

# SOPHIE COULSON

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Fluid Dynamics and Solid Mechanics (T-3)  
and Geophysics (EES-17) Groups,  
Los Alamos National Laboratory,  
Los Alamos, NM

## EDUCATION

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- 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

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- 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

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- 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

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### *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

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- 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

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- 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

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- 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**

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- 2021 Session Co-convenor 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 Convenor AGU 2020 - Links between mantle dynamics and evolution of the Earth's surface, atmosphere and biosphere.

## **LEADERSHIP, MENTORING AND OUTREACH**

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- 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 5<sup>th</sup>-8<sup>th</sup> 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**

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