

# Eric Beaucé

## Curriculum Vitae

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## Academic Positions

|  |                                    |   |
|--|------------------------------------|---|
| 02/2022 - present  | <b>Postdoctoral Brinson Fellow</b> | Lamont-Doherty Earth Observatory, Columbia University |
| 09/2021 - 01/2022  | <b>Postdoctoral Researcher</b>     | Massachusetts Institute of Technology                 |
| 2016 - 2021  | <b>Research/Teaching assistant</b> | Massachusetts Institute of Technology                 |
| Ph.D. Thesis: Analyzing the Collective Behavior of Earthquakes to Understand Fault Mechanisms Better. Available at <a href="https://tinyurl.com/EBPhDThesisManuscript">https://tinyurl.com/EBPhDThesisManuscript</a> . |                                    |   |
| Supervised by Robert van der Hilst and Michel Campillo.  |                                    |   |

## Education

|      |                                     |                                       |
|------|-------------------------------------|---------------------------------------|
| 2021 | <b>Ph.D., Geophysics</b>            | Massachusetts Institute of Technology |
| 2016 | <b>Master of Science, Physics</b>   | École Normale Supérieure de Lyon      |
| 2014 | <b>Bachelor of Science, Physics</b> | École Normale Supérieure de Lyon      |

## Teaching Experience

|   |  |                                       |
|---|--|---------------------------------------|
| 2023  | <b>Sonic and Visual Representation of Data</b>                   | Columbia University                   |
| Role: Teaching assistant. Level: Graduate.  |  |                                       |
| Summary: Introduction to data sonification and visualization in Python.                             |  |                                       |
| 2022  | <b>Introduction to Statistical Seismology</b>                    | Columbia University                   |
| Role: Guest lecturer. Level: Graduate.  |  |                                       |
| 2021  | <b>Introduction to Machine Learning in Earthquake Seismology</b> | University of Colorado                |
| Role: Guest lecturer (remote). Level: Undergraduate.  |  |                                       |
| 2019  | <b>Essentials of Geophysics</b>                                  | Massachusetts Institute of Technology |
| Role: Teaching assistant. Level: Graduate.  |  |                                       |
| Summary: Introduction to seismology, gravity, planetology, magnetism, and geodynamics.              |  |                                       |
| 2018  | <b>Physical Principles of Remote Sensing</b>                     | 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  | <b>OBS deployment at the Axial Seamount</b>                        | 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   | <b>Preliminary passive seismic experiment (FaultProbe project)</b> | 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     | <b>Groundwater flow imaging</b><br>Self-potential (SP), resistance and gravity survey to map groundwater flow and identify relevant locations for fresh water wells.  | Roseau Valley, Saint Lucia |
| 2016 - 2020 | <b>Diverse subsurface exploration geophysical methods</b><br>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. | New England, USA           |

## 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

|             |  |
|-------------|--|
| 2025        | AGU : Primary organizer of " <i>Collective Behaviors in Seismology: Models and Observations for Complexity in Seismicity, Crustal Mechanics, and Faulting</i> ". |
| 2023 - 2025 | Organizer of weekly divisional seminars at Lamont.   |
| 2025        | SSA : Co-organizer of workshop " <i>Building a High-Resolution Earthquake Catalog from Raw Waveforms: A Step-by-Step Guide</i> ".                                |
| 2025        | Lamont Symposium on Earth Hazards : Moderator of " <i>Challenges in Forecasting Earth Hazards</i> ".   |
| 2024        | AGU : Co-organizer of " <i>On the Seismicity of "Stable" Continental Regions: The April 2024 New Jersey Earthquake and Beyond</i> ".                             |
| 2023        | SSA : Primary organizer of " <i>Deciphering Earthquake Clustering for the Better Understanding of Crustal Deformation Mechanisms</i> ".                          |
| 2022        | AGU : Co-organizer of " <i>Microseismicity and Fault Slip: Observations, Modeling, and Experiments</i> ".  |

## Invited Conference Talks and Seminars

- o 3rd Workshop on Earthquake Physics and Applications of AI to Tectonic Faulting (Italy, September 2025).
- o UC Santa Cruz, Institute of Geophysics and Planetary Physics Seminar (USA, May 2025).
- o US Geological Survey, Moffett Field, Earthquake Science Center Seminar (USA, May 2025).
- o ERC TECTONIC / FEAR Seminars on Earthquake Physics (Online, November 2024).
- o Massachusetts Institute of Technology, Geophysics Seminar (USA, November 2023).
- o Ecole Normale Supérieure, Laboratoire de Géologie (France, October 2023).
- o Los Alamos National Laboratory, Frontiers in Geoscience (USA, June 2023).

## Technical and Personal skills

- o **Programming Languages:** C, C++, CUDA, Python, Fortran, Shell, Matlab.
- o **Parallel Computing:** OpenMP, CUDA.
- o **Machine Learning Libraries:** Pytorch, Tensorflow, Keras, Scikit-learn.
- o **Super-computer Job Scheduler:** Slurm, OAR.
- o **Open-source Software Developer** (<https://github.com/ebeauce>):
  - Fast Matched Filter ([https://github.com/beridel/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.
  - BPF ([https://github.com/ebeauce/Seismic\\_BPF](https://github.com/ebeauce/Seismic_BPF)):  
Complete earthquake detection and location workflow using Fast Matched Filter and BeamPower.
  - ILSI (<https://github.com/ebeauce/ILSI>):  
Python package for stress inversion.
- o **Languages:** French (native), English, Spanish.

## Submitted Articles

- o Rodrigo Flores Allende, Léonard Seydoux, **Eric Beaucé**, Luis Fabian Bonilla, Philippe Gueguen, Claudio Striano. An Enhanced Deep-Learning Catalog of the Mw 8.81 Maule Aftershock Sequence. *In review at Journal of Geophysical Research: Solid Earth*
- o Theresa Sawi, **Eric Beaucé**, Benjamin Holtzman, Fabian Walter, Léonard Seydoux. Array-based characterization of glacial seismicity via unsupervised machine-learning. *In review at Journal of Geophysical Research: Machine Learning and Computation*

## Articles in Preparation

- o **Eric Beaucé**, Piero Poli, Felix Waldhauser, Benjamin Holtzman and Chris Scholz. Shift and increase in tidal modulation of seismicity in the Ridgecrest fault zone before and after the 2019 M7.1 earthquake.

## Peer-reviewed Articles

### 2025

- o **Eric Beaucé**. Measuring and modelling the occupation probability to characterize the temporal statistics of seismic sequences. *Geophysical Journal International*. DOI: <https://doi.org/10.1093/gji/ggaf433>
- o **Eric Beaucé**, Felix Waldhauser, David Schaff, Won-Young Kim, Folarin Kolawole. The 5 April 2024  $M_w$ 4.8 Tewksbury, New Jersey aftershock sequence resolved with machine-learning-enhanced detection methods. *Geophysical Research Letters*. DOI: <https://doi.org/10.1029/2024GL113598>

### 2024

- o 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>
- o 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

- o **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>.
- 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. *Seismological Research Letters: Electronic Seismologist*. DOI: <https://doi.org/10.1785/>

## 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 Sánchez-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>.