

Sinan Özaydın

PhD, MSc, BS

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BIO

I am an Earth scientist specialising in magnetotellurics. My research targets how the electrical conductivity distribution of the lithosphere, 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, magnetotellurics and thermomechanical modelling.

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

15 - **Özaydın, Sinan**, Li, L., Singh, U., Rey, P.F., Manassero, M.C (2025). “pide: Petrophysical Interpretation tools for geoDynamic Exploration.”, *Journal of Open Source Software*, 10(105), 7021, [10.21105/joss.07021](https://doi.org/10.21105/joss.07021).

14 - Manassero M.C., **Özaydın, Sinan**, Afonso, J.C., Shea, J., Kirkby, A., Ezad, I.S., Thiel, S., Fomin, I., Czarnota, K. (2024). “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*, 129, [10.1029/2023JB028257](https://doi.org/10.1029/2023JB028257).

13 - **Özaydın, Sinan**, Selway, Kate, Foley, Stephen F., Ezad, Isra S., Griffin William L. Tarits, Pascal, Hautot, Sophie (2024). “Role of metasomatism in the development of the East African Rift at the Northern Tanzanian Divergence: Insights from 3D magnetotelluric modelling.”, *Geochemistry, Geophysics, Geosystems*, 25, [10.1029/2023GC011191](https://doi.org/10.1029/2023GC011191).

12 - 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*, 1-15, [10.1080/08123985.2023.2282711](https://doi.org/10.1080/08123985.2023.2282711)

11 - Han, Kui, Guo, Xinzhan, 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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1186/s40623-017-0695-2).

PUBLICATIONS IN PROGRESS	<p>Catherine A. Rychert, Yuhang Dai, Özaydın, Sinan, Eric Debayle, Nicholas Harmon, Emily J. Chin, Clinton P. Conrad, Greg Hirth, <u>Samer Naif</u>, Kate Selway, Irina Artemieva (2024). “Variations and dynamics of the lithosphere-asthenosphere boundary”, <i>Geology</i>, Under Review.</p>
	<p>Singh, Utpal, Özaydın, Sinan, Chatzaras, Vasileios, , Rey, Patrice F. (2024) “SAnTex: Seismic Anisotropy from Texture: A Python-based library for Seismic Anisotropy Calculation”, <i>Journal of Open Source Software</i>, Under Review.</p>
REVIEWED MANUSCRIPTS IN	<p>Nature, Nature Communications Earth & Environment; Geophysical Journal International; Journal of Open Source Software; Gondwana Research; Journal of Geophysical Research: Solid Earth; Geochemistry, Geophysics, Geosystems; Minerals.</p>
RESEARCH PROJECTS	<p>ARC-DP Identifying mineral systems by geochemical, geophysical and geological mapping of deep Australia 2024 - Research Associate</p> <hr/> <p>ARC-Linkage Project Evolution of Proterozoic multistage rift basins – key controls on mineral systems 2023 - 2024 Research Associate</p> <hr/> <p>Compositional constraints on the evolution of Tanzanian Craton and surrounding rift margins using magnetotelluric modelling. 2022 - 2023 Researcher</p> <hr/> <p>Unveiling the relationship between kimberlites and electrical conductivity signatures of the mantle. 2021 - 2022 Researcher</p> <hr/> <p>Improving the quantitative interpretations of magnetotelluric models of the cratonic mantle. 2018 - 2022 Researcher / PhD Candidate</p> <hr/> <p>Summit Station Magnetotellurics (SUMMAT) 2018 Researcher</p> <hr/> <p>Continental Dynamics / Central Anatolian Tectonics (CD-CAT) 2014-2018 Intern / Researcher</p> <hr/> <p>Imaging the Shallow Crustal Structure of Ganos Fault by Magnetotellurics 2015-2017 Researcher</p>

Özaydın, Sinan, Patrice F. Rey, Vasileios Chatzaras (2024). “Thermomechanical modelling as a tool for decoding geophysical anomalies: A case study of a strike-slip pull-apart basin.”, *SGTSG2024*, Armidale, Australia.

Özaydın, Sinan, Patrice F. Rey (2024). “Entering the anomaly factory: Conversion of thermomechanical geodynamic models into magnetotelluric models. An example from a pull-apart basin under a strike-slip stress regime.”, *EMIW2024*, Beppu, Japan.

Özaydın, Sinan, Lu Li, Utpal Singh, Patrice F. Rey, M.C. Manassero (2024) “pide: a python-based petrophysical interpretation tool of electrical conductivities of materials from crust to mantle transition zone.”, *EMIW2024*, Beppu, Japan.

Özaydın, Sinan (2023). “Understanding the compositional nature and architecture of the lithosphere using magnetotellurics. University of Sydney, Earthbyte Seminar Series.

Özaydın, Sinan, Rey, Patrice F., Selway, Kate, Giordani, Julian (2023). “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). “Unveiling the compositional nature and architecture of the lithospheric mantle at Northern Tanzanian Divergence 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 Presentation, *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, Karas, 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	<p>University of Sydney CAPEX Funding Scheme for scientific instrument - 200.000AUD (2023)</p> <p>NCI Adapter Scheme Q3 - 250 KSU Computing Time at Gadi Supercomputer (2023)</p> <p>Macquarie University Covid Recovery Postdoctoral Fellowship - Salary + 5000AUD (2021-2022)</p>
AWARDS & ACHIEVEMENTS	<p>Australian Research Council PhD research scholarship 2018-2021</p> <p>TUBITAK research scholarship 2016-2017</p>
SCIENTIFIC SOFTWARE	<p>pide - Creator - https://github.com/sinanozaydin/pide A python library to make petrophysical calculations of earth materials from crust to mantle transition zone.</p> <p>MATE - Creator - https://github.com/sinanozaydin/MATE A software to make quantified interpretations of the magnetotelluric models of the mantle. Published in G-cubed.</p> <p>SAnTex - Contributor - https://github.com/utpal-singh/SAnTex A python library to calculate elastic properties of rocks.</p> <p>Thermobar - Contributor - https://github.com/PennyWieser/Thermobar A python library to handle thermobarometric calculations of earth materials.</p>
FIELDWORK EXPERIENCE	<p>Broken Hill 2024 Installation of BBMT stations around Broken Hill.</p> <p>Greenland Summit Station Fieldwork 2018 Installation of broad-band and long-period MT stations in Greenland ice sheet.</p> <p>CD-CAT Fieldwork in Central Anatolia 2014-2018 Installation of nearly 150 broad-band and long-period MT stations in Central Anatolia.</p>
HIGHER DEGREE RESEARCH SUPERVISION	<p>Utpal Singh - PhD co-advisor (2023 -), University of Sydney.</p> <p>Yahya Al-Qahtani - PhD co-advisor (2023 -), University of Sydney.</p> <p>Puqing Li - PhD co-advisor (2023 -), University of Sydney.</p>