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*

Pre-Ph.D. Research Experience

- **Institut des Sciences de la Terre** — **Grenoble, France**
  6-month internship supervised by Michel Campillo — *2016*

  Development of automated methods for earthquake detection, based on template matching, and application to the Southwestern Alps. Analysis of the catalog in terms of Poissonian vs time clustered seismicity.
- **Departemento de Geofísica** — **Santiago, Chile**
  3-month internship co-supervised by Benoit Derode and Jaime Campos — *2015*

  Source characterization of intermediate-depth earthquakes: estimation of static stress drops

and seismic moments from earthquake spectra.

- **Laboratoire de Géologie, Terre, Planète, Environnement** — **Lyon, France**
  2-month internship supervised by Vincent Langlois — *2014*
  Development of a discrete element numerical model of a cohesive granular material in C/C++ to simulate landslides. Cohesion was modeled by Euler-Bernoulli beams.

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.

Peer-reviewed Articles

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`.

2021

- 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`.
- 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.

Articles in Preparation

- **Eric Beaucé**, Piero Poli, Benjamin Holtzman, Felix Waldhauser and Chris Scholz. Enhanced tidal sensitivity of seismicity before the 2019 M7.1 Ridgecrest, CA earthquake.
- **Eric Beaucé** and Felix Waldhauser. Monitoring the Dynamics of the Axial Seamount with a Seismic Network Covariance Matrix Analysis over a Decade.
- **Eric Beaucé**, William B. Frank, Léonard Seydoux and Piero Poli. BackProjection and Matched-Filtering (BPMF): An Automated Earthquake Detection and Location Workflow