

SOPHIE COULSON

+1 857-919-2624
sophie.coulson@unh.edu
sophiecoulson.github.io

James Hall 330,
Department of Earth Sciences,
University of New Hampshire,
Durham, NH

EDUCATION

- 2016 – 2021 **Harvard University, USA**
PhD in Earth and Planetary Sciences

“Geodynamic Insights on Critical Climate Events in Earth History”
Thesis Advisor: Prof. Jerry X Mitrovica
- 2012 – 2016 **University of Liverpool, UK**
MESci Geophysics (North America) (with First Class Honors)
Integrated Masters and Bachelors with a year in North America

“Modelling Guided Waves in the Alaskan-Aleutian Subduction Zone”
Thesis Advisor: Prof. Andreas Rietbrock
- 2014 – 2015 **McGill University, Canada**
Visiting Student, Department of Earth and Planetary Sciences

POSITIONS

- 2023 - **Assistant Professor of Geophysics**, Department of Earth Sciences, College of Engineering and Physical Sciences, University of New Hampshire, USA
- 2021 – 2023 **Director’s Postdoctoral Fellow**, Los Alamos National Laboratory, USA
Proposal Title: “Climate Change-induced Seismicity? Quantifying the Impact of Ice and Ocean Loading on Crustal Stress and Seismicity in the Russian Arctic”
- 2021 **Part-time Graduate Research Assistant**, Los Alamos National Laboratory, USA
Contributed to early stages of developing a framework to incorporate a sea-level model within a global climate model
Advisor: Dr. Matthew Hoffman

AWARDS AND FELLOWSHIPS

- 2024 *Geophysical Research Letters – Most Read Paper* for Coulson et al., 2021, “The Global Fingerprint of Modern Ice-Mass Loss on 3-D Crustal Motion”.
- 2021 - 2023 *Director’s Postdoctoral Fellowship*, Los Alamos National Laboratory
- 2020 *Earth and Planetary Science Teaching Award* for “A Brief History of the Earth”, Harvard University
- 2017, 2018 *Harvard Bok Center’s Certificate for Distinction in Teaching*
- 2016 - 2018 *Frank Knox Memorial Fellowship*
- 2016 *James Mills Peirce Fellowship*, Harvard University
- 2016 *University of Liverpool Undergraduate Geophysics Prize*
- 2016 *British Geophysical Association Undergraduate Prize* for outstanding theses
- 2012 *Scarborough Sixth Form College’s Glauert Award* for highest achieving female in mathematics

PUBLICATIONS

Submitted:

Yoo, M., Gopalan, G., Hoffman, M., **Coulson, S.**, Han, H.K., Wilke., C.K., Hillebrand, T., Uncertainty-enabled machine learning for emulation of regional sea-level change from mass loss of the Antarctic Ice Sheet. *Journal of Geophysical Research: Machine Learning and Computation*.

In review:

Coonin, A., Lau, H.C.P., **Coulson, S.**, Fingerprinting Meltwater Pulse 1A reveals pole-to-pole cascade of ice loss. *Nature Geoscience*.

In print:

- 2023 Richards, F.D., **Coulson, S.**, Hoggard, M.J., Austermann, J., Dyer, B., Mitrovica, J.X., Geodynamically corrected Pliocene shoreline elevations in Australia consistent with midrange projections of Antarctic ice loss. *Science Advances* 9 (46), p.eadg3035. <https://www.science.org/doi/full/10.1126/sciadv.adg3035>
- 2023 Borreggine, M., Latychev, K., **Coulson, S.**, Powell, E., Mitrovica, J.X., Milne, G.A., Alley, R.B., Sea-Level rise in Southwest Greenland as a contributor to Viking abandonment. *Proceedings of the National Academy of Sciences* 120 (17), e2209615120. <https://doi.org/10.1073/pnas.2209615120>
- 2022 **Coulson, S.**, Dangendorf, S., Mitrovica, J.X., Tamisiea, M.E., Pan, L., Sandwell, D.T., A Detection of the Sea Level Fingerprint of Greenland Ice Sheet Melt. *Science* 377 (6614), 1550-1554. <https://www.science.org/doi/full/10.1126/science.abo0926>
- 2022 Onac, B.P., Mitrovica, J.X., Ginés, J., Asmerom, Y., Polyak, V.J., Tuccimei, P., Fornós, J.J., Hoggard, M.J., Ashe, E.L., **Coulson, S.**, Ginés, A., Soligo, M., Villa, I.M., Exceptionally stable pre-industrial sea-level inferred from the western Mediterranean Sea, *Science Advances* 8 (26), p.eabm6185. <https://www.science.org/doi/10.1126/sciadv.abm6185>
- 2021 ***Coulson, S.**, Lubeck, M., Mitrovica, J.X., Powell, E., Davis, J.L., Hoggard, M., The Global Fingerprint of Modern Ice-Mass Loss on 3-D Crustal Motion, *Geophysical Research Letters* 48 (16), p.e2021GL095477. <https://doi.org/10.1029/2021GL095477>
- 2021 **Coulson, S.**, Al-Attar, D., Mitrovica, J.X., An Extended Ice-Age Sea-Level Equation: Incorporating Water Flux Across Sills, *Geophysical Journal International*, 225 (1), 236-252. <https://doi.org/10.1093/gji/ggaa596>
- 2020 Mitrovica, J.X., Austermann, J., **Coulson S.**, Creveling, J.R., Hoggard, M.J., Jarvis, G.T., and Richards, F.D., Dynamic Topography and Ice Age Paleoclimate, *Annual Review of Earth and Planetary Sciences* 48, 585-621. <https://doi.org/10.1146/annurev-earth-082517-010225>
- 2019 **Coulson, S.**, Pico, T., Austermann, J., Powell, E., Moucha, R., Mitrovica, J.X., The role of isostatic adjustment and gravitational effects on the dynamics of the Messinian salinity crisis, *Earth and Planetary Science Letters* 525, 115769. <https://doi.org/10.1016/j.epsl.2019.115760>
- 2018 Rowe, C.D., Ross, C., Swanson, M.T., Pollock, S., Backeberg, N.R., Barshi, N.A., Bate, C.E., Carruthers, C., **Coulson, S.**, Dascher-Cousineau, K., Harrichhausen, N., Peña Castro, A. F., Nisbet, H., Rakoczy, P., Scibek, J., Smith, H., Tarling, M. S., Timofeev, A., Young, E., Geometric complexity of earthquake rupture surface preserved in pseudotachylyte networks, *Journal of Geophysical Research: Solid Earth* 123 (9), 799-8015. <https://doi.org/10.1029/2018JB016192>

2018 **Coulson, S.**, Garth, T., Rietbrock, A., Velocity structure of the subducted Yakutat terrane, Alaska: Insights from guided waves, *Geophysical Research Letters* 45 (8), 3420-3428.
<https://doi.org/10.1002/2017GL076583>

*Highlighted in *Nature Research Highlights*, August 2021 <https://www.nature.com/articles/d41586-021-02285-0>

CONFERENCE ORAL PRESENTATIONS

*Indicates invited talk

-
- Apr 2024 ***Coulson S.**, Global to Local Sea-Level Rise Panel Discussion Speaker, From Ice Sheets to Coast: Sea Level Rise Impacts Workshop, University of Houston.
- Apr 2023 **Coulson S.**, Hoffman, M., Dascher-Cousineau, K., Delbridge, B., Bürgmann, R., Carmichael, J., Quantifying the Impact of Modern Ice Mass Loss on Crustal Strain and Seismicity across Greenland and the European Arctic, European Geosciences Union General Assembly 2023, Vienna.
- Apr 2023 ***Coulson S.**, Dangendorf, S., Mitrovica, J.X., Tamisiea, M.E., Pan, L., Sandwell, D.T., A Detection of the Sea Level Fingerprint of Greenland Ice Sheet Melt, European Geosciences Union General Assembly 2023, Vienna.
- Sep 2021 **Coulson, S.**, Lubeck, M., Mitrovica, J.X., Powell, E., Davis, J.L., Hoggard, M., The Global Fingerprint of Modern Ice-Mass Loss on 3-D Crustal Motion, PALSEA-SERCE Joint Meeting 2021, Online.
- Dec 2021 **Coulson, S.**, Lubeck, M., Mitrovica, J.X., Powell, E., Davis, J.L., Hoggard, M., The Global Fingerprint of Modern Ice-Mass Loss on 3-D Crustal Motion, American Geophysical Union Fall Meeting 2021, New Orleans.
- Feb 2020 ***Coulson, S.**, Pico, T., Austermann, J., Powell, E., Moucha, R., Mitrovica, J.X., The role of isostatic adjustment and gravitational effects on the dynamics of the Messinian salinity crisis, MEDSALT Final Symposium, Piran, Slovenia.
- Jan 2020 ***Coulson, S.**, Austermann, J., Hoggard, M., Richards, F., Borreggine, M.J., Mitrovica, J.X., The role of dynamic topography on glacial inception in North America, ASPECT Virtual User Meeting 2020.
- Dec 2019 **Coulson, S.**, Austermann, J., Hoggard, M., Richards, F., Borreggine, M.J., Mitrovica, J.X., The role of dynamic topography on glacial inception in North America, American Geophysical Union Fall Meeting 2019, San Francisco.
- Dec 2018 **Coulson, S.**, Pico, T., Austermann, J., Moucha, R., Mitrovica, J.X., The effect of geophysical feedbacks on sea level during the Messinian salinity crisis, American Geophysical Union Fall Meeting 2018, Washington DC.
- Dec 2017 **Coulson, S.**, Garth, T., Rietbrock, A., Velocity structure of the subducted Yakutat terrane, Alaska: Insights from guided waves, American Geophysical Union Fall Meeting 2017, New Orleans.
- Nov 2017 **Coulson, S.**, Pico, T., Austermann, J., Mitrovica, J.X., Revisiting the dynamics of the Messinian salinity crisis, PALSEA2 Workshop 2017, Playa del Carmen, Mexico.

INVITED SEMINARS

-
- Apr 2024 Department of Geosciences Colloquium, Stony Brook University.
- Mar 2024 UTIG Special Seminar, University of Texas, Austin.
- Mar 2024 Integrated and Applied Mathematics Fall Seminar Series, University of New Hampshire.
- Feb 2024 Ice+Climate Seminar, Dartmouth Engineering, Dartmouth College.
- Nov 2022 Berkeley Seismo Lab Seminar, University of California, Berkeley.
- Nov 2022 Institute for Geophysics and Planetary Physics Seminar, University of California, Santa Cruz.
- Sep 2022 Department of Geophysical Sciences Seminar, University of Chicago.
- May 2022 Department of Earth Sciences Special Seminar, University of New Hampshire.
- Apr 2022 School of Earth and Environmental Sciences Special Seminar, Cardiff University.
- Mar 2022 Department of Earth and Environmental Science Colloquium, New Mexico Tech.
- Sep 2021 Department of Earth and Planetary Sciences Seminar, University of New Mexico.
- Mar 2021 Los Alamos National Laboratory Climate, Ocean and Sea Ice Modeling Seminar.

WORKSHOP ATTENDANCE

- 2021 Python for Scientists and Engineers, Enthought Course, Virtual
2019 ASPECT Hackathon, Computational Infrastructure for Geophysics, Heber City, Utah
2018 ASPECT Hackathon, Computational Infrastructure for Geophysics, Petaluma, California
(ASPECT: Advanced Solver for Problems in Earth's ConvecTion)

TEACHING

- 2024 Co-instructor for *ESCI 895 – Southwest US Field Course*
- University of New Hampshire
2024 Instructor for *ESCI 402 – Earth History*
- University of New Hampshire
2023 Instructor for *ESCI 734/834 – Global Geophysics*
- University of New Hampshire
2020 Invited Guest Seminar Speaker for *GY400 - West Antarctic Ice Sheet History and Dynamics*
- Colorado College
2020 Teaching Fellow for *EPS 52 – Introduction to Global Geophysics*
- with Prof. Jerry X Mitrovica, Harvard University
2018, 2020 *Teaching Fellow and Head TF for *EPS 10 – A Brief History of the Earth*
- with Prof. Jerry X Mitrovica, Harvard University
2019 Graduate Student Field Trip Leader (8 days in Mt Baker, Olympic Peninsula and Mt Rainier, Washington), Department of Earth and Planetary Sciences, Harvard University
2017 Teaching Fellow for *EPS 10 – A Brief History of the Earth*
- with Prof. Jerry X Mitrovica, Harvard University

*Including independently leading both in person class field trips to Western Massachusetts and virtual field trip

MENTORSHIP

- 2023 - Primary Advisor for Grace Ertel, M.S. Oceanography Student, University of New Hampshire.
2023 PhD Thesis Adjudication Committee Member for Maaïke Weerdesteijn, University of Oslo.
“Solid Earth Deformation due to Glacial Mass Changes Above Low-Viscosity Upper Mantle”.
2022 - PhD Committee Member for Prajakta Mohite, New Mexico Institute of Mining and Technology.
2020 Short-term Summer Student Adviser for Talon Flodman '25, Harvard University.
“Interaction between Mountains and Glaciers”

SCIENTIFIC SERVICE

- 2023 - EarthScope Consortium Member Representative for University of New Hampshire
2023 Proposal Reviewer for *Marsden Fund, Royal Society Te Apārangi*
2021 – 2023 Reviewer for *Science Advances* and *Earth and Planetary Science Letters*
2022 Session Co-convener AGU 2022 – Observations and Models of Interactions Between Ice Sheets, Solid Earth and Sea Level: Toward Constraining Modern and Future Sea-Level Changes
2021 Session Co-convener AGU 2021 – Early Earth: Dynamics, Geology, Chemistry and Life in the Archean Earth
2020 Contributing Author for PALSEA Express Workshop Report (published in *PAGES Magazine*, <https://doi.org/10.22498/pages.28.2.67>)
2020 Primary Session Convener AGU 2020 - Links between mantle dynamics and evolution of the Earth's surface, atmosphere and biosphere
2017-2018 Graduate Student and Postdoc Seminar series organiser, Department of Earth and Planetary Sciences, Harvard University

LEADERSHIP, OUTREACH AND DIVERSITY INITIATIVES

- 2023 Exhibitor at Ocean Discovery Day, University of New Hampshire
- 2023 - Inclusion, Diversity, Equity, Access and Safety (IDEAS) Committee Member, Department of Earth Sciences, University of New Hampshire
- 2023 - Co-lead of the Department of Earth Sciences need-based field gear fund (Brewitt Gear Fund), University of New Hampshire
- 2023 Workshop Leader at GEAR UP New Mexico Girls STEM Pathways Conference for girls in 7th-8th grades, *"Explore How Glaciers Move and Melt"*, Crown Plaza, Albuquerque
- 2022 Workshop Assistant at STEM Santa Fe, Summer STEM Circles, *"Sky is Not the Limit – Aviation and Aerospace"*, Santa Fe Regional Airport
- 2021 Panelist for Royal Astronomical Society Early Career Network Event "Getting the Most Out of Your PhD", Virtual
- 2021 Workshop Leader at STEM Pathways for Girls Conference for girls in 5th-8th grades, *"Explore How Glaciers Move and Melt"*, Santa Fe Community College
- 2020 Panelist for Harvard Graduate School Application Workshop (designed for URM students), Virtual
- 2019 – 2021 Diversity, Inclusion and Belonging Committee Member, Department of Earth and Planetary Sciences, Harvard University
- 2018, 2019 Mentor through 'G2 Buddy Program' for students taking qualifying exam, Department of Earth and Planetary Sciences, Harvard University
- 2015-2016 Study Abroad Ambassador, University of Liverpool

LANGUAGES AND SKILLS

English (native), Matlab, UNIX/Bash/CSH, C/C++, Fortran, Python, LATEX