Eric Beaucé

Curriculum Vitae

61 Route 9W, 201J Seismology, Palisades, NY 10964 USA
ebeauce@ldeo.columbia.edu
ebeauce.github.io/

Academic Positions

02/2022 - present	**Postdoctoral Researcher**	*Lamont-Doherty Earth Observatory, Columbia University*
09/2021 - 01/2022	**Postdoctoral Researcher**	*Massachusetts Institute of Technology*
2016 - 2021	**Research/Teaching assistant**	*Massachusetts Institute of Technology*

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

Education

2021	**Ph.D., Geophysics**	*Massachusetts Institute of Technology*
2016	**Master of Science, Physics**	*École Normale Supérieure de Lyon*
2014	**Bachelor of Science, Physics**	*École Normale Supérieure de Lyon*

Teaching Experience

2023 **Sonic and Visual Representation of Data** *Columbia University*
Role: Teaching assistant. *Level*: Graduate.
Summary: Introduction to data sonification and visualization in Python.

2022 **Introduction to Statistical Seismology** *Columbia University*
Role: Guest lecturer. *Level*: Graduate.

2021 **Introduction to Machine Learning in Earthquake Seismology** *University of Colorado*
Role: Guest lecturer (remote). *Level*: Undergraduate.

2019 **Essentials of Geophysics** *Massachusetts Institute of Technology*
Role: Teaching assistant. *Level*: Graduate.
Summary: Introduction to seismology, gravity, planetology, magnetism, and geodynamics.

2018 **Physical Principles of Remote Sensing** *Massachusetts Institute of Technology*
Role: Teaching assistant. *Level*: Undergraduate.
Summary: Introduction to wave physics, Maxwell's equations, and their application to radar methods.

Field Experience

2022, 2023 **OBS deployment at the Axial Seamount** *Pacific Coast, USA*
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 detail.

07/2018 **Preliminary passive seismic experiment (FaultProbe project)** *San Jacinto, California, USA*
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.

01/2018 **Groundwater flow imaging** *Roseau Valley, Saint Lucia*
Self-potential (SP), resistance and gravity survey to map groundwater flow and identify relevant locations for fresh water wells.

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

Outreach Activity

Seismic Sound Lab

Link to website: `https://seismicsoundlab.github.io/`. The Seismic Sound Lab introduces audiences of all backgrounds and ages to the physics of earthquakes and wave propagation using sonified data as a means of communication. The Seismic Sound Lab brings a major contribution to Lamont-Doherty Earth Observatory's annual Open House event and also regularly showcases its work to campus visitors.

Conference and Seminar Organization

2023 - present Organizer of weekly divisional seminars at Lamont.
2025 Lamont Symposium on Earth Hazards : Moderator of "*Challenges in Forecasting Earth Hazards*".
2024 AGU : Co-organizer of "*On the Seismicity of "Stable" Continental Regions: The April 2024 New Jersey Earthquake and Beyond*".
2023 SSA : Primary organizer of "*Deciphering Earthquake Clustering for the Better Understanding of Crustal Deformation Mechanisms*".
2022 AGU : Co-organizer of "*Microseismicity and Fault Slip: Observations, Modeling, and Experiments*".

Invited Conference Talks and Seminars

- ERC TECTONIC / FEAR Seminars on Earthquake Physics, Online (November 2024).
- Massachusetts Institute of Technology, Geophysics Seminar (November 2023).
- Ecole Normale Supérieure, Laboratoire de Géologie (October 2023).
- Los Alamos National Laboratory, Frontiers in Geoscience (June 2023).

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.

Submitted Articles

- Folarin Kolawole, Zach Foster-Baril, Leonardo Seeber, Jacob Tielke, Abhishek Prakash, Meritxell Colet, **Eric Beaucé**, Won-Young Kim, Rasheed Ajala, Christine McCarthy, Felix Waldhauser.The 2024 M4.8 New Jersey Earthquake: Preferential Reactivation of Subtle Immature Rough Faults in Frictionally Unstable Basement Rocks. *In review at Geophysical Research Letters*

Articles in Preparation

- **Eric Beaucé**. Analyzing the structure of seismic sequences with the occupation probability: Formalism, models and examples. *Will be submitted to JGR: Solid Earth.*

  Theresa Sawi, **Eric Beaucé**, Benjamin Holtzman, Fabian Walter, Léonard Seydoux. Array-based characterization of glacial seismicity via unsupervised machine-learning.

Peer-reviewed Articles

2025

- **Eric Beaucé**, Felix Waldhauser, David Schaff, Won-Young Kim, Folarin Kolawole. The 5 April 2024 M_w4.8 Tewksbury, New Jersey aftershock sequence resolved with machine-learning-enhanced detection methods. *Geophysical Research Letters. In press.*

2024

- Tanner Acquisto, Anne Bécel, Juan Pablo Canales, **Eric Beaucé**. Structural controls on megathrust slip behavior inferred from a 3D, crustal-scale, P-wave velocity model of the Alaska Peninsula subduction zone. *Journal of Geophysical Research: Solid Earth*. DOI: `https://doi.org/10.1029/2024JB029632`
- Jens-Erik Lundstern, **Eric Beaucé** and Orlando J. Teran. The Importance of Nodal Plane Orientation Diversity for Earthquake Focal Mechanism Stress Inversions. *Geological Society of London*. DOI: `https://doi.org/10.1144/SP546-2023-63`.

2023

- **Eric Beaucé**, Piero Poli, Felix Waldhauser, Benjamin Holtzman, 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`.
- **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. *Seismological Research Letters: Electronic Seismologist*. DOI: `https://doi.org/10.1785/0220230230`.

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.
- 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

- **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.