Samuel D. Brenner

Postdoctoral Research Associate at Caltech

sbrenner@caltech.edu https://sdbrenner.github.io/

Summary

My research uses a combination of idealized models and *in situ* measurements to understand the dynamic and thermodynamic processes linking sea ice and the upper ocean, and how those processes impact — and are impacted by — the changing polar climate.

Research experience

Caltech • Environmental Science and Engineering *Pasadena, CA, USA*

Postdoctoral Research Associate Sep. 2024–*Present*

• Advisor: Andrew Thompson

Brown University • Department of Earth, Environmental, and Planetary Sciences *Providence, RI, USA*

Postdoctoral Research Associate Jul. 2022–Sep. 2024

• Advisor: Christopher Horvat

University of Washington • Applied Physics Laboratory *Seattle, WA, USA*

Graduate Research Assistant Sep. 2017–Jun. 2022

• Advisors: Luc Rainville and Jim Thomson

University of British Columbia • Environmental Fluid Mechanics *Vancouver, BC, Canada*

Graduate Research Assistant Sep. 2015–Aug. 2017

• Advisor: Bernard Laval

Undergraduate Research Assistant Jun. 2013–Jun. 2014

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 Aug. 2017

Bachelors of Applied Science in Civil Engineering Jun. 2015

Camosun College *Victoria, BC, Canada*

Advanced Diploma in Civil Engineering Technology Bridge Jun. 2013

Diploma in Civil Engineering Technology Jun. 2010

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

Scientific contributions

Publications

Submitted and in prep.

- Crews, L., **Brenner**, **S.**, Rainville, L., Lee, C., [*In prep*]. Sea ice fracturing promotes near-inertial atmosphere-ocean momentum transfer during a winter storm.
- Thomson, J., Yang, J., Taylor, R., Rainville, E., Zeiden, K., Rainville, L., **Brenner**, **S.**, Ballard, M., Cronin, M., [*In prep*]. Surface wave development and ambient sound in the ocean.
- **Brenner**, **S.**, Horvat, C. [*In review*]. Fetch-limited wind-wave generation in partial sea ice cover. doi (pre-print): 10.22541/essoar.172192879.97960332/v1

Peer-reviewed

- 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

- 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 meeting — Feb. 27, 2024
- University of Auckland, Physics Colloquium — Apr. 12, 2023
- Western Coastal Collaboratorium (WCC) lecture at University of Oregon — Mar. 10, 2022
- University of British Columbia, Physical Oceanography seminar — Jul. 6, 2020

Conference abstracts (first-author only)

- 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

Service

Committee work

UW School of Oceanography "Graduate Applications Mentorship Program" (DEI subcommittee) 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

Reviews

Journal articles:

• Ocean Modelling (1); Journal of Geophysical Research: Oceans (3); Ocean Science (1); Aquatic Sciences (1); The Cryosphere (1); Geophysical Research Letters (1) Nature Communications (1)

Proposals:

• National Science Foundation (1)

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

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

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