Eliel S.C. Anttila, Ph.D.

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Research Experience

ETH Postdoctoral Fellow Zürich, CH	July 2024 –	
Geological Institute, Department of Earth and Planetary Sciences, ETH Zürich		
Project: Constraining relationships between sedimentation rate and organic carbon preservation me marine environments Project Advisor: Jordon D. Hemingway	chanisms in marginal	
Education		
University of California, Santa Barbara Santa Barbara, CA	Aug. 2018 – June 2024	
Ph.D., Geology		
Thesis: Quantifying the distribution of time in sedimentary basins: integrative approaches and applie Advisor: Francis Macdonald	cations	
Harvard University Cambridge, MA	Aug. 2017 – Aug. 2018	
Graduate Student Researcher, Department of Earth and Planetary Sciences		
Advisor: Francis Macdonald		
University of California, Berkeley Berkeley, CA B.A. in Geology with Highest Honors, Department of Earth and Planetary Science	Aug. 2012 – May 2016	

Thesis: Newly differentiated Neoproterozoic strata in Tigray, Ethiopia Advisor: Nicholas Swanson-Hysell

Publications

In preparation:

- 10. Anttila, E.S.C., Swanson-Hysell, N., Macdonald, F.A. Order from CAOS: Paleomagnetic constraints on the Tuva-Mongolian Terrane and implications for crustal growth in the Central Asian Orogenic System. Geological Society of America Bulletin, in prep.
- 9. Anttila, E.S.C., Cottle, J.M., Nelson, D., and Eden, R. P. A tale of two mechanisms: U-Pb ages, zircon hafnium isotope compositions, and spatiotemporal context of the Coast Range Volcanics, California. Geology, in prep.
- 8. Durbin, O.L., **Anttila, E.S.C.**, Bold, U., Briggs, D.E.G., Macdonald, F.A., and Anderson, R.P.A. *Mongolian microfossils constrain the timing of the origin of animals.* Geology, in prep.

Accepted, in press:

7. Anttila, E.S.C., Macdonald, F.A., Schoene, B., Gaynor, S., 2025. *Cambrian foreland phosphogenesis in the Khuvsgul Basin of Mongolia*. American Journal of Science.

Accepted and published:

- 6. Anttila, E.S.C., Macdonald, F.A., Zinto, J., and Britt, M.D., 2024. *The Real McCoy: Great Unconformity source-to*sink on the rifted passive margin of Laurentia. Earth and Planetary Science Letters, v.642, 118852.
- 5. Anttila, E.S.C., Macdonald, F.A., Szymanowski, D., Schoene, B., Kylander-Clark, A., Danhof, C. and Jones, D.S., 2023. Timing and tempo of organic carbon burial in the Monterey Formation of the Santa Barbara Basin and relationships with Miocene climate. Earth and Planetary Science Letters, v.620, 118343.
- 4. Anttila, E.S.C., Macdonald, F. and Bold, U., 2021. *Stratigraphy of the Khuvsgul Group, Mongolia*. Mongolian Geoscientist, 26(52), pp.2-15.



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- 3. Park, Y., Maffre, P., Goddéris, Y., Macdonald, F.A., **Anttila, E.S.C.** and Swanson-Hysell, N.L., 2020. *Emergence of the Southeast Asian islands as a driver for Neogene cooling.* Proceedings of the National Academy of Sciences, 117(41), pp. 25319-25326.
- 2. Park, Y., Swanson-Hysell, N.L., MacLennan, S.A., Maloof, A.C., Gebreslassie, M., Tremblay, M.M., Schoene, B., Alene, M., **Anttila, E.S.C.**, Tesema, T. and Haileab, B., 2020. *The lead-up to the Sturtian Snowball Earth: Neoproterozoic chemostratigraphy time-calibrated by the Tambien Group of Ethiopia*. GSA Bulletin, 132(5-6), pp. 1119-1149.
- 1. MacLennan, S., Park, Y., Swanson-Hysell, N., Maloof, A., Schoene, B., Gebreslassie, M., **Anttila, E.S.C.**, Tesema, T., Alene, M. and Haileab, B., 2018. *The arc of the Snowball: U-Pb dates constrain the Islay anomaly and the initiation of the Sturtian glaciation.* Geology, 46(6), pp. 539-542.

Presentations

- 20. **‡*Anttila, E.S.C.**, 2025. "Constraining drivers of organic carbon burial in marginal marine strata: a case study from the Miocene Monterey Formation, California." Smith Lecture, University of Michigan.
- 19. ***Anttila, E.S.C.**, Cottle, J.M., Nelson, D., and Eden, R. P., 2024. "A tale of two mechanisms: U-Pb ages, zircon hafnium isotope compositions, and spatiotemporal context of the Coast Range Volcanics, California." GSA Connects. Paper 73-2.
- Anttila, E.S.C., Macdonald, F.A., Zinto, J., and Britt, M.D., 2024. "Evidence for a single Cryogenian rift-drift transition from the Trout Creek Sequence and McCoy Creek Group of Nevada and Utah." GSA Connects. Paper 47-2.
- 17. **‡*Anttila, E.S.C.**, Macdonald, F., Szymanowski, D., Schoene, B., Kylander-Clark., A., Danhof, C., and Jones, D., 2024. "Condensation for concentration: relationships between sedimentation rate and phosphogenesis in reworked sediments of the Monterey Formation of central California." Goldschmidt Conference.
- Anttila, E.S.C., Macdonald, F., Szymanowski, D., Schoene, B., Kylander-Clark., A., Danhof, C., and Jones, D., 2023. "Sedimentation rate, organic carbon burial, and geochemical proxy records in the Monterey Formation, CA". AGU Fall Meeting, Abstract PP11G-1225.
- 15. ***Anttila, E.S.C.,** Macdonald, F.A., Zinto, J., and Britt, M.D., 2023. "The Real McCoy: New constraints on the tectonic evolution of the late Neoproterozoic western Laurentian Margin from the McCoy Creek Group of northern Nevada." GSA Connects. Paper 267-11.
- Anttila, E.S.C., Macdonald, F., Szymanowski, D., Schoene, B., Kylander-Clark., A., Danhof, C., and Jones, D., 2023. "A new chronostratigraphic framework for the Miocene Monterey Formation of the Santa Barbara Basin". Geochronology Gordon Research Conference.
- *Anttila, E.S.C., Macdonald, F., Szymanowski, D., Schoene, B., Kylander-Clark., A., Danhof, C., and Jones, D., 2022. "A geochronologically-constrained test of the Monterey hypothesis for Miocene climate change". AAPG Pacific Section CGS Monterey Conference.
- 12. ***Anttila, E.S.C.**, Macdonald, F., Szymanowski, D., Schoene, B., Kylander-Clark., A., and Jones, D., 2022. "Production vs. preservation: a geochronologically-constrained test of the Monterey hypothesis for Miocene climate change". GSA Connects. Paper 227-6.
- 11. **Anttila, E.S.C.**, Macdonald, F., 2022. "Testing the Monterey Hypothesis: a new age and stratigraphic model for the Miocene Monterey Formation along the Santa Barbara Coast". Southern California Geobiology Conference.
- *Anttila, E.S.C., Macdonald, F., and Bold, U., 2021. "Phosphorites of the Khuvsgul Basin, Mongolia: Insights into the late Neoproterozoic to early Paleozoic phosphorus cycle". UC Santa Barbara Earth Science Department Colloquium.
- *Anttila, E.S.C., and Macdonald, F., 2021. "Testing the Monterey Hypothesis: a new age and stratigraphic model for the Miocene Monterey Formation along the central coast of California". GSA Connects Paper 38-I.

- 8. ****Anttila, E.S.C.**, and Macdonald, F., 2020. "Cryogenian to Cambrian evolution of the phosphorite-bearing Khovsgol Basin, Mongolia". GSA Connects. Paper 174-17.
- 7. **Anttila, E.S.C.**, 2019. "Evolution of the Khovsgol Paleobasin: new geological mapping, chemostratigraphy, and geochronology from the Khovsgol Group, Mongolia." GSA Connects. Paper 123-26.
- 6. **Anttila, E.S.C.** and Macdonald F., 2019. "Geological context of phosphorite <u>lagerstätten</u> in the Khovsgol Group, Mongolia." Southern California Geobiology Conference.
- *Anttila, E.S.C., LoBianco, S.J., Brenner, A.R. and Macdonald, F.A., 2018. Neogene to present changes in CO₂ sources and sinks due to the growth and tectonic evolution of Indonesia. AGU Fall Meeting. Abstract V51A-03.
- 4. ***Anttila, E.S.C.**, 2018. "Temporally and spatially constraining a Doushantuo-style microfossil-bearing phosphorite, Khubsugul Group, Mongolia." GSA Connects. Abstract 150-6.
- 3. **Anttila, E.S.C.** and Macdonald F., 2018. "Geological context of Cryogenian glacial deposits and Ediacaran phosphorite lagerstatten in the Khubsugul Group, northern Mongolia." Northeast Geobiology Conference.
- 2. ***Anttila, E.S.C.,** 2016. "New records of global change leading into the first Neoproterozoic snowball Earth event in Tigray, Ethiopia." UC Berkeley Earth and Planetary Science Undergraduate Honors Colloquium.
- 1. **Anttila, E.S.C.**, Wray, M., Knappe, E., Ogasawara, T., Tholt, A., Cliffe, B., Oshun, J., 2014: "Species type controls root strength and influences slope stability in coastal Ecuador." AGU Fall Meeting. Abstract EP31C-3582.

‡ invited presentation *oral presentation **oral presentation, virtual only

Grants, Fellowships, and Awards

ETH Postdoctoral Fellowship 217,400 CHF	2024
NSF EAR Postdoctoral Fellowship \$180,000 (declined)	2024
Earth Research Institute Graduate Research Fellowship \$5,203.00	2020
NSF Graduate Research Fellowship Program \$132,000.00	2017
UC Berkeley Summer Undergraduate Research Fellowship \$4,100.00	2015
Evolving Earth Foundation Grant \$2,700.00	2015
Charles H. Ramsden Scholarship \$1,050.00	2014
Charles H. Ramsden Scholarship \$2,350.00	2013
Other Awards and Honors:	
UCSB Department of Earth Science Graduate Student Opportunity Award	2022
SEPM/SDG Best Student Poster Winner, GSA Connects.	2019
Departmental Citation, Department of Earth and Planetary Science, UC Berkeley	2016
Dean's Honors, UC Berkeley College of Letters and Science	Fall 2016, Spring 2016

Teaching Experience

Teaching Assistant, UC Santa Barbara EARTH 104B Spring Field Course Assisted with instruction during field mapping and other field exercises, Kelso Mountains, CA.	Spring 2024
Teaching Assistant, UC Santa Barbara EARTH 118 Summer Field Course Summer 202 Assisted with instruction during field mapping and other field exercises near Ely, NV and Santa Cruz Island integrated new digital mapping technology into curriculum	I, 2022, 2023 J, CA;

 Teaching Assistant, UC Santa Barbara EARTH 104 Field Studies in Geological Methods
 Spring 2021

Taught field skills, including digital mapping, section measurement, and sample collection, during field classes held in the Santa Ynez Mountains.

Teaching Assistant, UC Berkeley EPS 118 Advanced Field Course Summer 2016 Assisted with instruction during field mapping, geophysical surveys, and other field exercises near Bishop, CA

Teaching Assistant, UC Berkeley EPS 101 Field Geology and Digital Mapping Fall 2014, 2015 Taught field skills and map production/interpretation during twice-weekly field classes in the Berkeley Hills; assisted with implementation of new digital mapping technology into curriculum

Mentoring experience

Trained and mentored students during their undergraduate thesis work with the Macdonald lab: Caroline Newell – Geochemical cyclostratigraphy of the Tonian Chuar Group, Grand Canyon 2023 2022 Joneel Zinto – Detrital zircon geochronology of the McCoy Creek Group, Nevada Brian Mo – Carbon and oxygen isotope chemostratigraphy of the Monterey Formation, California 2021 Camille Preece – Detrital zircon geochronology of northern Mongolia 2021

Professional Engagement and Activities

Session co-convener, GSA Connects

Organization and facilitation of Session T159: Making Sense of Subsidence: New Voices and Recent Advances in Basin Analysis

Externship mentor, Research Experience for Teachers, UC Santa Barbara

Trained and mentored a high school teacher during her participation in field and lab work associated with an ongoing research project on the Monterey Formation

Course design and co-instruction, School for Scientific Thought, UC Santa Barbara Fall 2022

Designed, planned, and co-taught coursework ('Geological Climate Change') targeted at high school science students; coursework integrated field, laboratory, and classroom components to illustrate how geologists use a variety of observations and approaches to document, interpret, and model climate change in Earth's past, present, and future.

Mobile Science Educator, University of Montana

Fall 2016 – Spring 2017 Designed and presented Earth science curriculum to schools (grades K-12) around the state of Montana; focus on bringing scientific exhibits and hands-on learning opportunities to groups historically underrepresented in STEM.

Professional organization affiliations: American Geophysical Union, Geological Society of America, Chemical Society

Field Experience

Monterey Formation, CA, USA 12 weeks

Mapping, section measurement, and collection of geochronological, geochemical, and paleomagnetic samples to a) develop a new chronostratigraphic framework for the evolution of the phosphogenic Miocene Santa Barbara Basin and b) better constrain the timing, rate, and first-order drivers of organic carbon burial in the Monterey Formation.

McCoy Creek Group, NV, USA 8 weeks

Mapping, section measurement, and geochronological sample collection to differentiate Tonian-Ediacaran strata in the Egan and Schell Creek Ranges and explore the tectonic evolution of the late Neoproterozoic Laurentide margin.

Chuar Group, AZ, USA 2 weeks

Section measurement and collection of samples for geochemistry and geochronology to assess the magnitude and periodicity of geochemical cyclicity in shales of the Carbon Canyon Member of the Chuar Group, and test hypotheses for pre-Sturtian Neoproterozoic polar glaciations.

2021-2023

2022

2019 - 2024

2023 - 2024

2024

Huqf Supergroup, Oman 2 weeks

Preliminary scouting, section measurement, and geochronological sample collection to assess prior interpretations of glacial/non-glacial facies associations within Cryogenian 'Snowball Earth' strata; field trip to Semail Ophiolite.

Khuvsgul Group, Mongolia 22 weeks

Mapping, section measurement, and sample collection for geochronology, geochemistry, and paleomagnetic analyses to constrain the age, spatial extent, tectonic setting, and basinal evolutionary history of the Cryogenian-Cambrian Khuvsgul Group.

Otavi and Port Nolloth Groups, Namibia 4 weeks

Mapping, section measurement, and collection of geochronological and geochemical samples to investigate the chronostratigraphy and tectonic history of Neoproterozoic basins on the northern margin of the Kalahari Craton.

Tambien Group, Ethiopia 7 weeks

Mapping, section measurement, and geochronological, geochemical, and paleomagnetic sample collection to constrain the age, paleogeographic and paleoenvironmental setting, and chemostratigraphy of Tonian-Cryogenian strata from the westernmost Arabian-Nubian Shield.

Bahia de Caráquez, Ecuador 3 weeks

Landslide mapping and profile measurement, soil cohesion analyses, and root-strength tests to inform reforestation strategies during efforts to maximize hillslope stability at the urban-forest interface in Bahia de Caráquez.

2017 - 2019

2019

2017

2015 train

2014