

Marine LAPORTE

Seismologist

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I have been a post-doc seismologist at University of Lyon 1 since 2023, working on the development of innovative techniques for seismicity analysis, seismotectonics and uncertainties assessment in earthquake catalogs.

Education

Ph.D of Earth Sciences | CEA, ENS-PSL | Bruyères-le-Châtel | 2022 |

Funded by the French Atomic Energy and Alternative Energies Commission (CEA) and granted by Ecole Nationale Supérieure – Paris Sciences et Lettre (ENS-PSL).

Master Earth and Planetary Science | University of Lorraine | Nancy | 2018 |

Engineering degree in Geology | Ecole Nationale Supérieure de Géologie | Nancy | 2018 |

Research experience

Post-doctoral position | University Claude Bernard Lyon 1 | Lyon, France | 2023-Present |

Funded by the Laboratory of Excellence : Institute of Origins of Lyon (Labex-LIO)

Title : Deciphering temporal variations of the b-value parameter from the Gutenberg-Richter law in large seismic datasets using a Bayesian approach.

Supervisors : Stéphanie Durand (Univ. Lyon), Blandine Gardonio (Univ. Lyon).

In collaboration with : T. Bodin (Univ. Lyon), D. Marsan (Isterre, Chambéry)

Ph.D student | CEA-DASE, ENS | Bruyères-le-Châtel | oct. 2019 – nov. 2022 |

Title : Contribution to the improvement of hypocentral depth estimations from regional and global networks. *Supervisors* : Laurent Bollinger (CEA), Jean Letort (University Paul Sabatier, Toulouse).

Jury : Martin Vallée (IPGP), Alexandrine Gesret (Mines), Alessia Maggi (University of Strasbourg), Gyorgy Hetényi (University of Lausanne)

Research assistant in seismology | ENS- Laboratory of Geology | Paris | jan. – sept. 2019 |

Progress in exploiting data from the HiKNet temporary seismological network (Nepal)

Internships and voluntary work

Engineering school | CEA-DASE, ENS | Bruyères-le-Châtel, France | may. – dec. 2018 |

Analysis of the seismicity of western Nepal revealed by the HiKNet network. Seismology.

Supervisors : Laurent Bollinger (CEA), Hélène Lyon-Caen (ENS)

Master internship | CRPG | Nancy | fev. 2018 – avril. 2018 |

In CRPG : Centre de Recherches Petrographiques et Géochimiques.

Study of deformation and exhumation within the foreland prism of an intercontinental collision chain. Thermochronology. Tectonics. Magnetostratigraphy.

Supervisors : Raphaël Pik (CRPG), Jérôme Lavé (CRPG), Julien Charreau (CRPG)

Voluntary work | *Himalaya-Solaire, Nyamdu Dro* | *India* | 2015, 2017 |

Solar electrification of remote villages in Ladakh-Zaskar. 1 month (2015). 3 months (2017)

Culture : Exchanges between children from a primary school in Nancy and schools in Ladakh.

Public dissemination – Outreach activities

Workshop | Formation for seismic analysts | *Katmandou (Nepal)* | 14-16 march 2022 | 3 days |

Title : The earthquake location problem.

With seismologists of the Kathmandu seismology centre. Course on location methods, presentation of the seismotectonic analysis of the Lamjung seismological crisis (2021). Installation of new localisation software at the NEMRC (Hypo71, NonLinLoc, iLoc) and localisation exercises using Seiscomp.

Course | Formation for seismic analysts | *CEA* | *jan. 2021* | 2h |

Title : Seismotectonics of Nepal Himalaya.

As part of the training of an analyst from the National Tsunami Warning Centre (CENALT, France).

Outreach presentation | Secondary school | *Feb. 2024* | 1h |

Title : The basics of seismology

Outreach presentation | Secondary school | *May. 2024* | 1h |

Title : Understanding the Earth Structure.

Micro-conference organized by CNRS in secondary schools. As a part of “Les échappées inattendues”.

Outreach presentation | Primary school | *Ecole élémentaire de Bruyères le Châtel* | *fev. 2021* | ½ day |

Title : Global tectonics - Understanding the formation of mountain ranges.

One-hour workshops for groups of 9/10 yo pupils.

Outreach presentation | Science local fair, 2019 | *CEA* | *oct. 2019* | ½ day |

Title : Understanding the formation of mountain ranges.

30-minute workshops for primary schools.

Skills

- ✓ Language : French, English, Spanish
- ✓ Programing languages : Shell, Python, Matlab, Fortran
bibliothèques : obspy, pyrocko, basemap, numpy, pandas, matplotlib, plotly (interactive plotting tools), SALib
- ✓ Software and programme skills:
 - Seismological data processing software: Seiscomp, notions of Seisan
 - Earthquake location algorithms : Hypo71, HypoDD, NonLinLoc, ILoc
 - Other algorithms for seismology : SourceSpec (magnitudes), FPFIT (focal-mechanisms), Zmap
 - GIS software for creating maps: Generic Mapping Tools (GMT), Python-Basemap, QGis, Google Earth
- ✓ Seismotectonics, general seismology, seismic cycle, notions of palaeoseismology
- ✓ Signal processing in seismology: deconvolution, cepstral analysis, stacking techniques, etc.

- ✓ Statistical seismology : epidemic type aftershocks sequences (Etas), basics of Bayesian approaches
- ✓ Global sensitivity analysis: Sobol indexes, Morris screening

Publications (peer-reviewed journals)

- **Laporte, M.**, Durand, S., Bodin, T., Gardonio, B., & Marsan, D. (**submitted 2024**). b-Bayesian: The Full Probabilistic Estimate of b-value Temporal Variations for Non-Truncated Catalogs. ([access](#))
- **Laporte, M.**, Letort, J., Bertin, M., & Bollinger, L. (2024). Understanding earthquake location uncertainties using global sensitivity analysis framework. *Geophysical Journal International*, 237(2), 1048-1060. ([access](#))
- **Laporte, M.**, Bollinger, L., Lyon-Caen, H., Hoste-Colomer, R., Duverger, C., Letort, J., ... & Adhikari, L. B. (**2021**). Seismicity in far western Nepal reveals flats and ramps along the Main Himalayan Thrust. *Geophysical Journal International*, 226(3), 1747-1763. ([access](#))
- Gardonio, B., Bollinger, L., **Laporte, M.**, Vergne, J., Lyon-Caen, H., & Adhikari, L. B. (submitted 2023). Seismicity acceleration and clustering before the Mw7. 9 Gorkha earthquake, Nepal. ([access](#))
- Koirala, B. P., **Laporte, M.**, Bollinger, L., Batteux, D., Letort, J., Guilhem Trilla, A., ... & Adhikari, L. B. (**2023**). Tectonic significance of the 2021 Lamjung, Nepal, mid-crustal seismic cluster. *Earth, Planets and Space*, 75(1), 165. ([access](#))
- Adhikari, L. B., **Laporte, M.**, Bollinger, L., Vergne, J., Lambotte, S., Koirala, B. P., ... & Perrier, F. (**2023**). Seismically active structures of the Main Himalayan Thrust revealed before, during and after the 2015 M w 7.9 Gorkha earthquake in Nepal. *Geophysical Journal International*, 232(1), 451-471. ([access](#))
- Retailleau, L., Saurel, J. M., **Laporte, M.**, Lavayssière, A., Ferrazzini, V., Zhu, W., ... & OVPF Team. (**2022**). Automatic detection for a comprehensive view of Mayotte seismicity. *Comptes Rendus. Géoscience*, 354(S2), 1-18. ([access](#))
- Adhikari, L. B., Bollinger, L., Vergne, J., Lambotte, S., Chanard, K., **Laporte, M.**, ... & Perrier, F. (**2021**). Orogenic collapse and stress adjustments revealed by an intense seismic swarm following the 2015 Gorkha earthquake in Nepal. *Frontiers in Earth Science*, 524. ([access](#))

Other publications

- **Laporte, M.** Ph.D manuscript. (2022). Contribution à l'amélioration de l'estimation de la profondeur hypocentrale à partir de réseaux régionaux ou globaux. (French only)([access](#))
- **Laporte, M.**, Durand, S., Gardonio, B., Bodin, T., & Marsan, D. (2023). Inversion-Variation temporelle de la bvalue. *Lettre d'information Epos-France*, (1), 17-18. (French only)([access](#))
- ✓ Participation in the peer-review of 3 manuscripts. *Journal of Seismology, Geophysical Journal International, Seismological Research Letter*.

Conferences

- **EGU 2024** | *Vienna, Austria* | *Poster* | *apr. 2024* |
Title : A Bayesian transdimensional approach to estimate temporal changes in the b-value distribution without truncating catalogs.
- **AGU Fall Meeting 2023** | *San Francisco, USA* | *Oral presentation* | *dec. 2023* |
Title : A Bayesian Transdimensional Framework to Recover Temporal Changes in the b-value Distribution of Non-truncated Seismic Catalog.
- **1st meeting EPOS-France** | *Saint-Jean Cap Ferrat* | *Poster* | *nov. 2023* |
Title : Modélisation Bayésienne des Variations Temporelles de la Distribution Fréquence-Magnitude des Séismes A Partir de Catalogues Non Tronqués. (Price of best poster : 2000€)
- **Visit from the High Commissioner for Atomic Energy** | *CEA* | *Poster* | *fev. 2022* |
Title : Improving teleseismic depth estimations in Nepal.
- **Science and Technology conference 2021** | *Virtual* | *Oral presentation* | *apr. 2021* |
Title : Teleseismic depth determination, techniques and uncertainties : an Himalayan case study
- **Scientific evaluation of the committee of experts in geophysics** | *CEA* | *Poster* | *apr. 2021* |
Title : Seismological work in Nepal
- **AGU Fall Meeting 2019** | *San Francisco, USA* | *Oral presentation* | *dec. 2019* |
Title : Seismicity in far western Nepal reveals flats and ramps along the Main Himalayan Thrust

Grants and prices

Best poster price (2000€) | 1st meeting EPOS-France | nov. 2023 |

External collaborator on Jean Letort ANR-Young Researchers program : ShallowDepth- DL
beginning on September 2024

Field missions

France | Low-noise underground laboratory | *2 weeks* | *oct. 2020* |
Support for the deployment of nodes and DAS at LSBB, a project led by Amaury Vallage (CEA) and Olivier Sèbe (CEA).

Nepal | National Earthquake Monitoring Center | *1 month* | *jan. 2020* |
Participation in a palaeoseismology field led by Magali Riesner (CEA post-doctoral researcher) and Laurent Bollinger (CEA) to sample and date ancient earthquakes along the track of the great Himalayan thrust fault in south-eastern Nepal.