Dr Rita Kounoudis

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RESEARCH INTERESTS

I explore the evolution of plate tectonics and geodynamics using a wide range of seismological techniques. My research aims to produce seismic models of crustal and mantle structure across a variety of tectonic settings: from terminal-stage subduction zones in the Eastern Mediterranean to continental rifting along the volcanically active East African Rift where I investigated plume-lithosphere interactions. More recently, I have been imaging parts of central and southern Africa that retain the geological imprints of ancient tectonic processes, such as Archean Cratons and the Pan-African orogens, which unfolded early in Earth's tectonic history and now contain abundant critical mineral deposits such as copper. I also work on microseismic analysis in volcanoes and rift systems to better characterise their geothermal systems.

Expertise: Seismological Imaging – Crustal and Mantle Structure – Active and Ancient Tectonic Processes – Geothermal Processes

RESEARCH EXPERIENCE

Sept 2023 – present: Postdoctoral Research Assistant (PDRA) in Seismology

The CuBES (Copper Basin Exploration Science) Geophysical Experiment

- Exploring the crustal and mantle structure of the Central African Plateau to constrain the region's tectonic evolution.
- Used several seismological techniques (e.g., shear-wave splitting, tomography, receiver functions) interpreted in conjunction with independent MT and gravity studies.
- Main collaborators: Prof. Michael Daly (PI), Prof. Mike Kendall, Prof. Stewart Fishwick, Chaanza Chifwepa (Zambian GSD).

Geothermal Energy in Central Zambia – Detecting Microseismicity

- Utilising earthquake detection and location techniques to map seismicity near hot springs and geothermal fields.
- Main collaborators: Prof. Michael Daly, Prof. Mike Kendall, Peter Vivian-Neal (Kalahari GeoEnergy).

Detecting Earthquakes in Montserrat

- Earthquake detection and location techniques applied on both broadband instruments and nodal seismometers to map seismicity across volcanically active Montserrat in the Caribbean.
- Main collaborators: Prof. Mike Kendall, Dr Petros Bogiatzis, colleagues from the Montserrat Volcano Observatory.

Oct 2019 – Aug 2023: PhD in Geophysics at Imperial College London

The TRAILS (Turkana Rift Arrays Investigating Lithospheric Structure) Project

Funding: Awarded the Imperial President's PhD Scholarship; NSF- and NERC-funded project.
Thesis: The Development of Rifting and Hotspot Tectonism in the Turkana Depression, East Africa
Primary Supervisors: Dr Ian Bastow (Imperial College London), Prof. Cynthia Ebinger (Tulane University).

- Conducted seismological fieldwork in Ethiopia in Oct-Nov 2019.
- 4 lead-author and 5 co-author publications in G^3, EPSL, GJI and Nature; Invited talks at the National Observatory of Athens, University of Oxford and Royal Astronomical Society.

EDUCATION

Oct 2015 – June 2019: MSci in Geophysics at Imperial College London (1st Class Honours – graduated top of the class)

MSci project: Seismic tomographic imaging of the Eastern Mediterranean mantle (achieved highest mark – 85%).

- Constrained the highest resolution P-wave and first body-wave S-wave model; work subsequently published in G^3.

BSc project: Crustal deformation and strain rates in the Aegean tectonic system using seismic moment tensors (achieved highest mark – 83%).

Select courses: Gravity, Magnetism and Orbital Dynamics (92%), Seismology (88%), Physics of Planet Earth (83%), Field Geophysics (74%), Structural Geology II (76%), Marine Geology and Geophysics (79%), Advanced Programming (84%).

Sept 2008 – June 2015: The Grammar School (Nicosia, Cyprus): A-levels: A*A*AA **IGCSE:** A*A*A*A*AAA

GRANTS, AWARDS AND RECOGNITION

2025	**MPLS Researcher Award (£500):** *Awarded for contributions to the postdoc community at Oxford.*
2023	**Janet Watson Memorial Prize:** *Awarded for excellence in research achievement and citizenship.*
2023	**BGA Gray-Milne Travel Grant (£500):** *Awarded to support attendance to an international conference.*
2022	**BGA Postgraduate Research in Progress (PGRiP) Conference Prize:** *Awarded for the best talk.*
2022	**Outstanding Graduate Teaching Assistant – Imperial College Union Award:** *Nominated by undergraduate students and selected as the Best Graduate Teaching Assistant at Imperial College in 2022.*
2022	**Outstanding Student Presentation:** *Earth Science and Engineering PhD Conference at Imperial College.*
2022	**Departmental Networking Fund (£1000):** *Awarded to fund a visit to the U.S. for a research group workshop.*
2021	**Departmental Teaching Assistant Award:** *Nominated by lecturers in the Earth Science Department.*
Nov 2021	**British Geophysical Association PhD Paper of the Month:** *Kounoudis et al., 2021, G-Cubed.*
2019-2023	**Imperial College President's PhD Scholarship (£22,000 p.a. stipend +£2000 p.a. research budget):** *Prestigious 4-year scholarship awarded to ~1 person per year in Earth Sciences.*
2019	**Ernest Edward Glorney Scholarship in Earth Resources Engineering:** *Awarded for excellence to a student completing their final undergraduate year.*
2019	**Earth Science and Engineering Student Centenary Prize:** *Awarded for the best MSci project.*
2019	**A.G. Charleton Institution of Mining and Metallurgy Prize:** *Awarded to a student for all-round excellence.*
2018 & 2019	**Faculty of Engineering Dean's List at Imperial College London**
2017 & 2018	**EPSRC Award:** *Awarded for two consecutive years to conduct summer research placements.*
2017	**British Geophysical Association Award:** *Awarded to best performing student on a geophysics field course.*
2016	**Roycroft Prize:** *Awarded for enthusiasm and high performance in first year undergraduate studies.*
2013	**Edexcel High Achievers Award:** *Achieved highest mark internationally in IGCSE mathematics.*

PUBLICATIONS

2025 View Paper

KOUNOUDIS, R., Bastow, I.D., Ebinger, C.J., Goes, S., Zhou., P., Musila, M., Ogden, C.S., Ayele, A., 2025. The Importance of Past Rifting on Large Igneous Province Development. *Nature*, 647, 115–120.

2025 View Paper

Ogden, C.S., **KOUNOUDIS, R.**, Chifwepa, C., Kendall, J-M., Holwell, D., Fishwick, S., Nippress, S.E.J., Finch, L., Lane, V., Daly, M.C. 2025. Crustal Structure of the Central African Plateau from Receiver Function Analysis. *Geophysical Journal International*, Volume 241, Issue 2, P. 1132-1144.

2025 View Paper

Musila, M., Civilini, F., Ebinger, C.J., Bastow, I.D., **KOUNOUDIS, R.**, Ogden, C.S. and Mariita, N., 2025. Ambient noise crustal imaging of a heterogeneous rift linkage zone: Turkana Depression, East Africa. *Geophysical Journal International*, *243*(1), p.ggaf282.

2025 View Paper

Zhou, P., Bastow, I.D., **KOUNOUDIS, R.**, Ogden C.S., Wang Y., 2025. Crustal Seismic Structure of the Anatolian Plate and its Implications for Plateau Uplift: Evidence from Joint Inversion of Receiver Functions and Surface Waves. *Geochemistry, Geophysics, Geosystems,* 26, e2025GC012393.

2024 View Paper

KOUNOUDIS, R., Kendall, J-M., Fishwick, S., Ogden, C.S., Chifwepa, C., Daly, M.C., 2024 (in-prep). The Tectonic Development of the Central African Plateau, Zambia: Evidence from Shear-Wave Splitting. *Geophysical Journal International,* p.ggae345.

2023 View Paper

Musila, M., Ebinger, C.J., Bastow, I.D., Sullivan, G., Oliva, S.J., Knappe, E., Perry, M., **KOUNOUDIS, R.**, Ogden, C.S., Bendick, R., Mwangi, S., Mariita, N., Kianji, G., Kraus, E., Illsley-Kemp, F., 2023. Active Deformation Constraints on the Nubia-Somalia Plate Boundary Through Heterogeneous Lithosphere of the Turkana Depression. *Geochemistry, Geophysics, Geosystems*, 24(9), p. e2023GC010982.

2023 View Paper

KOUNOUDIS, R., Bastow, I.D., Ebinger, C.J., Darbyshire, F., Musila, M., Ogden, C.S., Ayele, A., Sullivan, G., Ugo, F., Bendick, R., Mariita, N., Kianji, G., 2023. The Development of Rifting and Magmatism in the Multiply-Rifted Turkana Depression, East Africa: Evidence from Surface-Wave Analysis of Crustal and Mantle Structure. *Earth and Planetary Science Letters,* 621, p.118386.

2023 View Paper

Boyce, A., **KOUNOUDIS, R.**, Bastow, I.D., Cottaar, S., 2023. Mantle Wavespeed and Discontinuity Structure Below East Africa: Implications for Cenozoic Hotspot Tectonism and the Development of the Turkana Depression. *Geochemistry, Geophysics, Geosystems,* 24(8), p.e2022GC010775.

2023 View paper
Ogden, C.S., Bastow, I.D., Ebinger, C.J., Ayele, A., **KOUNOUDIS, R.**, Musila M., Bendick, R., Mariita, N., Kianji, G., Rooney T., Sullivan G., and Kibret B., 2022. The Development of Multiple Phases of Superposed Rifting in the Turkana Depression, East Africa: Evidence from Receiver Functions. *Earth and Planetary Science Letters,* 609, p.118088.

2021 View paper
Merry, T.A.J., Bastow, I.D., **KOUNOUDIS, R.**, Ogden, C.S., Bell, R.E., and Jones, L., 2021. The Influence of the North Anatolian Fault and a Fragmenting Slab Architecture on Upper Mantle Seismic Anisotropy in the Eastern Mediterranean. *Geochemistry, Geophysics, Geosystems*, 22(9), p.e2021GC009896.

2021 View paper
KOUNOUDIS, R., Bastow, I.D., Ebinger, C.J., Ogden, C.S., Ayele, A., Bendick, R., Mariita, N., Kianji, G., Wigham, G., Musila, M., and Kibret, B., 2021. Body-Wave Tomographic Imaging of the Turkana Depression: Implications for Rift Development and Plume-Lithosphere Interactions. *Geochemistry, Geophysics, Geosystems*, *22*(8), p.e2021GC009782.

2021 View paper
Boyce, A., Bastow, I.D., Cottaar, S., **KOUNOUDIS, R.**, Guilloud De Courbeville, J., Caunt, E. and Desai, S., 2021. AFRP20: New P-wavespeed Model for the African Mantle Reveals Two Whole-Mantle Plumes below East Africa and Neoproterozoic Modification of the Tanzania Craton. *Geochemistry, Geophysics, Geosystems, 22*(3), p.e2020GC009302.

2020 View paper
KOUNOUDIS, R., Bastow, I.D., Ogden, C.S., Goes, S., Jenkins, J., Grant, B., and Braham, C., 2020. Seismic Tomographic Imaging of the Eastern Mediterranean Mantle: Implications for Terminal-Stage Subduction, the Uplift of Anatolia, and the Development of the North Anatolian Fault. *Geochemistry, Geophysics, Geosystems, 21*(7), p.e2020GC009009.

2019 View paper
Venereau, C.M.A., Martin-Short, R., Bastow, I.D., Allen, R.M., and **KOUNOUDIS, R.**, 2019. The Role of Variable Slab Dip in Driving Mantle Flow at the Eastern Edge of the Alaskan Subduction Margin: Insights from Shear-Wave Splitting. *Geochemistry, Geophysics, Geosystems*, *20*(5), pp.2433-2448.

SCIENTIFIC COLLABORATORS

University of Oxford, University of Durham, Imperial College London, University of Montreal, Tulane University, University of Addis Ababa, University of Nairobi, University of Montana, Uppsala University, ETH Zurich, University of Leicester, University of Cambridge, University of Lusaka, Dedan Kimathi Institute of Technology, Zambian Geological Survey Department and Ministry of Mines, Cyprus Geological Survey Department, Kalahari GeoEnergy, BHP, First Quantum Minerals (FQM).

TEACHING EXPERIENCE AND SUPERVISION

Worcester College Stipendiary Lecturer and College Tutor (2024-2025).

- Weekly tutorials on a range of geological and geophysical topics to 1st, 2nd and 3rd year students (15 students).
- Also undertook pastoral responsibilities and attended Tutorial Fellow and Senior Common Room Committee meetings.

Independent project supervision (BSc and MSc thesis):

- Principal supervisor for 4th year MSc student thesis at Oxford (2024-2025) and Imperial College (2021-2022).
- Co-supervisor for two 4th year MSci seismology thesis students (2019-2020; 2020-2021).
- Graduate Teaching Assistant for 3rd year Geophysics Independent Research projects (2018-2022).

Undergraduate Teaching:

- Tutorial lecturer at the University of Oxford for Plate Tectonics (3rd years) and Geophysics (2nd years).
- Teaching Assistant at Imperial College for courses across all years of the MSci Geophysics and Geology degrees. Select modules: Seismology, Numerical Methods, Maths, Paleo-magnetism, Geodesy and Orbital Dynamics, Continental Tectonics, Planetary Physics, Applied Geophysics, Geohazards.
- Academic and Pastoral Mentor for ten 1st year undergraduates at Imperial College.
- Developed course material on generating publication quality maps and figures using Generic Mapping Tools (GMT) and an introduction to the UNIX system Geophysics undergraduates.

Fieldtrip Demonstrating:

- 3rd year Oxford Earth Science tectonics fieldtrip to Gulf of Corinth (2024 & 2025).
- Demonstrator and group leader on 2nd year Geophysics fieldtrip to Cyprus (2022, 2023).
- 1st Year Geology fieldtrip to Charnwood, Leicestershire and geological fieldwork toolkit/skills training modules.
- “Rocks and Structures in the Field” of South Wales and “Geology of Mars” virtual fieldtrips (2021).

FIELDWORK EXPERIENCE

May 2025	**ReSET seismic network in Montserrat:** B*roadband and nodal seismograph service team.*
Nov 2023	**Field leader for the CuBES seismic network:** *Led a team to service and decommission a NERC-funded broadband seismograph network across Zambia. Simultaneously conducted geological fieldwork to collect rock samples for density/gravity analysis.*
June 2023	**Field leader for the Bweenga geothermal project:** *Deployed a nodal seismometer array to monitor microseismicity around active hot springs and geothermal fields in central Zambia.*
March 2019, 22, 23	**Conducted a gravity survey across the Troodos Ophiolite in Cyprus:** *Involved collecting data for future publication alongside teaching and supervising undergraduate students on geophysical surveys.*
Oct 2019	**TRAILS seismic network in Ethiopia:** Servicing seismic *stations, data extraction and instrument calibration.*
March 2017, 18	**TROODOS seismic network in Cyprus:** *Instrument calibration and data extraction of 8 seismograph stations.*

ACADEMIC SERVICE, POSITIONS OF RESPONSIBILITY AND EEDI

2024-present	**Earth Sciences Postdoc representative at the University of Oxford**
2024	**Postdoc representative on the Athena Swann Action Group at the University of Oxford**
Dec 2024	**Lead convener for a Tectonophysics AGU Fall Meeting 2024 session** *Tectonic, Magmatic and Geodynamic Studies of Rifts, Rifted Margins and Ridges.*
2022-2023	**Interim Communications and Social Media Manager for the Imperial College Department of Earth Sciences** *Invited to be the Interim communications support for the department for 10 months.*
2020-2023	**Organiser of the PMaC (Plates, Mantle and Core) research group at Imperial College** *Organise and host weekly meetings and seminars with internal and external speakers.*
2022	**Member of Student Panel in the Imperial College Department of Earth Sciences** *Involved interviewing candidates for permanent departmental positions.*
2020-2023	**Committee Member of the Graduate Society at Imperial College** *PhD student representative for the Earth Science department. Involved organising social and academic events to keep PhD students connected, e.g., the annual departmental Earth Science PhD Student Conference.*
2021-present	**Reviewer for Academic Journals:** *G-Cubed, GJI, Tectonophysics, Nature Communications, GRL, EGU Sphere, PEPI, Gondwana Research, GSL, Scientific Reports.*
2015-2019	**Undergraduate Academic Representative** *Elected every academic year to represent all students in my cohort.*

INVITED TALKS

Dec 2024	**AGU Fall Meeting 2024 in the Volcanology, Geochemistry and Petrology Section** *Variable magmatic modification of the East African Lithosphere.*
Nov 2024	**COMET Seminar (The Centre for Observation and Modelling of Earthquakes, Volcanoes, and Tectonics)** *The Importance of Past Rifting in Large Igneous Province Development.*
Oct 2024	**Dublin Institute of Advanced Studies (DIAS) Geo-Seminar Series** *Crustal structure and mantle deformation across the Central African Plateau's Precambrian terranes.*
Apr 2024	**Royal Astronomical Society – Astronomy and Geophysics Highlights Meeting [view website]** *Continental break-up along the East African Rift: new insights from the Turkana Depression*
Sep 2023	**Rifts and Rifted Margins Online Webinar Seminar** *The Development of rifting and magmatism in the Turkana Depression*
Nov 2022	**Inaugural Earth Science and Engineering Departmental Research Seminar**

Oct 2022	**University of Oxford Geophysics Seminar** *Imaging the crust and mantle structure below the Turkana Depression*
Feb 2021	**National Observatory of Athens** *Terminal-stage subduction and implications for uplift and magmatism in the Eastern Mediterranean*
Feb 2021 & Nov 2022	**Geophysics Society at Imperial College London** *Presented PhD research and information on pursuing PhD studies to an undergraduate student-led society.*

CONFERENCES AND WORKSHOPS

May 2024	**Coordinated research group talks for Rio Tinto, BHP and FQM representatives at the University of Oxford**
Apr 2023	**European Geosciences Union (EGU) 2023 General Assembly** *Seismic imaging of heterogeneous lithosphere beneath the unusually broad Turkana Depression, East Africa.*
Apr 2024	**Royal Astronomical Society specialist meeting** *Variable magmatic modification of the East African Lithosphere.*
Sept 2022	**Earth Science and Engineering PhD Student Conference at Imperial College**
Sept 2022, 24	**British Seismology Meeting** *1. Seismic imaging of heterogeneous lithosphere beneath the unusually broad Turkana Depression, East Africa.* *2. Crustal Structure and Mantle Deformation Across the Central African Plateau, Zambia: Evidence from Receiver Functions and Shear-Wave Splitting Analysis.*
Sept 2021,22	**The BGA Postgraduate Research in Progress (PGRiP) Conference [award for best talk]** *Seismic imaging of heterogeneous lithosphere beneath the unusually broad Turkana Depression, East Africa*
July 2021	**President's Scholars Research Symposium at Imperial College**
Dec 2019,20,21 22,23,24	**American Geophysical Union Fall Meetings** *Presented posters and talks on work now published and in-preparation.*

SOCIETAL ENGAGEMENT AND OUTREACH

July 2025	**UNIQ Course University of Oxford** *Helps students from diverse backgrounds apply to Oxford.*
June 2024	**Oxplore Festival outreach seismology programme for Year 11-13 students in Cornwall**
June 2023	**Co-leader of seismology workshop for the Great Exhibition Road Festival**
2022-present	**Imperial College Earth Science and Engineering Open Days** *Delivered talks to prospective students and their families.*
2019-present	**Imperial College Outreach STEM leader** *Frequently deliver 'Meet the Researcher' Webinars and in-person talks aimed at age groups 10-18 yrs old.*
2018-present	**Earth Science Departmental Outreach Leader** *Promote Earth Science, deliver research talks and lectures at work experience events (e.g., Sutton Trust Summer School, Earth Science Taster Day) and school visits (e.g., Nonsuch School for Girls, Bridge Academy).*
2019 & 2022	**Great Exhibition Road Festival –** *Supported seismology and planetary science public workshops (8+ yrs old).*

RELEVANT WORK EXPERIENCE

June – Aug 2017 & 2018: Undergraduate Research Opportunities Programme (UROP) in Seismology

EPSRC-funded UROP, for two consecutive years, to conduct seismological data analysis that later formed part of publications in 2019 and 2021 (Venereau et al., G^3, 2019; Boyce et al., G^3, 2021).

June – Sept 2016: The Cyprus Institute

Research project on "Water management and supply in Nicosia during the British colonial period (1878-1960)". Supervised by the Director of Science and Technology in Archaeology at the Cyprus Institute and the University of Cyprus. Report is now included in the Cyprus Water Development Department library.

ATTENDED COURSES AND WORKSHOPS

AGU Courses: *ROSES 2020 (Remote Online Sessions for Emerging Seismologists)*
Graduate School Courses: *Introduction to Machine Learning, Professional Development, Graduate Teaching Assistant courses.*
EDI Workshops: *Active Bystander, Unconscious Bias, Equality and Diversity, Bullying and Harassment, Racism Awareness*.
Geomatrix Training: *Hand-on experience with active and passive geophysical equipment for teaching undergraduate field courses.*

ADDITIONAL SKILLS AND QUALIFICATIONS

Outdoor Fieldwork First Aid: Renewed in June 2025
Mental Health First Aid (MHFA England): Certified in March 2023
Driver's License: Since 2014
Languages: *English (Native, bilingual); Greek (Native, bilingual)*
IT Skills: *Python, Obspy, SAC, Bash, Shell Scripting, GMT, UNIX, Linux, C++, Illustrator, LaTeX, ArcGIS, High Performance Computing*