



Pablo Lara

Born on April 20 1989
pablo.elara@ieee.org

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About me: I am a final-year PhD candidate at Géoazur (France), working under the supervision of Quentin Bletery and Jean-Paul Ampuero. During my PhD, I developed Machine Learning tools for the detection and rapid characterization of earthquake sources, which have been implemented in the earthquake early warning system of Peru. I now seek a postdoctoral experience in earthquake seismology to broaden my research interests while still focusing on developing Machine Learning algorithms.

Education

2020 - present, Université Côte d'Azur, France

PhD program in Earth and Universe Sciences

Advisors: Quentin Bletery and Jean-Paul Ampuero

Title: "Detection of seismological signals based on artificial intelligence"

Expected defense date: December 2024.

2018 - 2020, Universidade Federal do Ceará, Brazil

Master of Science in Electrical Engineering and Computer Science

Title: "Automatic multichannel volcano-seismic classification using Machine Learning and EMD", <http://www.repositorio.ufc.br/handle/riufc/51894>

2017, Universidad Nacional de Ingeniería, Peru

Electrical Engineer certification, approved with honors

Title: "Design of a monitoring system for the satellite seismic network of Peru in real-time" <http://cybertesis.uni.edu.pe/handle/uni/13260>

2007 - 2014, Universidad Nacional de Ingeniería, Peru

Bachelor in Science in Electrical Engineering

Publications

P. Lara, H. Tavera, Q. Bletery; J. P. Ampuero; A. Inza, D. Portugal, B. Orihuela, and F. Meza, Implementation of the Peruvian Earthquake Early Warning System, 2024. Submitted to Bulletin of the Seismological Society of America (BSSA). Preprint: <https://eartharxiv.org/repository/view/7248/>

P. Lara, Q. Bletery; J. P. Ampuero; A. Inza, H. Tavera, Earthquake Early Warning Starting From 3 s of Records on a Single Station With Machine Learning, Journal of Geophysical Research: Solid Earth, 2023.

E. Calais, S. Symithe, T. Monfret, B. Delouis, A. Lomax, F. Courboux, J. P. Ampuero, **P. Lara**, Q. Bletery, J. Chèze et al., Citizen seismology helps decipher the 2021 Haiti earthquake, Science, 2022.

A. Teixeira, C. Rolim, **P. Lara**, A. Inza, J. Mars, J. P. Metaxian, M. Dalla Mura, M. Malfante, Tensor-Based Learning Framework for Automatic Multichannel Volcano-Seismic Classification, IEEE-JSTARS, 2021.

P. Lara, C. Rolim, A. Inza, J. Mars, J. P. Metaxian, M. Dalla Mura, M. Malfante, Automatic Multichannel Volcano-Seismic Classification Using Machine Learning and EMD, IEEE-JSTARS, 2020.



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Professional experience

Mar 2020 - Sep 2023, *Researcher*, Instituto Geofísico del Perú.

- Developed real-time volcanic event classification system for Ubinas volcano using Machine Learning.
- Designed the AI algorithm of the Peruvian Earthquake Early Warning System (SASPe) to detect earthquakes, pick the P-phase, and estimate magnitudes and hypocentral location in real-time based on 3 s of P-wave recorded by the nearest station.
- Led the implementation, testing and validation of the SASPe AI algorithm.

Oct 2014 - Nov 2017, *Software engineer*, Instituto Geofísico del Perú

- Designed a real-time monitoring system for the National Seismic and Accelerometric Network, comprising:
 - a decoding system for instruments with Satellite and Internet telemetry
 - a data acquisition system
 - a monitoring platform to display the state of health of the remote stations
 - an alert system to report the operational status of the stations
- Designed intensity maps (ShakeMaps) in real time, when an earthquake occurs.
- Designed software for Power Spectral Density estimation of seismic noise in real time.
- Designed software to monitor servers that manage the National Seismic Network in real time.

Teaching experience

2019 Winter (6 months), *Lecturer*, Universidade Federal do Ceará
Pattern Recognition, Sobral, Brazil.

Presentations

2023 September, *Poster*, ERC – TECTONIC Workshop

E3WS: Earthquake Early Warning starting from 3 seconds of records on a single station with machine learning, Rome, Italy.

2022, *Oral presentation*, American Geophysical Union

Earthquake Early Warning with 3 seconds of records on a single station, Chicago, USA.

2021 September, *Poster*, ERC – TECTONIC Workshop

Earthquake Early Warning System based on 3 seconds of P wave: a Machine Learning approach for rapid detection, estimation magnitude and location, Rome, Italy.

2020 December, *Poster*, American Geophysical Union

Efficient P-wave detection in real time for Earthquake Early Warning System based on Artificial Intelligence.

2020 December, *Oral presentation*, American Geophysical Union

Co-author: Sismo-volcano classification in real time based on Empirical Mode Decomposition (EMD) and Machine Learning.



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2018, *Oral presentation, III Meeting of Information Technology*

Subject "The Importance of Artificial Intelligence in Predicting Seismic events", Ieducare FIED University, Tianguá, Brazil.

2018, *Oral presentation, IV Cycle of Engineering Lectures*

Subject "Telemetry Satelital research perspectives in Brazil and abroad", Universidade Federal do Ceará, Sobral, Brazil.

Software Development Skills

Artificial Intelligence

- TensorFlow
- PyTorch
- Keras
- Scikit-learn

Programming

- C
- C++
- Python
- Bash
- C-Bash
- HTML
- PHP
- Matlab

Computer software

- MySQL
- MariaDB
- Linux
- MongoDB
- Clusters
- Supercomputers

Seismic software

- GMT
- Earthworm
- Seedlink
- Nanometrics
- Reftek
- Guralp
- Seiscomp3
- Proxmox VM

Languages

- Spanish, native language.
- English, advanced.
- Portuguese, advanced.
- French, basic.

Awards and Honors

- 2024, One of the 3 nominees for the Innovation Trophies. The laureate will be announced on October 7 at the "SCIENCE 4 ACTION" Forum, as part of the celebrations of IRD 80th anniversary, <https://en.ird.fr/discover-nine-nominees-2024-innovation-awards>.
- 2020, Doctoral Scholarship. Awarded scholarship for doctoral thesis preparation on "Detection of seismological signals using artificial intelligence" by IRD.
- 2018, Master Scholarship. Received scholarship for outstanding research proposals from the Organization of American States (OAS) and the Coimbra Group of Brazilian Universities.
- 2001, Second Place, UNI - PUCP - TRILCE - Peruvian Mathematical Society - International Commission of the Mathematics Olympics: Achieved second place in the "National Mathematics Contest".
- 2001, Second Place, TRILCE: Second place prize in the "6th Mathematics Olympiad".
- 2000, First Place, National University of Santa: First place prize in the "I Mathematical Logic Contest".
- 2000, First Place, Editorial Active School and Ministry of Education: First place award in the "VIII Mathematics Olympiad SIGMA 2000".
- 1997, Honorable Mention, UNASAM: Awarded for achievements in the "V Regional Mathematics Olympiad, Chavín Region".