault Mechanisms Better. Supervised by Robert D. van der Hilst and Michel Campillo. Available at `https://tinyurl.com/EBPhDThesisManuscript`.

Education

Massachusetts Institute of Technology   **Cambridge, USA**
Ph.D., Geophysics   *2021*

Massachusetts Institute of Technology   **Cambridge, USA**
Master of Science, Geophysics   *2018*

Ecole Normale Supérieure de Lyon   **Lyon, France**
Master of Science, Physics   *2016*

Ecole Normale Supérieure de Lyon   **Lyon, France**
Bachelor of Science, Physics   *2014*

Teaching Experience

Sonic and Visual Representation of Data   **Columbia University**
Graduate and undergraduate course (teaching assistant)   *2023*

Introduction to data sonification and visualization in Python.

Introduction to Statistical Seismology   **Columbia University**
Graduate course (guest lecturer)   *2022*

Introduction to Machine Learning in Earthquake Seismology   **University of Colorado**
Graduate course (guest lecturer, remote)   *2021*

○ **Essentials of Geophysics**   **Massachusetts Institute of Technology**
Graduate course (teaching assistant)   *2019*

Introduction to seismology, gravity, planetology, magnetism, and geodynamics.

○ **Remote Sensing**   **Massachusetts Institute of Technology**
Undergraduate course (teaching assistant)   *2018*

Introduction to wave physics, Maxwell's equations, and their application to radar methods.

Field Experience

○ **Axial Seamount**   **Pacific Coast, USA**
OBS deployment at the Axial Seamount aboard the Marcus Langseth   *September 2022*

Deployment of 15 three-component ocean bottom seismometers (OBS) near the Axial seamount, Pacific ocean off the coast of Oregon and Washington. The goal is to capture the next eruption in great details.

○ **San Jacinto Fault**   **California, USA**
Preliminary passive seismic experiment (FaultProbe project)   *July 2018*

Deployment of 400 one-component geophones in two arrays on either sides of the San Jacinto Fault. The project aimed to monitor temporal changes of the P-wave velocity on the fault.

○ **Roseau Valley**   **Saint Lucia**
Groundwater flow imaging   *January 2018*

Self-potential (SP), resistance and gravity survey to map groundwater flow and identify relevant locations for fresh water wells.

○ **New England**   **New England, USA**
Diverse subsurface exploration geophysical methods   *2016 - 2020*

Educational field trips with the SEG Student Chapter of MIT. Training to active source seismic acquisition (2x24 geophones and one sledge hammer), gravity measurements, SP/resistance and magnetometry.

Technical and Personal skills

○ **Programming Languages:** C, C++, CUDA, Python, Fortran, Shell, Matlab.

○ **Parallel Computing:** OpenMP, CUDA.

○ **Machine Learning Libraries:** Pytorch, Tensorflow, Keras, Scikit-learn.

○ **Super-computer Job Scheduler:** Slurm, OAR.

○ **Open-source Software Developer (`https://github.com/ebeauce`):**
  - `Fast Matched Filter` (`https://github.com/beridel/fast_matched_filter`):
    Template matching optimized on CPUs and GPUs with Python and Matlab wrappers.
  - `BeamPower` (`https://github.com/ebeauce/beampower`):
    Backprojection optimized on CPUs and GPUs with Python wrappers.

- BPMF (`https://github.com/ebeauce/Seismic_BPMF`):
  Complete earthquake detection and location workflow using `Fast Matched Filter` and `BeamPower`.
- ILSI (`https://github.com/ebeauce/ILSI`):
  Python package for stress inversion.
- **Languages:** French (native), English, Spanish.

Invited Seminars

- Los Alamos National Laboratory, Frontiers in Geoscience (2023).

Peer-reviewed Articles

2023

- **Eric Beaucé**, Piero Poli, Benjamin Holtzman, Felix Waldhauser and Chris Scholz. Enhanced tidal sensitivity of seismicity before the 2019 M7.1 Ridgecrest, CA earthquake. *Geophysical Research Letters*. DOI: `https://doi.org/10.1029/2023GL104375`.

2022

- **Eric Beaucé**, Robert D. van der Hilst, Michel Campillo. Microseismic Constraints on the Mechanical State of the North Anatolian Fault Thirteen Years after the 1999 M7.4 Izmit Earthquake. *Journal of Geophysical Research: Solid Earth*. DOI: `https://doi.org/10.1029/2022JB024416`.
- **Eric Beaucé**, Robert D. van der Hilst, Michel Campillo. An Iterative Linear Method with Variable Shear Stress Magnitudes for Estimating the Stress Tensor from Earthquake Focal Mechanism Data: Method and Examples. *Bulletin of the Seismological Society of America*. DOI: `https://doi.org/10.1785/0120210319`.
- René Steinmann, Léonard Seydoux, **Eric Beaucé**, Michel Campillo. Hierarchical Exploration of Continuous Seismograms with Unsupervised Learning. *Journal of Geophysical Research: Solid Earth*. DOI: `https://doi.org/10.1029/2021JB022455`.

2021

- Hugo Sanchéz-Reyes, David Essing, **Eric Beaucé**, Piero Poli. The Imbricated Foreshock and Aftershock Activities of the Balsorano (Italy) Mw 4.4 Normal Fault Earthquake and Implications for Earthquake Initiation. *Seismological Research Letters*. DOI: `https://doi.org/10.1785/0220200253`.

2019

- **Eric Beaucé**, William B. Frank, Anne Paul, Michel Campillo and Robert D. van der Hilst. Systematic Detection of Clustered Seismicity beneath the Southwestern Alps. *Journal of Geophysical Research: Solid Earth*. DOI: `http://dx.doi.org/10.1029/2019JB018110`.

o Florent Brenguier, Pierre Boué, Yehuda Ben-Zion, F. Vernon, C.W. Johnson, A. Mordret, O. Coutant, P-E. Share, **Eric Beaucé**, D. Hollis, T. Lecocq. Train Traffic as a Powerful Noise Source for Monitoring Active Faults with Seismic Interferometry. *Geophysical Research Letters*. DOI: `http://dx.doi.org/10.1029/2019GL083438`.

2017

o **Eric Beaucé**, William B. Frank and Alexey Romanenko. Fast Matched Filter (FMF): An Efficient Seismic Matched-Filter Search for Both CPU and GPU Architectures. *Seismological Research Letter*. DOI: `https://doi.org/10.1785/0220170181`.

Submitted Articles

o **Eric Beaucé**, William B. Frank, Léonard Seydoux, Piero Poli, Nathan Groebner, Robert D. van der Hilst and Michel Campillo. BackProjection and Matched-Filtering (BPMF): An Automated Earthquake Detection and Location Workflow. *Submitted at Seismological Research Letters: Electronic Seismologist*.

o Jens-Erik Lundstern, **Eric Beaucé** and Orlando J. Teran. The importance of nodal plane orientation diversity for earthquake focal mechanism stress inversions. *Under review at Geological Society of London*.

Articles in Preparation

o **Eric Beaucé** and Felix Waldhauser. Monitoring the Dynamics of the Axial Seamount with a Seismic Network Covariance Matrix Analysis over a Decade.

o **Eric Beaucé**. Statistical Model of Earthquake Occurrence for Local-Scale Seismicity Based on Fractal Clustering.