

1 Contact

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Department of Earth Sciences, University of Oxford

2 Professional History

01/07/2025–present Schmidt AI in Science Fellow

Department of Earth Sciences, University of Oxford

Associate Research Fellow of Reuben College

Investigating probabilistic AI methods for inner core seismology

24/02/2025–27/06/2025 Machine Learning Engineer

Earth Rover Program

Developing machine learning tools for the analysis of seismic waves probing soil structure.

23/01/2023–22/01/2025 Postdoctoral Fellow in Seismology

Research School of Earth Sciences, Australian National University

Investigating the sedimentary structure of Australia using novel passive seismic methods.

Investigating regularisation approaches to obtain sharp boundaries in geophysical imaging

01/10/2022–31/12/2022 Postdoctoral Research Associate in Seismology

Department of Earth Sciences, University College London

Investigating high-dimensional Bayesian methods for imaging the deep mantle plume beneath the Azores using data from the *UPFLOW* expedition.

15/10/2019–15/05/2020 Machine Learning Intern

KageNova Ltd.

Investigating spherical convolutional neural networks for applications in virtual reality.

3 Education

1/10/2018–30/9/2022 PhD Data Intensive Science (Seismology and Cosmology), UCL

From Dark Matter to the Earth's Deep Interior: There and Back Again

Supervised by Prof Ana Ferreira and Prof Thomas Kitching

Submitted 30/9/22, Defended 6/12/22, Awarded 28/01/2023

1/10/2014–09/06/2018 MSci Geophysics, UCL

First Class Honours

Independent Project: *Rayleigh wave ellipticity inversion for crustal velocity structure*

Won UCL Matthew's Prize for Excellence in Geophysics

4 Awards and Prizes

Schmidt AI in Science Research Fellowship, University of Oxford — £150,000

ANU ECR Travel Grant, 2024 — AU\$3000

ANU RSES Director's Award for Strategic Research, 2023 — AU\$6000

AGU Fall Meeting Outstanding Student Presentation Award, 2021 — US\$250

UCL Matthew's Prize for Excellence in Geophysics, 2018

UCL Earth Sciences Prize for Best MSci Poster Presentation, 2018

References

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- [2] S. P. Hicks, P. J. Gonzalez, A. Lomax, A. M. G. Ferreira, R. S. Ramalho, N. C. Mitchell, G. Silveira, N. A. Dias, J. Fontiela, R. Fernandes, S. Custódio, M. Tsekhmistrenko, V. Mendes, A. Pimentel, R. Silva, W. Sturgeon, **A. Marignier**, F. Carrilho, R. Marques, M. Miranda, and A. M. Garcia, "Leaky faults modulated magma ascent and adjacent seismicity during the 2022 São Jorge Island (Azores) seismic-volcanic unrest." (*under review at Nature Geoscience*) <https://eartharxiv.org/repository/view/8224/>.
- [3] **A. Marignier**, J. Hauser, and M. Sambridge, "Opinionated inversion and regularisation approaches for delineation of DCIP targets." (*under review at Geophysical Journal International*).
- [4] J. He, M. Sambridge, J. Hauser, A. P. Valentine, F. Magrini, and **A. Marignier**, "CoFI: Linking geoscience inference problems with tools for their solution." (*in prep*).
- [5] M. Tsekhmistrenko, A. M. G. Ferreira, M. Miranda, S. Baranbooei, R. Cabeices Diaz, M. Carapuço, C. Corela, J. L. Duarte, H. Ferreira, W. Hartmut Geissler, K. Harris, S. P. Hicks, K. Hosseini, K.-Y. Ke, F. Krüger, D. Lange, A. Loureiro, P. Makus, **A. Marignier**, M. Neres, L. Ramos, T. Rein, A. Saoulis, D. Schlaporst, M. C. Schmidt-Aursch, and F. Tilmann, "Performance of the 2021-2022 UPFLOW large ocean bottom seismometer array in the Azores-Madeira-Canary Islands region, Atlantic Ocean." (*in prep*).
- [6] **A. Marignier**, C. M. Eakin, B. Hejrani, S. Agrawal, and R. Hassan, "Sediment thickness across Australia from passive seismic methods," *Geophysical Journal International*, vol. 237, pp. 849–861, May 2024 <https://doi.org/10.1093/gji/ggae070>.
- [7] W. Sturgeon, A. M. G. Ferreira, L. Schardong, and **A. Marignier**, "Crustal Structure of the Western U.S. From Rayleigh and Love Wave Amplification Data," *Journal of Geophysical Research: Solid Earth*, vol. 128, no. 8, p. e2022JB026148, 2023 <https://doi.org/10.1029/2022JB026148>.
- [8] **A. Marignier**, "PxMCMC: A Python package for proximal Markov Chain Monte Carlo," *Journal of Open Source Software*, vol. 8, p. 5582, July 2023 <https://doi.org/10.21105/joss.05582>.
- [9] M. A. Price, M. Mars, M. M. Docherty, A. S. Mancini, **A. Marignier**, and J. D. McEwen, "Fast emulation of anisotropies induced in the cosmic microwave background by cosmic strings," *The Open Journal of Astrophysics*, vol. 6, October 2023 <https://doi.org/10.21105/astro.2307.04798>.
- [10] **A. Marignier**, T. D. Kitching, J. D. McEwen, and A. M. G. Ferreira, "Sparse Bayesian mass-mapping using trans-dimensional MCMC," *The Open Journal of Astrophysics*, vol. 6, June 2023 <https://doi.org/10.21105/astro.2211.13963>.
- [11] **A. Marignier**, J. D. McEwen, A. M. G. Ferreira, and T. D. Kitching, "Posterior sampling for inverse imaging problems on the sphere in seismology and cosmology," *RAS Techniques and Instruments*, vol. 2, pp. 20–32, January 2023 <https://doi.org/10.1093/rasti/rzac010>.
- [12] **A. Marignier**, *From Dark Matter to the Earth's Deep Interior: There and Back Again*. PhD thesis, University College London, 2023 <https://discovery.ucl.ac.uk/id/eprint/10162902>.
- [13] O. J. Cobb, C. G. R. Wallis, A. N. Mavor-Parker, **A. Marignier**, M. A. Price, M. d'Avezac, and J. D. McEwen, "Efficient Generalized Spherical CNNs," in *International Conference on Learning Representations*, March 2021 <https://arxiv.org/abs/2010.11661v3>.

- [14] **A. Marignier**, A. M. G. Ferreira, and T. D. Kitching, “The Probability of Mantle Plumes in Global Tomographic Models,” *Geochemistry, Geophysics, Geosystems*, vol. 21, no. 9, p. e2020GC009276, 2020 <https://doi.org/10.1029/2020GC009276>.
- [15] A. M. G. Ferreira, **A. Marignier**, J. Attanayake, M. Frietsch, and A. Berbellini, “Crustal structure of the Azores Archipelago from Rayleigh wave ellipticity data,” *Geophysical Journal International*, vol. 221, pp. 1232–1247, May 2020 <https://doi.org/10.1093/gji/ggaa076>.

5 Open Source Code Packages

CoFI: Framework for geophysical inverse problems

neighpy: Python implementation of the Neighbourhood Algorithm for Bayesian Inference

octo: Python implementation of overcomplete tomography inversion

aussedthick: Estimating the sediment thickness across Australia

stringgen: Fast Python emulations of cosmic string maps using wavelet phase harmonics

mmtdt: C++ code for cosmological mass-mapping using trans-dimensional MCMC

pxmcmc: Python package for proximal MCMC

greatcirclepaths: Python package for discretising great circle paths for different spherical sampling theorems

6 Teaching

2023 Earth Science Research Project (ANU)

Postgraduate

Expert Examiner for a Master’s research project entitled *Developing a deep-learning model to detect and measure the Earth’s inner-core sensitive waves*.

Selected as Expert Examiner for my understanding of machine learning in seismology.

Parts of the thesis have since been published in *JGR:SE*.

2021–2022 Machine Learning with Big Data (UCL)

Postgraduate

>100 students from a range of physics, computer science and data science Masters programs

Teaching in the form of hands-on tutorials, and coursework and exam marking

Leading and coordinating team of demonstrators

2019–2021 Seismology II (UCL)

3rd year undergraduate

8–13 students

Teaching in the form of guest lectures, practical sessions, coursework marking and project supervision

2019–2021 Field Geophysics (UCL)

3rd year undergraduate

8–13 students

Teaching in the form of guided practicals, fieldwork and project supervision

2017–2021 MATLAB for Earth Sciences (UCL)

1st year undergraduate

>70 students

Developed the course from scratch

Teaching in the form of short lectures, practical sessions and coursework marking

7 Student Supervision

- 2023 Kaustubh Raj. Future Research Talent Student, RSES ANU
Using receiver function autocorrelations to estimate sedimentary thickness of Australia.
 Co-supervised with Dr Caroline Eakin
- 2022 Mansi Baguant. MSc Knowledge, Information and Data Science, UCL
Deep earthquake classification using deep learning.
 Co-supervised with Prof Ana Ferreira and Dr Maria Tsekhmistrenko
- 2021 Mag Marin Adrian. MSci Geophysics, UCL
Towards building 3D global seismic tomography models using proximal methods.
 Co-supervised with Prof Ana Ferreira and Dr Matthew Price

8 Fieldwork

- 19/09/2023–29/09/2023 SNAKEY seismic network service run, South Australia
 Servicing of seismic stations and initial data recovery around Kangaroo Island, Lake Eyre and the York Peninsula.
- 24/06/2022–01/07/2022 Land seismometer deployment, Azores
 Emergency deployment of seismic stations in the Azores archipelago in response to a swarm of seismic activity reminiscent of the activity prior to a previous major eruption in the area.
- 29/06/2021–20/08/2021 UPFLOW Ocean-bottom Seismometer deployment, Atlantic Ocean
 2-month expedition at sea deploying ocean-bottom seismometers to study upwellings of mantle material beneath the Azores archipelago. Part of the H2020 ERC Consolidator Grant *UPFLOW* (101001601).
- 29/08/2017–21/09/2017 GeoTenerife Magnetotelluric survey of Gran Canaria, Spain
 Deployment of magnetotelluric instruments on Gran Canaria in the search for geothermal resources.

9 Volunteering Activities and Service

- External Examiner, University of Durham MScR in Geological Science (2025)
- RSES Education Committee ECR Representative (2024)
- Journal Peer-Reviewing
 Geophysical Journal International (2022, 2024)
 Journal of Geophysical Research: Solid Earth (2022)
 Physics of the Earth and Planetary Interiors (2021, 2023)
- Expert Examiner RSES Masters of Earth Sciences (Advanced)
 Jiarun Zhou (2023). *Developing a deep-learning model to detect and measure the Earth's inner-core sensitive waves.* Supervised by Prof. Hrvoje Tkalčić and Dr Thanh-Son Phạm.
- Session Convener
 Kennett Symposium (2023), Canberra
 ANU RSES Geophysics Weekly Meeting (08/2023–12/2023)

10 Outreach and Communication Activities

- 4/10/2022 UCL GeoBus Earthquake Simulation, ACS STEAM Fair, London
- 2021–2022 UPFLOW Outreach and Communications Team and Web Designer

11 Publications