

CURRICULUM VITAE

Natalie M. Freeman

Department of Atmospheric and Oceanic Sciences

University of Colorado at Boulder

Email: natalie.freeman@colorado.edu

Web: n2freeman.wixsite.com/oceanography

Education

Ph.D. Atmospheric and Oceanic Sciences, University of Colorado at Boulder, 2017.

M.S. Atmospheric and Oceanic Sciences, University of Colorado at Boulder, 2014.

B.S. Mathematics, Applied Concentration: Statistics, *with Distinction*, University of Kansas, 2012.

Professional Experience

Postdoctoral Researcher, University of Colorado Boulder, 2020–present.

Postdoctoral Research Scholar, Scripps Institution of Oceanography, U. California San Diego, 2017–2020.

Graduate Student Researcher, Institute of Arctic and Alpine Research, U. Colorado Boulder, 2012–2017.

Undergraduate Research Intern, SMART Program, U. Colorado Boulder, 2011.

Fellowships and Awards

Scripps Institutional Postdoctoral Scholar Program Fellowship, Scripps Institution of Oceanography, 2017–2019.

NASA MPOWIR (Mentoring Physical Oceanography Women to Increase Retention) Speaker Series, 2016.

Peter B. Wagner Memorial Award for Women in Atmospheric Sciences, Desert Research Institute, 2016.

Carol B. Lynch Graduate Fellowship, University of Colorado at Boulder, 2016.

Best Oral Presentation, 6th International SOLAS Summer School, 2013.

Graduate Research Fellowship, National Science Foundation, 2012–2015.

Diversity Fellowship, University of Colorado at Boulder, 2012.

Funded Proposals

Lead Principal Investigator

Freeman, N. M., 2017–2019. *Scripps Institutional Postdoctoral Scholar Program*, ~\$125,000 total award.

Freeman, N. M., 2012–2015. *National Science Foundation Graduate Research Fellowship Program*, ~\$94,000 total award.

Publications

In Preparation

12. **Freeman, N. M.**, D. Giglio, S. T. Gille, and M. C. Hell, in prep: Stormy weather: On the upper ocean's response to high-frequency wind variability. *Journal of Geophysical Research: Oceans*.
11. **Freeman, N. M.**, A. Verdy, and M. R. Mazloff, in prep: Implementing SiBLING: the effects of silicate as a prognostic tracer on carbon flux in the Biogeochemical Southern Ocean State Estimate. *Geophysical Research Letters*.
10. Munro, D. R., N. S. Lovenduski, **N. M. Freeman**, C. Sweeney, T. Newberger, B. B. Stephens, T. Takahashi, in prep: Geochemical evidence for calcification from the Drake Passage Time-series. *Geophysical Research Letters*.
9. **Freeman, N. M.**, D. R. Munro, J. Sprintall, M. R. Mazloff, and S. Purkey, in prep: On the recent increase in surface silicate-to-nitrate availability in the southern Drake Passage. *Geophysical Research Letters*.

In Print

8. Rosso, I., L. D. Talley, M. R. Mazloff, S. G. Purkey, **N. M. Freeman**, and G. Maze (2020), Water mass and biogeochemical variability in the Kerguelen sector of the Southern Ocean: A machine learning approach for a mixing hotspot. *Journal of Geophysical Research: Oceans*, 125. doi:10.1029/2019JC015877.
7. **Freeman, N. M.**, D. R. Munro, J. Sprintall, M. R. Mazloff, S. Purkey, I. Rosso, C. A. DeRanek, and C. Sweeney (2019), The observed seasonal cycle of macronutrients in Drake Passage: Relationship to fronts and utility as a model metric. *Journal of Geophysical Research: Oceans*, 124, 4763–4783. doi:10.1029/2019JC015052.

6. **Freeman, N. M.**, N. S. Lovenduski, D. R. Munro, K. M. Krumhardt, K. Lindsay, M. C. Long, and M. MacIennan (2018), The variable and changing Southern Ocean Silicate Front: Insights from the CESM Large Ensemble. *Global Biogeochemical Cycles*, 32, 752–768. doi:10.1029/2017GB005816.
5. **Freeman, N. M.**, N. S. Lovenduski, and P. R. Gent (2016), Temporal variability in the Antarctic Polar Front (2002–2014). *Journal of Geophysical Research: Oceans*, 121, 7263–7276. doi:10.1002/2016JC012145.
4. **Freeman, N. M.** and N. S. Lovenduski (2016), Mapping the Antarctic Polar Front: weekly realizations from 2002 to 2014. *Earth System Science Data*, 8, 191–198. doi:10.5194/essd-8-191-2016.
3. Krumhardt, K. M., N. S. Lovenduski, **N. M. Freeman**, and N. R. Bates (2016), Apparent increase in coccolithophore abundance in the subtropical North Atlantic from 1990 to 2014. *Biogeosciences*, 13, 1163–1177. doi:10.5194/bg-13-1163-2016.
 * *Ocean Carbon & Biogeochemistry News: A chalkier ocean?*
2. **Freeman, N. M.** and N. S. Lovenduski (2015), Decreased calcification in the Southern Ocean over the satellite record. *Geophysical Research Letters*, 42, 1834–1840. doi:10.1002/2014GL062769.
 * *Nature Climate Change Research Highlights: Calcification changes*
 * *The New York Times: Phytoplankton on Decline in Southern Ocean*
 * *CU Press Release: Shell-shocked: Ocean acidification likely hampers tiny shell builders in Southern Ocean*
1. Munro, D. R., N. S. Lovenduski, B. B. Stephens, T. Newberger, K. R. Arrigo, T. Takahashi, P. D. Quay, J. Sprintall, **N. M. Freeman**, and C. Sweeney (2015), Estimates of net community production in the Southern Ocean determined from time series observations (2002–2011) of nutrients, dissolved inorganic carbon, and surface ocean $p\text{CO}_2$ in Drake Passage, *Deep-Sea Research II*, 114, 49–63. doi:10.1016/j.dsr2.2014.12.014.

Datasets

Freeman, N. M. and N. S. Lovenduski (2016), Mapping the Antarctic Polar Front: Weekly realizations from 2002 to 2014. *Supplement to: Earth Syst. Sci. Data*, 8, 191–198. doi:10.5194/PANGAEA.855640.

Non peer-reviewed publications

MacFerrin **et al.** (2019), Next generation of polar researchers agree on three priorities. *Nature*, 570, 36. doi: 10.1038/d41586-019-01718-1.

Freeman, N. M. (2017), Physical and biogeochemical features of the Southern Ocean: Their variability and change over the recent past and coming century. *Atmospheric & Oceanic Sciences Graduate Theses & Dissertations*, 70. https://scholar.colorado.edu/atoc_gradetds/70.

Invited Talks

Climate, Atmospheric Sciences, and Physical Oceanography (**CASPO**) Seminar (*virtual*), Scripps, Spring 2021.
 Ocean Carbon & Biogeochemistry (**OCB**) Summer Webinar Series (*virtual*), Woods Hole Oceanographic Institution, July 2020.
 NSF Next Generation of Polar Researchers (**NGPR3**) Leadership Symposium, Catalina Island, CA, May 2019.
 Dissertations Symposium in Chemical Oceanography (**DISCO**) XXVI, Kona, HI, October 2018.
 Southern Ocean Carbon & Climate Observations & Modeling (**SOCOM**) Project Annual Meeting, Princeton, NJ, June 2018.
 Climate, Atmospheric Sciences, and Physical Oceanography (**CASPO**) Seminar, Scripps, La Jolla, CA, March 2018.
 NASA **MPOWIR Speaker Series**, Jet Propulsion Laboratory, Pasadena, CA, July 2016.
Peter B. Wagner Memorial Award Research Seminar, Desert Research Institute, Reno, NV, June 2016.

Academic Service & Outreach

External

Convener, Ocean Sciences, Planktonic recorders: using tiny organisms to understand past, present, and future oceans, 2020.
 Chair, Dissertations Symposium in Chemical Oceanography (**DISCO**) XXVI, Carbon Export, 2018.
 Member, Association of Polar Early Career Scientists (**APECS**), Leadership Council, 2017–2018.
 Convener, APECS International Online Conference, **Session 3**, 2018.
 Member, APECS International Mentorship Award Review Panel, 2018.
 Reviewer: *Geophysical Research Letters*, *Nature Climate Change*, *Nature Geoscience*, *Ocean Science*, Marsden Fund, National Science Foundation.

Internal

Organizer, SIO **SOCOM**/Southern Ocean Seminar Series, SIO, 2018–2019.
 Co-advisor, Scripps Undergraduate Research Fellowship (**SURF**) Program, SIO, 2018.

Faculty Judge, [UC LEADS](#) Research and Leadership [Symposium](#), UC Santa Barbara, 2018.

Volunteer, Scripps Community Outreach Program for Education ([SCOPE](#)), SIO, 2017.

Grader, ATOC 4200/5200: Biogeochemical Oceanography, U. Colorado Boulder, Spring 2014, Spring 2015, Spring 2017.

Community

Mentor, [Science Research Seminar](#), Boulder Valley School District, 2015, 2020.

Scientist, Letters to a Pre-Scientist ([LPS](#)) Pen Pal Program, 2019.

Science Communicator, [Adopt-A-Float](#) Program, SOCCOM, 2019.

Mentor, Summer Multicultural Access to Research Training ([SMART](#)) Program, U. Colorado Boulder, 2013, 2014, 2015, 2016, 2017.

Mentor, Significant Opportunities in Atmospheric Research and Science ([SOARS](#)) Program, NCAR, Boulder, 2014, 2017.

Workshop Lead, *Phytoplankton Fun*, [Expanding Your Horizons](#) Conference, [American Association for University Women](#), Boulder, 2017.

Speaker, [Conference for Undergraduate Women in Physics](#), [American Physical Society](#), U. Colorado Boulder, 2017.

Volunteer, [National Ocean Sciences Bowl](#) Regional Competition: [Trout Bowl](#), [CIRES Education & Outreach](#), U. Colorado Boulder, 2017.

Mentor, [Graduate Peer Mentoring Program](#), U. Colorado Boulder, 2016.

Volunteer, [Expanding Your Horizons](#) Conference, [American Association for University Women](#), Boulder, 2013.

Teaching Experience

Courses Taught

Guest Lecturer, *Observations of Large-Scale Ocean Circulation* ([SIOC 220](#)), U. California San Diego, Spring 2018.

Graduate-level lesson covering the use of satellite remote sensing data in oceanographic research.

Instructor, *The living ocean: from microscope to satellite*, Pre-Collegiate Development Program ([PCDP](#)) – STEM Track, U. Colorado Boulder, Summer 2017.

An introductory short course on biogeochemical oceanography in order to expose underrepresented minority, first-generation, low-income high school students to various STEM disciplines.

Certification

Pathways to Scientific Teaching [Course](#) Certificate, U. California San Diego Vice Chancellor of Research Affairs, Winter 2018: *Advancing learning and knowledge of how research informs teaching and teaching informs research to be an effective educator*. Conducted by [Diane Ebert-May](#), Distinguished Professor, Michigan State University.

Undergraduate students advised, U. California San Diego

Carissa DeRanek, Scripps Undergraduate Research Fellowship ([SURF](#)) Program, Scripps Institution of Oceanography, La Jolla, California, Summer 2018.

High School students advised, U. Colorado Boulder

Paige DiFronzo, Lia Farrell, and Kasia Hires [Science Research Seminar](#), Boulder Valley School District, Louisville, Colorado, 2020–2021.

Student Recognition: “Effects of storm entrainment on Southern Ocean phytoplankton” awarded:

- * Boulder Valley [Regional Science Fair](#) Winner, *Environmental Sciences*, 2nd place
- * State Qualifier, Colorado Science and Engineering Fair ([CSEF](#))
- * US Stockholm Junior Water Prize, [ISEF](#) Special Award
- * American Meteorological Society Award, [ISEF](#) Special Award

Madison Shogrin and Mariah Wagner, [Science Research Seminar](#), Boulder Valley School District, Louisville, Colorado, 2015–2016.

Student Recognition: “Evidence of undersaturation with respect to aragonite off the coast of California” awarded:

- * Boulder Valley [Regional Science Fair](#) Winner, *Environmental Sciences*, 3rd place
- * Association for Women Geoscientists Student Award for Geosciences Excellence, [ISEF](#) Special Award

Field Work & Professional Development

[SciPy 2020](#): 19th Annual Scientific Computing with Python (Virtual) Conference, July 2020.

[ECCO Summer School](#) on Global Ocean State & Parameter Estimation: From Methods to Applications in Oceanographic Research, Friday Harbor, Washington, USA, 2019, *competitively selected*.

ORCHESTRA ANDREX II, RRS James Clark Ross, 17 February–17 April 2019, Punta Arenas–Falkland Islands, SOCCOM representative. Chief Scientist: Andrew Meijers.

Dissertations Symposium in Chemical Oceanography (DISCO) XXVI, Kona, HI, October 2018, *competitively selected*.

Personal Survival Techniques Training Course (*5-year certification*), Training Resources Limited, July 2018.

GO-SHIP/CO₂ Repeat Hydrography Program Section I08S, R/V Roger Revelle, 8 February–16 March 2016, Fremantle–Fremantle, CTD watch-stander. Chief Scientist: Alison M. Macdonald.

IOCCG Summer Lecture Series on Frontiers in Ocean Optics and Ocean Colour Science, Villefranche-sur-Mer, France, 2014, *competitively selected*.

SOLAS 6th International Summer School on Surface Ocean - Lower Atmosphere Study, Xiamen, China, 2013, *competitively selected*.

Professional Affiliations

American Geophysical Union (AGU)

Mentoring Physical Oceanography Women to Increase Retention (MPOWIR)

National Postdoctoral Association (NPA)

Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)