

Samuel Brenner, PhD

Postdoctoral researcher at the California Institute of Technology

Education

University of Washington

PhD in Physical Oceanography

Masters of Science in Physical Oceanography

Seattle, WA, USA

Jun. 2022

Jun. 2019

University of British Columbia

Masters of Applied Science in Civil Engineering (Environmental Fluid Mechanics)

Bachelors of Applied Science in Civil Engineering (*with distinction*)

Vancouver, BC, Canada

Aug. 2017

Jun. 2015

Camosun College

Advanced Diploma in Civil Engineering Technology Bridge

Diploma in Civil Engineering Technology

Victoria, BC, Canada

Jun. 2013

Jun. 2010

Research Experience

California Institute of Technology • Environmental Science and Engineering

Postdoctoral Research Associate

Pasadena, CA, USA

Sep. 2024–Present

Brown University • Department of Earth, Environmental, and Planetary Sciences

Postdoctoral Research Associate

Providence, RI, USA

Jul. 2022–Sep. 2024

University of Washington • Applied Physics Laboratory

Graduate Research Assistant

Seattle, WA, USA

Sep. 2017–Jun. 2022

University of British Columbia • Environmental Fluid Mechanics

Graduate Research Assistant

Vancouver, BC, Canada

Sep. 2015–Aug. 2017

Undergraduate Research Assistant

Jun. 2013–Jun. 2014

Professional Experience

AECOM

Civil Engineering Student Intern

Burnaby, BC, Canada

May – Sep. 2015

Canadian Sewage Solutions Inc.

Engineering Technologist

Langford, BC, Canada

Dec. 2011 – Nov. 2012

Kiewit Construction

Purchasing Engineer (co-op student)

Field Engineer (co-op student)

Kearl Lake Oilsands, AB, Canada

Aug. 2010 – Jan. 2011

Aug. – Dec. 2009

District of North Saanich

Drafting Assistant (co-op student)

North Saanich, BC, Canada

Dec. 2008 – Mar. 2009

Technical Skills

Numerical modelling

Surface wave models: SWAN

Ocean process models: Oceananigans, the General Ocean Turbulence Model (GOTM)

Sea ice discrete element models: FloeDyn, SubZero

Climate models: the Community Earth System Model (CESM)

Data analysis and visualization

MATLAB, (advanced), Python (beginner), and Julia (intermediate)

Programming

C++ (beginner), Fortran (beginner)

Software & Tools

Microsoft Office suite, HPC environments, Git, LaTeX, Inkscape

Scientific contributions

Publications

Submitted and in prep.

- **Brenner, S.**, Thompson, A., Gupta, M., Manucharyan, G. [*In prep*]. Patterns of sea ice floes shape ocean turbulence in the marginal ice zone

Peer-reviewed

- Thomson, J., Yang, J., Taylor, R., Rainville, E., Zeiden, K., Rainville, L., **Brenner, S.**, Ballard, M., Cronin, M., 2024. Surface wave development and ambient sound in the ocean. *J. Geophys. Res. Oceans.*, 129, e2024JC021921. doi: [10.1029/2024JC021921](https://doi.org/10.1029/2024JC021921)
- **Brenner, S.**, Horvat, C. 2024. Scaling simulations of local wind-waves amid sea ice floes. *J. Geophys. Res. Oceans.*, 129, e2024JC021629. doi: [10.1029/2024JC021629](https://doi.org/10.1029/2024JC021629)
- Blanchard-Wrigglesworth, E.★, **Brenner, S.★**, Webster, M., Horvat C., Foss, Ø., Bitz, C. 2024. Model biases in simulating extreme sea ice loss associated with the record January 2022 Arctic cyclone. *J. Geophys. Res. Oceans.*, 129, e2024JC021127. doi: [10.1029/2024JC021127](https://doi.org/10.1029/2024JC021127) (★ indicates co-first authors)
- **Brenner, S.**, Horvat, C., Hall, P., Lo Piccolo, A., Fox-Kemper, B., Labb  , S., Dansereau, V. 2023c. Scale-dependent air-sea exchange in the polar oceans: floe-floe and floe-flow coupling in the generation of ice-ocean boundary layer turbulence. *Geophys. Res. Lett.*, 50, e2023GL105703. doi: [10.1029/2023GL105703](https://doi.org/10.1029/2023GL105703)
- **Brenner, S.**, Rainville, L., Thomson, J., Crews, L., and Lee, C., 2023b. Wind-driven motions of sea ice and the ocean surface mixed layer in the Western Arctic. *J. Phys. Oceanogr.*, 53(7), 1787-1804. doi: [10.1175/JPO-D-22-0112.1](https://doi.org/10.1175/JPO-D-22-0112.1)
- **Brenner, S.**, Thomson, J., Rainville, L., Torres, D., Doble, M., Wilkinson, J., and Lee, C., 2023a. Acoustic sensing of ocean mixed layer depth and temperature from uplooking ADCPs. *J. Atmos. Oceanic Technol.*, 40(1), 53-64. doi: [10.1175/JTECH-D-22-0055.1](https://doi.org/10.1175/JTECH-D-22-0055.1)
- Cooper, V., Roach, L., Thomson, J., **Brenner S.**, Smith, M., Meylan, M., Bitz, C., 2022. Wind waves in sea ice of the western Arctic and a global coupled wave-ice model. *Phil. Trans. Roy. Soc. A.*, 380(2235), p. 19. doi: [10.1098/rsta.2021.0258](https://doi.org/10.1098/rsta.2021.0258)
- MacKinnon, J., et. al, [including **Brenner, S.**], 2021. A warm jet in a cold ocean. *Nat. Comm.*, 12(1) p. 12 doi: [10.1038/s41467-021-22505-5](https://doi.org/10.1038/s41467-021-22505-5)
- **Brenner, S.**, Rainville, L., Thomson, J., Cole, S. and Lee, C., 2021. Comparing observations and parameterizations of ice-ocean drag through an annual cycle across the Beaufort Sea. *J. Geophys. Res. Oceans.*, 126(4), p. 29. doi: [10.1029/2020JC016977](https://doi.org/10.1029/2020JC016977)
- **Brenner, S.**, Rainville, L., Thomson, J., and Lee, C., 2020. The evolution of a shallow front in the Arctic marginal ice zone. *Elem. Sci. Anth.*, 8(1), p. 17. doi: [10.1525/elementa.413/](https://doi.org/10.1525/elementa.413/)
- **Brenner, S.**, and Laval., B. 2018. Seiche modes in multi-armed lakes. *Limnol. Oceanogr.*, 63: 2717-2726 doi: [10.1002/lno.11001](https://doi.org/10.1002/lno.11001)

Invited seminars

- Purdue University: Civil Engineering Hydraulics & Hydrology Seminar — Oct. 7, 2025
- Caltech: Breakfast Exchange in Environment & Sustainability — Feb. 4, 2025
- University of Washington: Applied Physics Lab seminar — May. 28, 2024
- "Nortek Days" instrumentation seminar — May. 10, 2024
- Interagency Arctic Research Policy Committee (IARPC) - Ocean Boundary Layer Modeling and Observing: Physical Oceanography Community Meeting — Mar. 7, 2024
- University of Oklahoma: Arctic and Antarctic Atmospheric Research Group seminar — Feb. 27, 2024
- University of Auckland: Physics colloquium — Apr. 12, 2023
- Oregon State University: Western Coastal Collaboratorium (WCC) Lecture — Mar. 10, 2022
- University of British Columbia: Physical Oceanography seminar — Jul. 6, 2020

Conference abstracts (first-author only)

- Brenner, S., Thompson, A., Manucharyan, G., Gupta, M., Gering, S. Surface heterogeneity mediates ocean kinetic energy pathways in the marginal sea ice zone. Submitted to: Ocean Sciences Meeting; 2026 Feb. 22–27; Glasgow, Scotland
- Brenner, S., Thompson, A., Manucharyan, G., Gupta, M., Gering, S. Floe-scale variability in upper-ocean energy pathways. Presented at: Consortium for the Advancement of Marine Arctic Science 2nd Annual Workshop; 2025 Apr. 15–18; Seattle, WA.
- Brenner, S., C. Horvat, P. Hall, A. Lo Piccolo, B. Fox-Kemper, S. Labb  , V. Dansereau. Floe-scale effects on ice-ocean boundary layer turbulence. Presented at: Ocean Sciences Meeting; 2024 Feb. 18–23; New Orleans, LA.
- Brenner, S., C. Horvat, P. Hall, A. Lo Piccolo, B. Fox-Kemper, S. Labb  , V. Dansereau. The dual roles of floe-floe interactions and floe-flow interactions on ice-ocean coupling and surface fluxes. **Invited presentation** at: AGU Fall Meeting 2023 Dec. 11–15; San Francisco, CA.
- Brenner, S. The role of sea ice in mediating atmosphere-ice-ocean momentum transfer. Presented at: Physical Oceanography Doctoral Symposium; 2022 Oct. 17–21; Kona, HI.
- Brenner, S., L. Rainville, J. Thomson, L. Crews, C. Lee. Seasonal variations of inertial velocities of sea ice and ocean surface layer in the Beaufort Sea. Presented at: Ocean Sciences Meeting; 2022 Feb. 27–Mar. 04; virtual.
- Brenner, S., L. Rainville, J. Thomson, C. Lee. In-situ observations to validate (and invalidate) model parameterizations of the ice-ocean drag coefficient. Presented at: 10th IICWG-DA Workshop 2021 Oct. 26–28; virtual.
- Brenner, S., L. Rainville, J. Thomson, C. Lee. Distributed and year-long observations of ice-ocean drag across a range of ice morphologies in the Beaufort Sea. Presented at: AGU Fall Meeting 2020 Dec. 01–17; virtual.
- Brenner, S., L. Rainville, J. Thomson, J. MacKinnon, C. Lee. Momentum fluxes across the air-ice-ocean interface in the Beaufort Sea. Poster presented at: Ocean Sciences Meeting; 2020 Feb. 17–21; San Diego, CA.
- Brenner, S., L. Rainville, J. Thomson, C. Lee. The evolution of an Arctic meltwater front. Poster presented at: Li  ge Colloquium on Ocean Dynamics; 2019 May. 6–9; Li  ge, Belgium
- Brenner, S., L. Rainville, J. Thomson, C. Lee. Small scale upper-ocean variability in the Arctic. Poster presented at: Ocean Sciences Meeting; 2018 Feb. 11–16; Portland, OR
- Brenner, S., B. Laval, J. Shore, S. Vagle. Surface Seiching in Quesnel Lake, British Columbia. Poster presented at: Canadian Meteorological and Oceanographic Society Congress; 2017 Jun. 4–8; Toronto, ON

Other courses and training

CESM Tutorial • Boulder, CO, USA	Aug. 2024
Atmosphere-Ocean-Ice Winter School • Longyearbyen, Svalbard, Norway	May. 2022
Estuarine & Coastal Fluid Dynamics Summer School • Friday Harbor, WA, USA	Jul.–Aug. 2019
Instructional Skills Workshop • UBC Centre for Teaching, Learning and Technology	Jul.–Aug. 2016

Fieldwork

Research cruises

Norwegian Sea: NORSE pilot/process cruise (R/V Neil Armstrong; 35 days at sea)	Sep.–Oct. 2021
Beaufort Sea: SODA recovery cruise (USCGC Healy; 42 days at sea)	Sep.–Oct. 2019
Beaufort Sea: SODA deployment cruise (USCGC Healy; 36 days at sea)	Sep.–Oct. 2018

Other oceanography/limnology fieldwork

San Juan Channel, WA (mooring deployment/recovery and CTD sections)	Aug. 2019
Cultus Lake, BC (CTD sections)	various dates, 2015–2017
Deeks Lake, BC (mooring deployment and CTD sections)	various dates, 2015–2017
Quesnel Lake, BC (mooring recovery/servicing and CTD sections)	Sep. 26–30, 2016
Resolute Bay, NU (water sample collection and CTDs)	Aug. 2014

Field camps

Milne ice shelf, NU (ice shelf GPR, CTDs, mooring service, glacier ablation stakes)	Jul.–Aug. 2014
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Teaching experience

Guest Lecturer

University of Washington

- Field Measurements (CEWA590): "Measuring sea ice"
- Hydrodynamics (CEWA570): "Wind-driven flow in a lake"

May, 2022 & May 2024
Feb., 2022

Teaching Assistant

University of Washington

- Coastal Engineering (CEE473/CEWA573)
- Foundations of Ocean Sensors (OCEAN351)

Spring 2021
Winter 2019

University of British Columbia

- Fluid Mechanics I (CIVL215)
- Environmental Hydraulics (CIVL416)
- Fluid Mechanics II (CIVL315)

Spring 2016
Fall 2016
Fall 2015 & Fall 2016

Service

Committee work

UW School of Oceanography "Graduate Applications Mentorship Program"

2020–2022

- Program aimed at demystifying the graduate application process for prospective students:

https://www.ocean.washington.edu/story/Graduate_Application_Mentorship_Program

- Assisted in program development, initial roll-out, and post-program assessment

- Mentor for a prospective graduate student

Outreach

Frontier School Division: Churchill "Climate Action" Summer School

June 2023

- Instructor and lesson organizer

Pacific Science Center: Climate Change Curiosity Expo

annually, 2018–2020

University of Washington Engineering Discovery Days

annually, 2018–2019

Science World: "Meet a Scientist" days

various dates, 2015–2017

Reviews

Journal articles:

- Ocean Modelling (1); Journal of Geophysical Research: Oceans (3); Ocean Science (1); Aquatic Sciences (1); The Cryosphere (2); Geophysical Research Letters (2); Nature Communications (1); Deep-Sea Research Part I (1); Journal of Advances in Modeling Earth Systems (1); Geoscientific Model Development (1); Journal of Physical Oceanography (1);

Proposals:

- US National Science Foundation (1)