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Sinan Özaydın

PhD, MSc, BS

BIO

I am an Earth scientist specialising in magnetotellurics. My research targets how the electrical conductivity distribution of the lithospheric mantle, as it is acquired from magnetotelluric models, can be related to tectonic and magmatic processes. I try to do this via quantified interpretations, combining the knowledge from geochemistry, petrology and magnetotellurics.

Employment

Postdoctoral Research Associate at University of Sydney *January 2023 -*

Postdoctoral Research Fellow at Macquarie University *January 2022 - December 2023*

Research Associate at University of South Australia *September - December 2021*

Education

PhD in Geophysics at Macquarie University *2018 - 2021*
Sydney, Australia
Thesis Title: *"Three-dimensional magnetotelluric constraints on compositional variations of the Southern African mantle."*
Supervisors: Kate Selway (Primary), William L. Griffin (Associate)

MSc in Geophysics at Boğaziçi University *2015 - 2017*
Istanbul, Turkey
Thesis Title: *"The role of crustal fluids in tectonics of north-central Turkey, inferred from three-dimensional magnetotellurics."*
Supervisors: S. Bülent Tank

BS. in Geophysical Engineering at Istanbul Technical University *2009-2015*
Istanbul, Turkey

Research Interests

Magnetotellurics, geophysical inversion, geochemistry, quantified interpretations of mantle electrical conductivities, geodynamic modelling.

Publications

11 - Han, Kui, Guo, Xinzhuan, Wang, Xuben, Zhang, Junfeng, **Özaydın, Sinan**, Li, Dewei, Clark, Simon Martin (2023). "The electrical conductivity of granite: The role of hydrous accessory minerals and the structure water in major minerals.", *Tectonophysics*, 229857, 856. 10.1016/j.tecto.2023.229857.

10 - Wieser P., Petrelli M., Lubbers J., Wieser E., **Özaydın, Sinan**, Kent A., Till C., (2022). "Thermobar: Open source thermobarometry and hygrometry in Python3.", *Volcanica*, 5(2), doi:10.30909/vol.05.02.349384.

9 - **Özaydın, Sinan**, Selway, Kate (2022). "The Relationship Between Kimberlitic Magmatism and Electrical Conductivity Anomalies in the Mantle.", *Geophysical Research Letters*, 49, e2022GL099661, doi:10.1029/2022GL099661

8 - **Özaydın, Sinan**, Selway, Kate, Griffin, William L., Moorkamp, Max (2022). " Probing the southern African lithosphere with magnetotellurics: 2. Linking electrical conductivity, composition, and tectonomagmatic evolution.", *Journal of Geophysical Research: Solid Earth*, 127, e2021JB023105. doi:10.1029/2021JB023105

7 - Moorkamp, Max, **Özaydın, Sinan**, Selway, Kate, Jones, Alan G., (2022). "Probing the Southern African Lithosphere With Magnetotellurics—Part I: Model Construction", *Journal of Geophysical Research: Solid Earth*, 127, e2021JB023117. doi:10.1029/2021JB023117

6 - **Özaydın, Sinan**, Selway, Kate, Griffin, William L. (2021). "Are xenoliths from southwestern Kaapvaal Craton representative of the broader mantle? Constraints from magnetotelluric modeling", *Geophysical Research Letters*, 48, doi:10.1029/2021GL092570.

5 - **Özaydın, Sinan**, Selway, Kate, "MATE: An analysis tool for the interpretation of magnetotelluric models of the mantle" (2020). *Geochemistry, Geophysics, Geosystems*, 21, doi:10.1029/2020gc009126.

4 - Selway, Kate, O'Donnell, J. P., **Özaydın, Sinan** (2019). "Upper Mantle Melt Distribution From Petrologically Constrained Magnetotellurics", *Geochemistry, Geophysics, Geosystems*, 20, doi:10.1029/2019GC008227.

3 - Tank, S. Bülent, **Özaydın, Sinan**, Karaş, Mustafa (2018). "Revealing the electrical properties of a gneiss dome using three-dimensional magnetotellurics: Burial and exhumation cycles associated with faulting in Central Anatolia, Turkey", *Physics of the Earth and Planetary Interiors*, 283, doi:10.1016/j.pepi.2018.07.010.

2 - **Özaydın, Sinan**, Tank, S. Bülent, Karaş, Mustafa (2018). "Electrical resistivity structure at the North-Central Turkey inferred from three-dimensional magnetotellurics.", *Earth, Planets and Space*, 70(49), doi:10.1186/s40623-018-0818-4.

1 - Karaş, Mustafa, Tank, S. Bülent, **Özaydın, Sinan** (2017). "Electrical conductivity of a locked fault: investigation of the Ganos segment of the North Anatolian Fault using three-dimensional magnetotellurics.", *Earth, Planets and Space*, 69(107), doi:10.1186/s40623-017-0695-2.

Publications in progress

Özaydın, Sinan, Selway, Kate, Foley, Stephen F., Ezad, Isra S., Griffin William L. Tarits, Pascal, Hautot, Sophie (2023). "Role of metasomatism in the development of the East African Rift at the Northern Tanzanian Divergence: Insights from 3D magnetotelluric modelling.", *Geochemistry, Geophysics, Geosystems*, Submitted, under review 10.22541/essoar.169230197.72316079/v1

Manassero M.C., **Özaydın, Sinan**, Afonso. J.C., Shea, J., Kirkby, A., Ezad, I.S., Thiel, S., Fomin, I., Czarnota, K. (2023). "Lithospheric structure and melting processes in southeast Australia: new constraints from joint probabilistic inversions of 3D magnetotelluric and seismic data", *Journal of Geophysical Research: Solid Earth*, Submitted, under review 10.22541/essoar.167591113.34975523/v1.

Selway, Kate, **Özaydın, Sinan**, Payne, Justin (2023). "Metasomatism and depletion of the southern Gawler Craton from combined mantle xenocryst and AusLAMP magnetotelluric data.", *Exploration Geophysics*, Submitted, under review.

Takenaka, L.B., **Özaydın, Sinan**, Ciardelli, Caio, Griffin, W.L., Ganade, C. E., Jacob, D., Basei, M. A. S., Assumpção, M, O'Reilly, S. Y. (2022). "Survivors of metasomatism: Diamonds

and mantle domains on the SW margin of the São Francisco Craton.", *Lithos*, In preperation.

Özaydın, Sinan, Manassero M.C., Selway, Kate (2022 or 2023). "MATE v. 2, An analysis tool for interpretation of magnetotelluric models of the mantle with probabilistic multiparameter solutions.", *Journal of Open Source Software*, In preperation.

Reviewed Manuscripts in

Geophysical Journal International; Gondwana Research; Journal of Geophysical Research: Solid Earth; Geochemistry, Geophysics, Geosystems; Minerals; Nature Communications Earth & Environment.

Research Projects

ARC-Linkage Project Evolution of Proterozoic multistage rift basins – key controls on mineral systems *2023 -*
Research Associate

Compositional constraints on the evolution of Tanzanian Craton and surrounding rift margins using magnetotelluric modelling. *2022 - 2023*
Researcher

Unveiling the relationship between kimberlites and electrical conductivity signatures of the mantle. *2021 - 2022*
Researcher

Improving the quantitative interpretations of magnetotelluric models of the cratonic mantle. *2018 - 2022*
Researcher / PhD Candidate

Summit Station Magnetotellurics (SUMMAT) *2018*
Researcher

Continental Dynamics / Central Anatolian Tectonics (CD-CAT) *2014-2018*
Intern / Researcher

Imaging the Shallow Crustal Structure of Ganos Fault by Magnetotellurics *2015-2017*
Researcher

Conference Proceedings (1^{st} Author Only)

Özaydın, Sinan, Rey, Patrice F., Selway, Kate, Giordani, Julian (2023, Upcoming). "Magnetotelluric insights in to the rheology and composition of the mantle and applications for geodynamic modelling." Oral Presentation, *AESC2023*, Perth, Australia.

Özaydın, Sinan, Selway, Kate, Foley, Stephen F., Tarits, Pascal, Sophie, Griffin, William L., Ezad, Isra S. (2023, Upcoming). "Unveiling the compositional nature and architecture of the lithospheric mantle at Northern Tanzanian Divergace with magnetotellurics.", Poster Presentation, *AESC2023*, Perth, Australia.

Özaydın, Sinan, Selway, Kate, Moorkamp Max, Griffin, William L., Manassero, M. C. (2022). "What are the compositional causes behind electrical conductivity variations in continental lithospheric mantle? Methodology and practice for quantified interpretations.", Poster Presentation, *EMIW2022*, Çeşme, Turkey.

Özaydın, Sinan, Selway, Kate, Foley, Stephen F., Tarits, P., Hautot, S. (2022). "Investigation into lithospheric mantle of Northern Tanzania utilising 3D magnetotellurics.", Poster Presenta-

tion, *EMIW2022*, Çeşme, Turkey.

Özaydın, Sinan, Selway, Kate "Laboratory results coded in MATE.", Oral Presentation (Invited Speaker), *EM-Community Webinar Series*, Virtual Conference, International.

Özaydın, Sinan, Selway, Kate, Griffin, William L. (2021). "Composition and evolution of the southern African lithosphere from combined xenocryst and magnetotelluric data", Oral Presentation, *AESC2021*, Virtual Conference, Australia.

Özaydın, Sinan, Selway, Kate (2020). "Interpretation of conductivity variations in magnetotelluric models of cratonic lithospheric mantle with the new open-source software MATE.", Oral Presentation, *AGU2020*, Virtual Conference, USA.

Özaydın, Sinan, Selway, Kate (2019). "Utilising 3-D magnetotelluric models of southern African mantle to constrain hydrogen content and compositional variations.", Oral Presentation, *AEGC2019*, Perth, Australia.

Özaydın, Sinan, Selway, Kate (2018). "Measuring the hydrogen content variations in Southern African mantle.", Poster Presentation, *EMIW2018*, Helsingör, Denmark.

Özaydın, Sinan, Tank, S. Bülent, Karaş, Mustafa, Sandvol, Eric (2017). "Resolving the deep electrical resistivity structure at Central Pontides, Northern Turkey by three-dimensional magnetotelluric modeling.", Poster Presentation, *EGU2017*, Vienna, Austria.

Grants

NCI Adapter Scheme Q3 - 250 KSU Computing Time at Gadi Supercomputer (2023)
Macquarie University Covid Recovery Postdoctoral Fellowship - Salary + 5000AUD (2021-2022)

Awards & Achievements

Australian Research Council PhD research scholarship 2018-2021
TUBITAK research scholarship 2016-2017

Scientific Software

MATE - Creator -`https://github.com/sinanozaydin/MATE`
A software to make quantified interpretations of the magnetotelluric models of the mantle. Published in G-cubed.

Thermobar - Contributor - `https://github.com/PennyWieser/Thermobar`
A python library to handle thermobarometric calculations of earth materials.

Computer Skills

Languages: Python, Matlab, Fortran, Bash, LaTeX
MT Inversion: ModEM, jif3D, WS3DINV, MARE2DEM, rjmcmcmt
MT Processing: EMTF, BIRRP
Geoscience Software: QGIS, GMT, PerpleX
Visualisation: Paraview, Inkscape, Gimp
Operating systems: Linux proficient

Fieldwork Experience

Greenland Summit Station Fieldwork *2018*
Installation of broad-band and long-period MT stations in Greenland ice sheet.

CD-CAT Fieldwork in Central Anatolia *2014-2018*
Installation of nearly 150 broad-band and long-period MT stations in Central Anatolia.

Other Interests	Philosophy (Philosophy and history of science, differential ontology & process philosophy, post-structuralism), Music production (Multi-instrumentalist), Cinema.