





# ANDRÉS BARAJAS

## Data Scientist

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 Paris, France



Data Scientist with a strong background in physics and mathematics, and over 6 years of experience in European Research Council (ERC)-funded projects.

Expert in data analysis, signal processing, and computational modeling. Proficient in Python, C, C++, and Fortran, with extensive experience developing algorithms for data-driven solutions, including machine learning applications. Highly skilled in communication, organization, and problem-solving, with a proven track record of teaching and knowledge sharing across diverse domains.

## EXPERIENCE

### Researcher

#### Temporal series analysis - ERC Seismaze

 March-2021 - December 2024  ISTERre, Grenoble, France

- Design of generative encoder-decoder convolutional neural networks (CNN) for signal recovery
- Implementation of matrix transformation and decomposition methods for information extraction
- Temporal and spectral analysis (Fourier transform) of volcanic and tectonic signals
- Conception and design of digital filters for the generation of synthetic waveforms
- Development of techniques and codes to study long temporal data series

### PhD



#### Environmental and theoretical seismology - ERC F-image

 November 2017 - March 2021  ISTERre, Grenoble, France

- Development of a physical model of wave propagation and mathematical estimation of sensitivity kernels through Monte Carlo simulations
- Construction of a physical model to estimate the water levels in underground aquifer reservoirs from rainfall data
- Processing and interpreting multi-year GPS, rain, and seismic data to identify correlations.
- Inversion of seismic data to identify the depth in the Earth's crust changes from measurements obtained at the surface.
- Measurement of the seismic velocity changes from ambient noise

### University professor

#### Physics professor

 January 2014 - November 2017  Bogotá, Colombia

- Professor in Universidad America of Classical Mechanics, Hydrostatics, Electrostatic and Modern Physics to students of engineering programs
- Adjunct Professor in Universidad de los Andes of Classical Mechanics, Electrostatic, and Experimental Physics to students of engineering, medicine, and basic science programs

## SKILLS SUMMARY



### Data Analysis

Physics (wave propagation, thermodynamics, mechanics, ...), Mathematics (linear algebra, calculus, differential equations, ...), Deep learning, Machine learning, Signal processing, Inverse problem, Monte Carlo simulations



### Programming Languages

Python (pytorch, pandas, numpy, scipy, igraph, matplotlib, scikit-learn, jupyter), C, C++, Fortran, Bash, Latex.



### Software

VSCode, Github, Microsoft Office (Excel, PowerPoint, Word), Illustrator, Photoshop



### Operative Systems

Linux, MacOS, Windows

## SOFTS SKILLS

Achiever

Communication Skills

Writing

Big data set management

Organization & Time Management

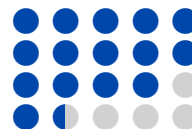
## LANGUAGES

Spanish (Native)

English

French


Italian



## EDUCATION

### Master - Theoretical physics

#### Univerdad de los Andes

 January 2012 - December 2013

*Courses: Advanced quantum mechanics, Electrodynamics, Statistical mechanics, Analytical mechanics*

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## PUBLICATIONS

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### Journal Articles

- **A. Barajas** and N. Shapiro, "Digital filters for waveform generation (in progress)," *Geophysical Journal International*, 2025.
- **A. Barajas**, N. M. Shapiro, and G. Prieto, "Differential phase analysis for volcanic tremor detection and source location," *Journal of Geophysical Research: Solid Earth*, vol. 129, no. 10, e2024JB029010, 2024.
- **A. Barajas**, C. Journeau, K. Obara, and N. M. Shapiro, "Comparison of continuously recorded seismic wavefields in tectonic and volcanic environments based on the network covariance matrix," *Journal of Geophysical Research: Solid Earth*, vol. 128, no. 12, e2023JB026784, 2023.
- **A. Barajas**, L. Margerin, and M. Campillo, "Coupled body and surface wave sensitivity kernels for coda-wave interferometry in a three-dimensional scalar scattering medium," *Geophysical Journal International*, vol. 230, no. 2, pp. 1013–1029, 2022.
- **A. Barajas**, P. Poli, N. d'Agostino, L. Margerin, and M. Campillo, "Separation of poroelastic and elastic processes of an aquifer from tectonic phenomena using geodetic, seismic, and meteorological data in the pollino region, italy," *Geochemistry, Geophysics, Geosystems*, vol. 22, no. 11, e2021GC009742, 2021.

Bachelor of Sciences-Physics

Universidad Nacional de Colombia

📅 February 2004 – June 2010

*Courses: Relativity, Quantum mechanics, Thermodynamics, Integral calculus, Topology, Differential equations*

## CONFERENCES

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### International Conferences

- AGU conferences, 1st author, San Francisco, New Orleans, 2019, 2021.
- EGU conferences, 1st author, Vienna, 2019, 2020, 2022, 2023, 2024.
- Summer school, 1st author, Cargese, 2019, 2022.

## INTERESTS

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Biology, Language, Teaching, Dancing, Running