Samuel Brenner, PhD

Postdoctoral researcher at the California Institute of Technology

Education

University of Washington — *Seattle, WA, USA*
PhD in Physical Oceanography — Jun. 2022
Masters of Science in Physical Oceanography — Jun. 2019

University of British Columbia — *Vancouver, BC, Canada*
Masters of Applied Science in Civil Engineering (Environmental Fluid Mechanics) — Aug. 2017
Bachelors of Applied Science in Civil Engineering *(with distinction)* — Jun. 2015

Camosun College — *Victoria, BC, Canada*
Advanced Diploma in Civil Engineering Technology Bridge — Jun. 2013
Diploma in Civil Engineering Technology — Jun. 2010

Research Experience

California Institute of Technology • Environmental Science and Engineering — *Pasadena, CA, USA*
Postdoctoral Research Associate — Sep. 2024–*Present*

Brown University • Department of Earth, Environmental, and Planetary Sciences — *Providence, RI, USA*
Postdoctoral Research Associate — Jul. 2022–Sep. 2024

University of Washington • Applied Physics Laboratory — *Seattle, WA, USA*
Graduate Research Assistant — Sep. 2017–Jun. 2022

University of British Columbia • Environmental Fluid Mechanics — *Vancouver, BC, Canada*
Graduate Research Assistant — Sep. 2015–Aug. 2017
Undergraduate Research Assistant — Jun. 2013–Jun. 2014

Professional Experience

AECOM — *Burnaby, BC, Canada*
Civil Engineering Student Intern — May – Sep. 2015

Canadian Sewage Solutions Inc. — *Langford, BC, Canada*
Engineering Technologist — Dec. 2011 – Nov. 2012

Kiewit Construction — *Kearl Lake Oilsands, AB, Canada*
Purchasing Engineer (co-op student) — Aug. 2010 – Jan. 2011
Field Engineer (co-op student) — Aug. – Dec. 2009

District of North Saanich — *North Saanich, BC, Canada*
Drafting Assistant (co-op student) — 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
- Muilwijk, M., Renner, A., Foss, Ø., **Brenner, S.**, Divine, D., Granskog, M., Koenig, Z., Sundfjord, A., Dodd, P. [*In prep*]. Two years of direct observations of ice-ocean momentum exchange and mixed layer dynamics in the Eurasian Arctic
- Foss, Ø., Granskog, M., **Brenner, S.**, Salganik E., Landy J., Sundfjord, A. [*In prep*]. Late arrivals: Seasonal transition from young, local sea ice to thicker, imported sea ice on the northwestern Barents Sea shelf.
- Crews, L., **Brenner, S.**, Rainville, L., Lee, C., [*In prep*]. Sea ice fracturing promotes near-inertial atmosphere-ocean momentum transfer during a winter storm.

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
- **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
- 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 (★ 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
- **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
- **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
- 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
- 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
- **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
- **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/
- **Brenner, S.**, and Laval., B. 2018. Seiche modes in multi-armed lakes. *Limnol. Oceanogr.*, 63: 2717-2726 doi: 10.1002/lno.11001

Invited seminars

- 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
- Western Coastal Collaboratorium (WCC) lecture at Oregon State University — 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

Teaching experience

Guest Lecturer

University of Washington
- Field Measurements (CEWA590): "Measuring sea ice" — May, 2022 & May 2024
- Hydrodynamics (CEWA570): "Wind-driven flow in a lake" — Feb., 2022

Teaching Assistant

University of Washington
- Coastal Engineering (CEE473/CEWA573) — Spring 2021
- Foundations of Ocean Sensors (OCEAN351) — Winter 2019

University of British Columbia
- Fluid Mechanics I (CIVL215) — Spring 2016
- Environmental Hydraulics (CIVL416) — Fall 2016
- Fluid Mechanics II (CIVL315) — 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);

Proposals:
- US National Science Foundation (1)