SOPHIE COULSON

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[sophiecoulson.github.io](https://sophiecoulson.github.io/)

Fluid Dynamics and Solid Mechanics (T-3)

and Geophysics (EES-17) Groups,

Los Alamos National Laboratory,

Los Alamos, NM

**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**

2021 – pres. **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**

2021 *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**

*In review:*

**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.*

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.*

*In print:*

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,* 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>

*In preparation:*

**Coulson, S**., Richards, F.D., Hoggard, M., Austermann, J., Mitrovica, J.X., Dynamic topography across the Canadian Arctic and implications for Plio-Pleistocene climate.

Richards, F.D., **Coulson, S**., Austermann, J., Hoggard, M.J., & Mitrovica, J.X., The Impact of Mantle Dynamics on Australian Mid-Pliocene Sea-Level Records*.*

Borreggine, M.,Latychev, K., **Coulson, S**., Powell, E., Mitrovica, J.X., Alley, R.B., The potential role of Late-Holocene regional ice history and sea-level change in Viking out-migration from Southwest Greenland.

**CONFERENCE ORAL PRESENTATIONS AND INVITED SEMINARS**

\*Indicates invited talk

2022 \*Department of Earth and Environmental Science Colloquium, New Mexico Tech *(scheduled March).*

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.

2021 \*Department of Earth and Planetary Sciences Seminar, University of New Mexico. Dynamics of ancient Mediterranean sea-level change: an extended ice-age sea-level model for water flux across sills.

2021 ***\****Los Alamos National Laboratory Climate, Ocean and Sea Ice Modeling Seminar. The Global Fingerprint of Modern Ice-Mass Loss on 3-D Crustal Motion.

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.

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.

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.

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.

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.

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.

**ADDITIONAL WORKSHOP ATTENDANCE**

2021 Python for Scientists and Engineers, Enthought Course, Virtual

2020 New England Future Faculty Workshop, Northeastern University, 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**

2020 Invited Guest Seminar Speaker for *GY400 - West Antarctic Ice Sheet History and Dynamics*

- Colorado College

2020 Short-term Summer Student Adviser

Talon Flodman ’25: *“Interaction between Mountains and Glaciers”*, Harvard University

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

**SCIENTIFIC SERVICE**

2021 Session Co-convener AGU 2021 – Early Earth: Dynamics, Geology, Chemistry and Life in the Archean Earth

2021 Reviewer for *Science Advances*

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.

**LEADERSHIP, MENTORING AND OUTREACH**

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.

2017-2018 Graduate Student and Postdoc Seminar series organiser, 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