Rita Kounoudis

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RESEARCH INTERESTS

I am interested in exploring the evolution of plate tectonics and geodynamics through various seismological techniques. My work thus far has involved conducting a broad range of seismological analysis to develop models of crust and mantle structure in a variety of tectonic settings: from terminal-stage subduction zones in the Eastern Mediterranean to continental break-up along the seismically and volcanically active East African Rift. My PhD project focused on understanding continental break-up, plumelithosphere interactions and rifting processes within the complex, multiply-rifted Turkana Depression in East Africa, providing fresh insights into mechanisms entailed in long-term rift evolution. More recently, I have been investigating parts of central and southern Africa that retain the geological imprints of ancient tectonic processes, such as the Pan African orogeny, which unfolded early in Earth's tectonic history and today contain abundant critical mineral deposits such as copper. I also work on microseismicity analysis for geothermal fields to help characterise the geothermal reservoir.

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).

Sept 2023 – present: Geothermal Energy in Central Zambia – Detecting Microseismicity

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

Oct 2019 – Aug 2023: PhD in Geophysics at Imperial College London - The TRAILS Project

Funding: Imperial President's PhD Scholarship.

<u>Thesis</u>: Rifting and Hotspot Tectonism: Imaging the Crust and Mantle Structure of the Turkana Depression in East Africa. <u>Primary Supervisors</u>: Dr Ian Bastow (Imperial College London), Prof. Cynthia Ebinger (Tulane University).

- The TRAILS Project is funded by NSF (1824417) and NERC (NE/S014136/1).
- Conducted seismological fieldwork in Ethiopia in Oct-Nov 2019.
- See 'Publications' section below for papers resulting from PhD work.

EDUCATION

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

MSci Project: Seismic tomographic imaging of the Eastern Mediterranean (achieved highest grade).

• Constrained the highest resolution P-wave and first body-wave S-wave model of the Eastern Mediterranean mantle.

BSc Project: Crustal deformation of the Aegean tectonic system from seismic moment tensors (achieved highest grade).

Conducted Kostrov Summation to explore strain rates and deformation patterns in the region.

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

AWARDS AND RECOGNITION

2023 Janet Watson Memorial Prize: Awarded for excellence in research achievement and citizenship.
BGA Gray-Milne Travel Grant: Awarded to support attendance to an international conference.
2022 Best Talk – BGA Postgraduate Research in Progress (PGRiP) Conference: 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: Awarded to fund a visit to Tulane University 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	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

2024 (in-prep)	Ogden, C.S., KOUNOUDIS R. , Fishwick, S., Chifwepa, C., Holwell, D., Kendall, J-M., Daly, M. 2024 (in-prep). Crustal Structure of the Katangan Basin in Zambia: Evidence from Receiver Functions. Planning to submit to <i>GJI</i> .
2024 (in-prep)	KOUNOUDIS, R. , Kendall, J-M., Fishwick, S., Ogden, C.S., Chifwepa, C., Daly, M. 2024 (in-prep). Lithospheric Deformation Across the Central African Plateau Revealed by Shear-Wave Splitting. Planning to submit to <i>GJI</i> .
2024 (in-prep)	KOUNOUDIS, R. , Bastow, I.D., Ebinger, C.J., Goes, S., Ogden, C.S., Ayele, A., Musila, M. 2024 (in-prep). Variable Magmatic Modification of East African Lithosphere. Planning to submit to <i>Nature Geoscience</i> .
2024 (in-prep)	Zhou, P., Bastow, I.D., KOUNOUDIS, R. , Ogden C. 2024 (in-prep). Crustal Seismic Structure of the Anatolian Plate and its Implications for Plateau Uplift: Evidence from Joint Inversion of Receiver Functions and Surface Waves. Planning to submit to <i>GJI</i> .
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. <i>G-Cubed</i> , 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 (in-rev). The Development of Rifting and Magmatism in the Multiply-Rifted Turkana Depression, East Africa: Evidence from Surface-Wave Analysis of Crustal and Mantle Structure. <i>EPSL</i> , 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. <i>G-Cubed</i> . 24(8), p.e2022GC010775.
2023 <u>View paper</u>	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. <i>EPSL</i> , 609, p.118088.
2021 View paper	Merry, T.A., 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. <i>G-Cubed</i> , 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. <i>G-Cubed</i> , <i>22</i> (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. <i>G-Cubed 22</i> (3), p.e2020GC009302.

2020	KOUNOUDIS, R., Bastow, I.D., Ogden, C.S., Goes, S., Jenkins, J., Grant, B., and Braham, C., 2020. Seismic
<u>View paper</u>	Tomographic Imaging of the Eastern Mediterranean Mantle: Implications for Terminal-Stage Subduction, the Uplift of Anatolia, and the Development of the North Anatolian Fault. <i>G-Cubed 21</i> (7), p.e2020GC009009.
2019	Venereau, C.M.A., Martin-Short, R., Bastow, I.D., Allen, R.M., and KOUNOUDIS, R., 2019. The Role of Variable
View paper	Slab Dip in Driving Mantle Flow at the Eastern Edge of the Alaskan Subduction Margin: Insights from Shear-
	Wave Splitting. G- <i>Cubed, 20</i> (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, CNRS University of Leon, University of Leicester, University of Cambridge, University of Lusaka, Zambian Geological Survey Department, Cyprus Geological Survey Department.

FIELDWORK EXPERIENCE

November 2023	Field leader for CuBES seismic network: Led a team to service and decommission the NERC-funded broadband seismograph network across Zambia.
June 2023	Field leader for Geothermal project: Deployed a nodal seismometer array to monitor microseismicity around an active geothermal field.
March 2019 & May 2022,23	Conducted a gravity survey across the Troodos Ophiolite in Cyprus: Involved collecting data for future publication alongside teaching and supervising undergraduate students on gravity surveys.
Oct 2019	Member of field service team for the TRAILS seismic network in southern Ethiopia: Involved deployment and decommissioning of seismic stations, data extraction and instrument calibration.
March 2017 & March 2018	Member of field service team for the TROODOS seismic network in Cyprus: Involved instrument calibration and data extraction.

TEACHING AND SUPERVISION

Research	Principal supervisor for 4 th year masters student at the University of Oxford (2024-2025).
Supervision	Principal supervisor and mentor for 4 th year MSci (masters) seismology project (2021-2022).
	Co-supervisor and mentor for two seismology 4 th year MSci seismology projects (2019-2020; 2020-2021).
	Graduate Teaching Assistant for 3 rd year Geophysics independent research projects (2018-2022).
Undergraduate	Tutorial lecturer at the University of Oxford for Plate Tectonics (3 rd years) and Geophysics (2 nd years).
Teaching	Graduate Teaching Assistant at Imperial College for courses across all years of the MSci Geophysics and
	Geology degrees. Modules include Seismology and Numerical Methods, Maths Methods, Gravity, Magnetism
	and Orbital Dynamics, Continental Tectonics, Planetary Physics, Advanced Applied Geophysics, Geohazards.
Fieldwork	Demonstrator for the 3 rd year Earth Science tectonics fieldtrip to Gulf of Corinth (2024).
Teaching	Demonstrator and group leader on 2 nd year Geophysics fieldtrip to Cyprus (2022, 2023).
	Graduate Teaching Assistant on 1 st Year Geological fieldtrip training modules.

POSITIONS OF RESPONSIBILITY AND EDI

2024-present	Postdoc Rep on the Athena Swann Action Group at the University of Oxford
2022-2023	Social Media Manager for the Imperial College Department of Earth Science Twitter Account
	Invited to be the Interim communications support for the department until the permanent position is filled.
2020-2023	Leader of the PMaC (Plates, Mantle and Core) research group at Imperial College
	Organise and host weekly meetings and seminars.
2022	Member of Student Panel in the Earth Science and Engineering Department at Imperial
	Involves interviewing candidates for permanent departmental positions.

Committee Member of the Graduate Society at Imperial College
Act as PhD student representative for the Earth Science department. Involves organising social and academic
events to keep PhD students connected, e.g., the annual departmental Earth Science PhD Student Conference.
Reviewer for Academic Journals: G-Cubed, GJI, Tectonophysics, Nature Comms, GRL, EGU Sphere, PEPI,
Gondwana Research, GSL, Scientific Reports.
Undergraduate Academic Representative: Elected every academic year to represent all students in my cohort

INVITED TALKS, CONFERENCES AND WORKSHOPS

Dec 2024	Invited talk: AGU Fall Meeting 2024 in VGP: Variable magmatic modification of the East African Lithosphere.
Dec 2024	Primary convener for a Tectonophysics AGU 2024 session: Tectonic, Magmatic and Geodynamic Studies of
	Rifts, Rifted Margins and Ridges.
May 2024	Coordinated research group talks for Rio Tinto representatives at Oxford
Apr 2024	Royal Astronomical Society specialist meeting – tectonics, magmatism and hazards in the East African Rift.
Apr 2024	Invited talk: Royal Astronomical Society Highlights Meeting
March 2024	British Seismology Meeting – presented CuBES postdoc work.
Sep 2023	Invited talk: Global online Rifts and Rifted Margins seminar
Apr 2023	EGU Meeting: Presented a talk on published PhD work.
Nov 2022	Inaugural Earth Science and Engineering Departmental Research Seminar
Oct 2022	Invited talk by the University of Oxford – Imaging the crust and mantle structure below Turkana.
Sept 2022	Earth Science and Engineering PhD Student Conference
Sept 2022	British Seismology Meeting – presented TRAILS PhD work.
Sept 2021,22	The BGA Postgraduate Research in Progress (PGRiP) Conference – Won award for best talk.
July 2021	President's Scholars Research Symposium at Imperial College
Feb 2021	Invited talk by the National Observatory of Athens – Seminar on work published in Kounoudis et al., (2020)
Feb 2021 & Nov	Invited talks by the Geophysics Society at Imperial College London – Presented PhD research and information
2022	on pursuing PhD studies to an undergraduate student-led society.
Dec 2019,20,21	AGU Fall Meeting: Presented posters and talks on work now published and in-prep.
22,23,24	

SOCIETAL ENGAGEMENT AND OUTREACH

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, ESE 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, with Dr Ian Bastow at Imperial College London. Work has formed part of publications in 2019 and 2021 (Venereau et al., G³, 2019; Boyce et al., G³, 2021).

June – Sept 2016: The Cyprus Institute

Research project on 'Water management and supply in Nicosia during British colonial period (1878-1960)'. Supervised by the Director of Science and Technology in Archaeology at the Cyprus Institute, Prof. Manfred Lange, and Prof. Efrosyni Egoumenidou from 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)

<u>Graduate School Courses:</u> Introduction to Machine Learning, Professional Development, Graduate Teaching Assistant courses. <u>EDI Workshops:</u> Active Bystander, Unconscious Bias, Equality and Diversity, Bullying and Harassment, Racism Awareness.

ADDITIONAL SKILLS AND QUALIFICATIONS

Outdoor Fieldwork First Aid (Marlin Training): Renewed in March 2022 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