Ethan Chen Campbell

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Employment

Jan. 2025 – present
NSF Office of Polar Programs Postdoctoral Research Fellow
Polar Science Center, Applied Physics Laboratory, University of Washington, Seattle, WA
Exploring how storms and snowfall impact heat and freshwater fluxes in the ice-covered Southern Ocean and the future trajectory of Antarctic sea ice, advised by Melinda Webster (APL) and Edward Blanchard-Wrigglesworth (Department of Atmospheric and Climate Science).

Aug. 2016 – Dec. 2024
Graduate Research Fellow / RA / TA / Predoctoral Instructor
School of Oceanography, University of Washington, Seattle, WA
Studied Antarctic sea ice growth and melt, snow on sea ice, and open-ocean polynyas using autonomous profiling float observations and modeling. Co-developed and taught an undergraduate course on oceanographic data analysis and scientific programming.

Education

2025
2019
Ph.D. in Physical Oceanography
M.S. in Physical Oceanography
School of Oceanography, University of Washington, Seattle, WA
Dissertation: "Constraining Antarctic polynya formation and sea ice and snow evolution using autonomous observations and modeling" (advised by Stephen C. Riser).

2016
A.B. in Geosciences, *magna cum laude*
Princeton University, Princeton, NJ
Senior thesis: "Where three oceans meet: Nitrate isotope measurements from the South Atlantic along 34.5°S" (advised by Daniel M. Sigman).

Publications (in preparation)

Campbell, E.C., Riser, S.C. Antarctic sea ice formation and melt rates estimated from ocean salinity observations. In prep for *Journal of Geophysical Research–Oceans*.

Campbell, E.C., Riser, S.C. Lagrangian reconstruction of snow accumulation and loss on Antarctic sea ice. In prep for *The Cryosphere*.

Ryu, Y., Marconi, D., Fripiat, F., Smart, S.M., **Campbell, E.C.**, Fawcett, S.E., Martínez-García, A., Haug, G.H., Sigman, D.M. Nitrogen fixation rates in the Atlantic Ocean estimated with total nitrogen isotopes. In prep for *Global Biogeochemical Cycles*.

Publications

* Indicates publication was not peer-reviewed

* **Campbell, E.C.** (2025). Constraining Antarctic polynya formation and sea ice and snow evolution using autonomous observations and modeling [Dissertation]. School of Oceanography, University of Washington. 31768131, 1–232. [ProQuest]

* Wilson, E.A., Dove, L.A., Gray, A.R., MacGilchrist, G., Purkey, S., Thompson, A.F., Youngs, M., Diggs, S., Balwada, D., **Campbell, E.C.**, Talley, L.D. (2024). Future priorities for observing the dynamics of the Southern Ocean. *Bulletin of the American Meteorological Society*, **105**(12), E2316–E2323. doi:10.1175/BAMS-D-24-0254.1.

Granger, R., Smart, S.M., Foreman, A., Auderset, A., **Campbell, E.C.**, Marshall, T.A., Haug, G.H., Sigman, D.M., Martínez-García, A., Fawcett, S.E. (2024). Tracking Agulhas leakage in the South Atlantic using modern planktic foraminifera nitrogen isotopes. *Geochemistry, Geophysics, Geosystems*, **25**(9), e2023GC011190. doi:10.1029/2023GC011190.

Campbell, E.C.‡, Christensen, K.M.‡, Nuwer, M., Ahuja, A., Boram, O., Liu, J., Miller, R., Osuna, I., Riser, S.C. (2024). Cracking the code: An evidence-based approach to teaching Python in an undergraduate earth science setting. *Journal of Geoscience Education*, **73**(3), 239–258. doi:10.1080/10899995.2024.2384338.

‡ Co-first authors, reflecting equal contributions to this work

Marshall, T.A., Sigman, D.M., Beal, L.M., Foreman, A., Martínez-García, A., Blain, S., **Campbell, E.C.**, Fripiat, F., Granger, R., Harris, E., Haug, G.H., Marconi, D., Oleynik, S., Rafter, P.A., Roman, R., Sinyanya, K., Smart, S.M., Fawcett, S.E. (2023). The Agulhas Current transports signals of local and remote Indian Ocean nitrogen cycling. *Journal of Geophysical Research–Oceans*, **128**(3), e2022JC019413. doi:10.1029/2022JC019413.

* Arndt, S., Janout, M.A., Biddle, L.C., **Campbell, E.C.**, Thomalla, S.J. (2022). The Weddell Sea and Dronning Maud Land (WS-DML) Regional Working Group Virtual Science Workshop, 14-16 June 2022. SOOS Report Series, #15. doi:10.5281/zenodo.6931423.

von Berg, L., Prend, C.J., **Campbell, E.C.**, Mazloff, M.R., Talley, L.D., Gille, S.T. (2020). Weddell Sea phytoplankton blooms modulated by sea ice variability and polynya formation. *Geophysical Research Letters*, **47**(11), e2020GL087954. doi:10.1029/2020GL087954.

→ *Press release: Princeton University*

Campbell, E.C., Wilson, E.A., Moore, G.W.K., Riser, S.C., Brayton, C.E., Mazloff, M.R., Talley, L.D. (2019). Antarctic offshore polynyas linked to Southern Hemisphere climate anomalies. *Nature*, **570**(7761), 319–325. doi:10.1038/s41586-019-1294-0. [ePDF]

→ *Press releases: University of Washington, Scripps Institution of Oceanography*

Wilson, E.A., Riser, S.C., **Campbell, E.C.**, Wong, A.P.S. (2019). Winter upper-ocean stability and ice-ocean feedbacks in the sea ice-covered Southern Ocean. *Journal of Physical Oceanography*, **49**(4), 1099–1117. doi:10.1175/JPO-D-18-0184.1.

Swart, S., **Campbell, E.C.**, Heuzé, C.H., Johnson, K., Lieser, J.L., Massom, R., Mazloff, M.R., Meredith, M., Reid, P.A., Sallée, J.-B., Stammerjohn, S. (2018). Return of the Maud Rise polynya: Climate litmus or sea ice anomaly? [in "State of the climate in 2017"]. *Bulletin of the American Meteorological Society*, **99**(8), S188–S189. doi:10.1175/2018BAMSStateoftheClimate.1.

Marconi, D., Sigman, D.M., Casciotti K.L., **Campbell, E.C.**, Weigand, M.A., Fawcett, S.E., Knapp, A.N., Rafter, P.A., Ward, B.B., Haug, G.H. (2017). Tropical dominance of N_2 fixation in the North Atlantic Ocean. *Global Biogeochemical Cycles*, **31**(10), 1608–1623. doi:10.1002/2016GB005613.

* **Campbell, E.C.** (2016). Where three oceans meet: Nitrate isotope measurements from the South Atlantic along 34.5°S [Undergraduate senior thesis]. Department of Geosciences, Princeton University. 1–59. arks.princeton.edu/ark:/88435/dsp01j3860941p. [PDF]

Awards and fellowships

Jan. 2025 – Dec. 2026 — National Science Foundation Office of Polar Programs Postdoctoral Research Fellowship (NSF OPP-PRF)

$231,050 over 2 years as PI for "Constraining the impacts of snowfall and storm events on the coupled Antarctic sea ice and ocean state" (NSF award #2420300).

Oct. 2025 – Sep. 2028 — Washington Research Foundation (WRF) Postdoctoral Fellowship

$337,500 over 3 years, with salary support waived during period of overlap with NSF OPP-PRF.

2023 Southern Ocean Observing System (SOOS) Symposium ECR Honorable Mention
Awarded 2nd place among early career researcher (ECR) talks for presentation on "Antarctic sea ice formation and melt rates estimated from under-ice Argo observations."

2021 American Geophysical Union (AGU) Outstanding Student Presentation Award
For presentation with Katy Christensen at AGU Fall Meeting: "Cracking the code: A flipped, virtual approach to teaching Python in an undergraduate setting."

2017–2021 National Defense Science and Engineering Graduate (NDSEG) Fellowship
Sponsored by Office of Naval Research. 4 years of tuition support plus $153,600 in stipend payments. Approximately 200 fellowships awarded out of over 3,500 applicants.

2017 National Science Foundation (NSF) Graduate Research Fellowship
Declined in favor of NDSEG. $138,000 for 3 years of graduate support.

2016–2019 Achievement Rewards for College Scientists (ARCS) Foundation Fellowship
$17,500 of additional graduate support over 3 years.

2016–2017 Program on Climate Change (PCC) Graduate Fellowship | *University of Washington*
Research assistantship and tuition support for 9 months. Sole awardee from departmental cohort.

2016 Chairman's Award | *Department of Geosciences, Princeton University*
Awarded to recognize 'special curricular and scientific achievement over an undergraduate career.'

2015-2016 Edmund Hayes Sr. '18 grant for senior thesis research | *Princeton Environmental Institute*

Presentations as first author

Campbell, E.C., Riser, S.C., Webster, M.A. Lagrangian reconstruction of snow evolution on Antarctic sea ice. Kavli Institute for Theoretical Physics (KITP) Conference on 'The Future of Earth's Polar Regions,' UC Santa Barbara, Santa Barbara, CA, June 2025. *Invited talk.*

Campbell, E.C., Riser, S.C., Webster, M.A. Constraining Antarctic sea ice and snow evolution using autonomous observations and modeling in a Lagrangian framework. Antarctic Margins seminar series, hosted by Institute for Marine and Antarctic Studies, University of Tasmania, May 2025. *Talk (virtual).*

Campbell, E.C., Riser, S.C., Webster, M.A. Lagrangian reconstructions of Antarctic sea ice and snow evolution. Gordon Research Conference on Polar Marine Science, Barga, Italy, March 2025. *Poster.*

Campbell, E.C., Riser, S.C. Antarctic sea ice formation and melt rates estimated from ocean salinity observations. Gordon Research Seminar on Polar Marine Science, Barga, Italy, March 2025. *Invited talk.*

Campbell, E.C., Riser, S.C. Constraining Antarctic sea ice and snow evolution using autonomous observations and modeling in a Lagrangian framework. Antarctic Sea Ice and Southern Ocean seminar series, hosted by University of Texas at San Antonio, March 2025. *Talk (virtual).*

Campbell, E.C. Constraining Antarctic sea ice and snow evolution using autonomous observations and modeling in a Lagrangian framework. University of Washington, Seattle, WA, December 2024. *Dissertation defense.*

Campbell, E.C., Riser, S.C. Constraining the evolution of Antarctic sea ice and snow using under-ice ocean observations and modeling in a Lagrangian framework. Physical Oceanography Dissertation Symposium (PODS) XIII, Lihue, HI, October 2024. *Talk.*

Campbell, E.C. Processes in the Antarctic seasonal sea ice zone: Recent advances, key questions, and observational needs. Workshop on 'Observing the Dynamics of the Southern Ocean: Present Challenges and Future Strategies,' Scripps Institution of Oceanography, La Jolla, CA, April 2024. *Invited keynote.*

Campbell, E.C., Riser, S.C. Lagrangian reconstructions of Antarctic sea ice growth and snow accumulation. Workshop on 'Observing the Dynamics of the Southern Ocean: Present Challenges and Future Strategies,' Scripps Institution of Oceanography, La Jolla, CA, April 2024. *Poster.*

Campbell, E.C. Sailing towards a FAIR (Findable, Accessible, Interoperable, and Reusable) Southern Ocean Observing System: Challenges and opportunities. Southern Ocean Observing System (SOOS) Symposium, Hobart, Australia, August 2023. *Invited plenary.* [PDF]

Campbell, E.C., Riser, S.C. Antarctic sea ice formation and melt rates estimated from under-ice Argo observations. Southern Ocean Observing System (SOOS) Symposium, Hobart, Australia, August 2023. *Talk; awarded Honorable Mention (2nd place) among early career researcher (ECR) talks.*

Campbell, E.C. Pushing Seattle towards net zero: Opportunities for local advocacy and engagement. University of Washington Program on Climate Change (PCC) Summer Institute, Friday Harbor, WA, September 2022. *Poster.* [PDF]

Campbell, E.C., Riser, S.C. Towards Lagrangian reconstructions of Antarctic sea ice growth and snow accumulation. Weddell Sea–Dronning Maud Land (WS-DML) Regional Working Group Science Workshop, June 2022. *Talk (virtual).*

Campbell, E.C., Christensen, K., Nuwer, M., Ahuja, A., Boram, O., Liu, J., Miller, R., Osuna, I. Cracking the code: A flipped, virtual approach to teaching Python in an undergraduate setting. AGU Fall Meeting, December 2021. *Poster (virtual); received Outstanding Student Presentation Award (OSPA) with Katy Christensen.* [PDF]

Campbell, E.C., Riser, S.C. Antarctic sea ice formation and melt rates estimated from under-ice float observations. Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) Annual Meeting, June 2021. *Talk (virtual).*

Campbell, E.C., Christensen, K., Nuwer, M. Cracking the code: A flipped, virtual approach to teaching Python. University of Washington Symposium on Teaching and Learning, April 2021. *Poster (virtual).*

Campbell, E.C., Riser, S.C. Antarctic sea ice formation and melt rates estimated from under-ice ocean observations. AGU/ASLO/TOS Ocean Sciences Meeting, San Diego, CA, February 2020. *Talk.*

Campbell, E.C. New perspectives on Southern Ocean offshore polynyas and deep convection. AOS Colloquium, NYU Courant Institute of Mathematical Sciences, New York, NY, September 2019. *Invited talk.*

Campbell, E.C., Wilson, E.A., Moore, G.W.K., Riser, S.C., Brayton, C.E., Mazloff, M.R., Talley, L.D. Reappearance of Weddell Sea offshore polynyas driven by Southern Hemisphere climate anomalies. IGS Sea Ice Symposium, Winnipeg, Canada, August 2019. *Talk.*

Campbell, E.C., Wilson, E.A., Moore, G.W.K., Riser, S.C., Brayton, C.E., Mazloff, M.R., Talley, L.D. Deep convection in the 2016 and 2017 Weddell Sea polynyas. 6th Argo Science Workshop, Tokyo, Japan, October 2018. *Talk.*

Campbell, E.C., Wilson, E.A., Moore, G.W.K., Riser, S.C., Brayton, C.E., Mazloff, M.R., Talley, L.D. Reappearance of Weddell Sea polynyas in 2016 and 2017. Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) Annual Meeting, Princeton University, Princeton, NJ, June 2018. *Talk.*

Campbell, E.C., Wilson, E.A., Moore, G.W.K., Brayton, C.E., Riser, S.C., Mazloff, M.R., Talley, L.D. Deep convection in the 2016 Weddell Sea polynya. AGU/ASLO/TOS Ocean Sciences Meeting, Portland, OR, February 2018. *Talk.*

Campbell, E.C., Wilson, E.A., Riser, S.C., Moore, G.W.K. Deep convection in the 2016 Weddell Sea polynya. Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) Annual Meeting, Princeton University, Princeton, NJ, May 2017. *Talk*.

Selected presentations as coauthor

Adams, J., **Campbell, E.C.**, Flaim, C., Rupan, R., Seroy, S. MATE Floats: Immersive experience for underrepresented students in marine science and technology. Underwater Intervention, New Orleans, LA, November-December 2023.

Horowitz, H.M., Gergel, D.R., **Campbell, E.C.**, McCullough, L., Beckerman, L.G., Ismael, A., Cuomo, D., Scherrer, R. Polar Planetarium Show: a new program connecting local scientists, science center educators, and the public to the poles. AGU Fall Meeting, Washington, DC, December 2018.

Field work

2023 — R/V Rachel Carson, Puget Sound, Washington State

Instructional cruise for NCAT/MATE marine technology workshop. Assisted with water sample collection, measurement of dissolved oxygen, and analysis of data. PIs: Josie Adams, Sasha Seroy (University of Washington).

2015 — R/V S.A. Agulhas II (SOSCEx III, SAMOC-SA, GEOTRACES), Southern Ocean

Research cruise to Antarctic winter ice edge. Organized collection of over 500 samples for nitrate isotope analysis. Assisted with trace-metal-clean sampling for dFe and pFe analysis. PI: Sarah E. Fawcett (University of Cape Town).

Teaching

June 2025 – August 2025 — Co-instructor for summer Python scientific programming course
Applied Physics Laboratory SURP (Summer Undergraduate Research Program), University of Washington (with Emilio Mayorga)

May 2022 & 2023, April 2024 & 2025 — Guest lectures on Antarctic coastal and open-ocean polynyas, OCEAN 403/497/506 (The Southern Ocean: Climate and Ecosystems)
School of Oceanography, University of Washington

August 2023 — Instructor, NCAT/MATE/GO-BGC marine technology summer camp
School of Oceanography, University of Washington
→ *I developed and taught lessons on introductory Python programming and data analysis techniques at this week-long workshop for underrepresented community college students.*

September 2022 – June 2023 — Teaching assistant, 'Python and data literacy' department-wide position
School of Oceanography, University of Washington
→ *I launched this pilot project, which aimed to bolster students' data literacy and programming fluency by offering dedicated office hours and assistance with course design.*

April 2023 — Guest instructor on ocean fundamentals, OCEAN 210 (Integrative Oceans)
School of Oceanography, University of Washington

September 2022 — Guest instructor on tides and data analysis, Marine Geoscience Education, Oceanographic Discovery, Undergraduate Collaboration (GEODUC) Scholars Initiative
Friday Harbor Laboratories, University of Washington

September 2020 – December 2020 — Co-instructor, OCEAN 215 (Methods of oceanographic data analysis)
School of Oceanography, University of Washington (with Katy Christensen)
→ *See our course website, where lessons and other materials are available for reuse.*
→ *Read our retrospective study of the efficacy of our evidence-based course redesign.*

July 2019	Guest lecture on Antarctic sea ice, ATM S 211 (Climate and climate change) *Department of Atmospheric Sciences, University of Washington*
September 2017 – December 2017	Teaching assistant, OCEAN 215 (Methods of oceanographic data analysis) *School of Oceanography, University of Washington* *→ Read highlights from students' evaluations of my teaching performance.*

Mentorship

June 2025 – August 2025	Mentor for Rachel Ha (University of Washington undergraduate research intern) *Applied Physics Laboratory SURP (Summer Undergraduate Research Program), University of Washington*
October 2021 – December 2021	Mentor for GAMP (Graduate Applicant Mentorship Program) *School of Oceanography, University of Washington*
March 2021 – June 2021	Co-mentor for Abrahan Hernandez and Derek Mourad (undergraduate students, GEOG 469) *Department of Geography, University of Washington & Real Change Homeless Empowerment Project*
March 2018 – November 2019	Mentor for Connor Izumi (undergraduate research assistant, Quay Lab) *School of Oceanography, University of Washington*
June 2017 – August 2017	Co-mentor for Casey Brayton (University of South Carolina undergraduate research intern) *SURF (Summer Undergraduate Research Fellows) REU (Research Experiences for Undergraduates), Scripps Institution of Oceanography*

Leadership and service

Reviewer for:	*Journal of Climate, Journal of Geophysical Research–Oceans, Geophysical Research Letters, The Cryosphere, Ocean Science*
January 2021 – February 2024	Association of Polar Early Career Scientists (APECS) representative, Weddell Sea–Dronning Maud Land Regional Working Group *Southern Ocean Observing System (SOOS)*
November 2023	Invited speaker, University of Washington Foundation Board "Discover UW: Ocean Innovation" program *College of the Environment, University of Washington*
April 2021 – September 2022	Chair, Culture Survey Report Committee *School of Oceanography, University of Washington*
June 2022	Co-chair, Weddell Sea–Dronning Maud Land (WS-DML) Regional Working Group Virtual Science Workshop *Southern Ocean Observing System (SOOS)*
June 2021	Float data tutorial leader, Global Ocean Biogeochemistry (GO-BGC) Array Virtual Science Workshop *Ocean Carbon and Biogeochemistry (OCB) and US Climate Variability and Predictability (CLIVAR) Programs* *→ Our workshop tutorial can be viewed on YouTube (downloadable Jupyter notebook here).*
March 2021	Invited panelist, Teaching Assistant Workshop *College of the Environment, University of Washington*

June – December 2020	Contributed to departmental efforts towards structural change *School of Oceanography, University of Washington* → *(1) Diversity, Equity, and Inclusion (DEI) Call to Action letter* → *(2) Proposal for updates to the department graduate curriculum* → *(3) Recommendations to mitigate the potential for abuse and harm* → *(4) Coordinated a department-wide screening of the documentary 'Picture a Scientist'*
May 2020	Invited panelist, STEM Graduate Fellowships Student Panel *Graduate School, University of Washington*
September 2017 – September 2019	Committee member, Graduate Student Steering Committee *Program on Climate Change (PCC), University of Washington* → *Read an EOS article on how our graduate student leadership has shaped the PCC.*
May 2018, April 2019	Lead organizer (2019) and organizer (2018), PCC Spring Symposium *University of Washington* → *Read a PCC blog post that I wrote about the 2019 Spring Symposium.*
November 2018	Organizer, 12th Annual UW/MIT Graduate Climate Conference (Co-chair, Abstract Committee; Chair, A/V Committee) *Pack Forest Conference Center, Eatonville, WA* → *Read a PCC blog post that I co-wrote summarizing the conference.*
September 2018	Invited panelist, New Student Orientation *College of the Environment, University of Washington*
November 2016 – July 2017	Group member, Graduate Recruitment, Retention and Diversity Group (GRRAD) *College of the Environment, University of Washington*
February 2017	Application reviewer, 2017 Doris Duke Conservation Scholars Program *University of Washington*

Public engagement and science outreach

Research featured in:	*Scientific American* (2019), *Earther* (2019), *Climate Scientists* [podcast] (2019), *Popular Science* (2019), *The Naked Scientists* [radio show] (2019), *Atlas Obscura* (2019), *CNET* (2019), *Mashable* (2019), *CNN* (2019), *InsideScience* (2019), *LiveScience* (2019), *OceanBites* (2020)
Quoted by:	*Mashable* (2019), *Hakai Magazine* (2021)
Writing in:	*The Stranger* [op-ed] (2024)
April 2025	Volunteer, Polar Science Day *Pacific Science Center*
February 2018 – February 2020	Science Communication Fellow and live planetarium presenter *Willard Smith Planetarium, Pacific Science Center* → *As part of an NSF-funded project, I developed and presented a segment of a live planetarium projection show, "Earth: Pole to Pole," over a dozen times, introducing families to the role of the Southern Ocean in global climate and the importance of polar oceanographic research.*
January 2019	Invited speaker, 3rd Shift Dance/Pacific Science Center *Cornish Playhouse Arts Incubator* → *Read about the dance performance that was inspired by our discussion on climate change.*
November 2017	Volunteer, Discover Science Weekend *Seattle Aquarium*