

# Samuel Brenner, PhD

*Postdoctoral researcher at the California Institute of Technology*

## Education

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### 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

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### 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

Undergraduate Research Assistant

*Vancouver, BC, Canada*

Sep. 2015–Aug. 2017

Jun. 2013–Jun. 2014

## Professional Experience

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### 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

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### 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. Labbé, 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. Labbé, 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. Labbé, 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: Liège Colloquium on Ocean Dynamics; 2019 May. 6-9; Liège, 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

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### 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

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### 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](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)