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

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[3] **A. Marignier**, J. Hauser, and M. Sambridge, "Opinionated inversion and regularisation approaches for delineation of DCIP targets." (*under review at Geophysical Journal International*).

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[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.

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[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