

Adrian Marin Mag

Long Curriculum Vitae

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Research Interests

Imaging theory, inverse and inference theory, computational seismology, theoretical seismology.

Education

2022– **PhD in Deep Earth Imaging**, *University of Oxford*, Oxford

Present Thesis: *“Imaging the multi-scale topography of the Earth’s core”*

Advisors: Dr. Paula Koelemeijer, Dr. Christophe Zaroli, Dr. Andrew Walker

2018–2022 **MSci in Geophysics**, *University College London*, London, UK

First-Class Honours (Average: 82%)

Research Experience

2022– **PhD Researcher in Deep Earth Imaging**, *University of Oxford*

Present Developed 3D finite-frequency sensitivity kernel computations at global scale using the AxisEM3D wave solver.

Extended the SOLA inversion framework to constrain new classes of Earth properties and established formal connections with related methods (Deterministic Linear Inference, MOLA).

Maintain a Python package for solving general linear inverse problems using the SOLA-DLI framework.

Contribute to a scientific Python library for probabilistic linear inferences by implementing abstract function spaces, linear operators, measures, and their interrelations.

Publications

1. Mag, A.M., Zaroli, C. and Koelemeijer, P., 2025. Bridging the gap between SOLA and deterministic linear inferences in the context of seismic tomography. *Geophysical Journal International*, 242(1), p.ggaf131.

Conferences and Presentations

- 2023 **Poster**: “Mapping the Topography of Earth’s Core: Relationships Between Topography Variations and Seismic Waveforms”, PGRIP 2023, Edinburgh, UK
- 2024 **Poster**: “Constraining Earth model properties through Backus-Gilbert SOLA inferences”, UKSEDI, Leeds, UK.
- 2024 **Poster**: “Graph Networks for Protein Folding”, Gordon Research Conference.
- 2024 **Poster**: “Constraining Earth model properties through Backus-Gilbert SOLA inferences”, BSM, Reading, UK
- 2025 **Poster**: “Combining SOLA and Deterministic Linear Inferences”, Inge Lehman Symposium, Copenhagen, Denmark
- 2025 **Poster**: “Constraining Earth model properties through Backus-Gilbert SOLA inferences and normal modes”, MODES/Deep Earth Meeting, Oxford-Cambridge, UK

Teaching Experience

2020 - 2021 **Mathematics and Physics Tutor**, *Notebook Tutors*, London

Tutored mathematics (for MYP IB) and physics (for MYP IB, A level, and AP exams) via online lessons.

2023 Python Course Demonstrator

Replaced a demonstrator for one day as part of an intermediate Python scientific computing course at Oxford.

2023 - 2025 First Year Mathematics College Tutor

Tutored groups of first year students from Exeter and Worcester college on introductory mathematics (calculus and statistics).

2023 - 2025 Third Year Mathematics College Tutor

Tutored groups of third year students from Exeter and Worcester college on vector calculus and continuum mechanics.

2024 Python Course Demonstrator

Helped carrying out a two day intermediate Python scientific computing workshop at Oxford.

Technical Skills

Programming	Python (Intermediate), C++ (beginner), MATLAB (beginner)
Software Development	Version control (Git), CI/CD (GitHub Actions), Testing (pytest), Documentation (Sphinx), Package development (setuptools, poetry)
Scientific Computing	Designed extensible scientific libraries modeling functional spaces and operators; applied in inverse problems and numerical PDEs. Numerical methods (FEM, FDM).
Mathematics	Linear algebra, ODE/PDEs, functional analysis, measure theory, bayesian inversions and inferences.
DevOps / Other	LaTeX, Linux, Jupyter, Markdown

Selected Projects

Fast Marching Method in MATLAB	Implemented the 2D Fast Marching Method for wavefront propagation in heterogeneous media. Used for modeling seismic travel times.
Thermo-Mechanical Mantle Convection	Developed a 2D coupled thermal and mechanical convection model in MATLAB. Simulated viscosity- and temperature-dependent dynamics in the Earth's mantle.
Scientific Python Packages	Built package for solving linear inference methods using the SOLA-DLI method.

Honors & Awards

- 2022 Travel grant for SEDI conference
- 2023 Grant for SPIN workshop

Professional Memberships

Since 2023 Member, RAS (Royal Astronomical Society)

References

Dr. Paula Koelemeijer Associate Professor, Department of Earth Sciences, University of Oxford,
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