

DR. MADISON SMITH

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EDUCATION

University of Washington, Seattle 2016-2019

Ph.D in Civil & Environmental Engineering

Dissertation: The role of waves in the autumn Arctic Ocean

Advisor: Jim Thomson

University of Washington, Seattle, Washington 2014-2016

M.S. in Civil & Environmental Engineering

Thesis: Surface waves in the Beaufort Sea

Advisor: Jim Thomson

Bowdoin College, Brunswick, Maine 2010-2014

B.A. with Honors in Earth & Oceanographic Science, and Environmental Studies

Honors Thesis: Sediment Transport in Katama Bay and Inlet, Martha's Vineyard, MA

RESEARCH EXPERIENCE

Applied Physics Lab, University of Washington 2019-Present

Postdoctoral Research Associate

Polar Science Center

Advisors: Bonnie Light and Marika Holland

Applied Physics Lab, University of Washington 2014-2019

Graduate Research Assistant

Air-Sea Interaction & Remote Sensing Group

Bowdoin College, Department of Earth & Oceanographic Science 2012-2014

Undergraduate Research Assistant

Woods Hole Oceanographic Institution 2013

NSF REU Summer Student Fellow

Advisor: Britt Raubenheimer

TEACHING EXPERIENCE

University of Washington 2020

Guest lecturer

Principles of Glaciology (Sea Ice)

University of Colorado, Boulder 2019

Guest lecturer

Our Changing Environment (Cryosphere)

University of Washington <i>Graduate Teaching Assistant</i> Coastal Engineering	2018
University of Washington <i>Graduate Teaching Assistant</i> Undergraduate Fluid Mechanics	2016
Bowdoin College <i>Laboratory Teaching Assistant</i> Environmental Hydrology & Geology	2013-2014

FIELD WORK

65 day cruise in the Central Arctic aboard R/V Polarstern <i>Leg 4 MOSAiC: Multidisciplinary drifting Observatory for the Study of Arctic Climate, funded by Alfred-Wegener Institute/National Science Foundation.</i>	June-August 2020
30 day cruise in the Beaufort Sea aboard R/V Sikuliaq <i>Stratified Ocean Dynamics of the Arctic (SODA), funded by Office of Naval Research.</i>	Sept 2018
65 day cruise in the Ross Sea aboard R/V Palmer <i>Polynyas and Ice Production and Export in the Ross Sea (PIPERS), funded by NSF.</i>	Apr-June 2017
42 day cruise aboard R/V Sikuliaq in Beaufort and Chukchi Seas <i>Sea State DRI, funded by Office of Naval Research.</i>	Sept-Nov 2015
10 day cruise aboard R/V Norseman II in Beaufort Sea <i>Marginal Ice Zone (MIZ) DRI, funded by Office of Naval Research.</i>	Sept 2014

JOURNAL ARTICLES

1. Thomson, J., Lund, B., Hargrove, J., **Smith, M.**, Horstmann, J., and J. A. MacKinnon. (*accepted* 2020). Wave-driven flow along a compact marginal ice zone. *Geophysical Research Letters*
2. Thompson, L., **M. Smith**, S. Stammerjohn, S. Ackley, J. Thomson, and B. Loose. (2020). Frazil ice growth and ice production during katabatic wind events in the Ross Sea, Antarctica. *The Cryosphere* doi.org/10.5194/tc-2019-213
3. **Smith, M.**, and J. Thomson. (2019). Pancake ice kinematics and dynamics using shipboard stereo video. *Annals of Glaciology*. doi.org/10.1017/aog.2019.3
4. Kohout, A. L., **Smith, M.**, Roach, L. A., Williams, G., Montiel, F., Williams, M. J. (2020). Observations of exponential wave attenuation in Antarctic sea ice during the PIPERS campaign. *Annals of Glaciology*, 1-14.
5. Ackley, S. F., Stammerjohn, S., Maksym, T., **Smith, M.**, Cassano, J., Guest, P., ... DePace, L. (2020). Sea-ice production and air/ice/ocean/biogeochemistry interactions in the Ross Sea during the PIPERS 2017 autumn field campaign. *Annals of Glaciology*, 1-15. doi.org/10.1017/aog.2020.31
6. **Smith, M.**, and J. Thomson. (2019). Ocean surface turbulence observed in newly-formed sea ice. *Journal of Geophysical Research-Oceans*. doi:10.1029/2018JC014405
7. Voermans, J., A. Babanin, J. Thomson, **M. Smith**, and H. Shen. (2019). Wave attenuation by sea ice turbulence. *Geophysical Research Letters*.

8. **Smith, M.**, S. Stammerjohn, O. Persson, L. Rainville, G. Liu, W. Perrie, W., R. Robertson, J. Jackson, and J. Thomson. (2018). Episodic reversal of autumn ice advance caused by release of ocean heat in the Beaufort Sea. *Journal of Geophysical Research-Oceans*. doi:10.1002/2018JC013764
9. Roach, L., **M. Smith**, and S. Dean. (2018). Quantifying growth of pancake sea ice floes using images from drifting buoys. *Journal of Geophysical Research-Oceans*. doi:10.1002/2017JC013693
10. Collins, C., M. Doble, B. Lund, and **M. Smith**. (2018). Observations of Surface Wave Dispersion in the Marginal Ice Zone. *Journal of Geophysical Research-Oceans*. doi:10.1029/2018JC013788
11. Stopa, J.E., F. Ardhuin, J. Thomson, **M. Smith**, A. Kohout, M. Doble, and P. Wadhams. (2018). Wave attenuation through an Arctic Marginal Ice Zone on October 12, 2015. Part 1: measurement of wave spectra and ice features from Sentinel 1A. *Journal of Geophysical Research-Oceans*. doi:10.1029/2018JC013791
12. Lund, B., H. Graber, **M. Smith**, M. J. Doble, O. Persson, J. Thomson, and P. Wadhams. (2018). Arctic sea ice drift measured by shipboard marine radar. *Journal of Geophysical Research-Oceans*. doi:10.1029/2018JC013769
13. Thomson, J., [and 32 others, including **M. Smith**]. (2018). Overview of the Arctic Sea State and Boundary Layer Physics Program. *Journal of Geophysical Research-Oceans*. doi:10.1002/2018JC013766
14. Cheng, S., [and 12 others, including **M. Smith**]. (2017). Calibrating a Viscoelastic Sea Ice Model for Wave Propagation in the Arctic Fall Marginal Ice Zone. *Journal of Geophysical Research-Oceans*. doi:10.1002/2017JC013275
15. Collins III, C.O., [and 12 others, including **M. Smith**]. (2017). Doppler Correction of Wave Frequency-Spectra Measured by Underway Vessels. *Journal of Atmospheric and Oceanic Technology*. doi:10.1175/JTECH-D-16-0138.s1
16. **Smith, M.**, and Thomson, J. (2016). Scaling observations of surface waves in the Beaufort Sea. *Elementa Science of the Anthropocene* 4: 000097. doi: 10.12952/journal.elementa.000097
17. Ardhuin, F, J. Stopa, B. Chapron, F. Collard, **M. Smith**, J. Thomson, M. Doble, B. Blomquist, O. Persson, C. O. Collins III, and P. Wadhams. (2016). Measuring ocean waves in sea ice using SAR imagery: A quasi-deterministic approach evaluated with Sentinel-1 and in situ data. *Remote Sensing of the Environment* 189. doi:10.1016/j.rse.2016.11.024

SEMINAR PRESENTATIONS

- *Feb 2021*. University of Alaska Fairbanks, Physical Oceanography seminar. Surface waves and near-surface stratification in sea ice. (virtual).
- *Oct 2018*. University of Gothenburg, Department of Marine Science seminar. The role of waves in autumn sea ice advance. Gothenburg, Sweden.
- *Oct 2018*. Ifremer, Laboratoire d’Oceanographie Physique et Spatiale seminar. The role of waves in autumn sea ice advance. Brest, France.
- *May 2016*. Applied Physics Lab seminar. Surface waves in the Beaufort Sea. Seattle, Washington.

FIRST-AUTHORED CONFERENCE PRESENTATIONS

- *2020, oral (virtual)*. Smith, M., M. Holland, and B. Light. Arctic sea ice sensitivity to lateral melting representation in a coupled climate model . AGU Fall Meeting (online).
- *2020, oral (virtual)*. Albedo evolution of melting Arctic sea ice: Observations from MOSAiC. Symposium on "Environmental control of algal bloom phenology in a pan-Arctic perspective".

- *2020 (Delayed to 2021 due to Covid-19)*. The role of waves in the autumn Arctic. Physical Oceanography Dissertation Symposium, Lihue, Hawaii.
- *2019, oral (Invited)*. Smith, M. and J. Thomson. Small-scale feedbacks between waves and sea ice in the evolving marginal ice zone. AGU Fall Meeting, San Francisco
- *2019, oral*. Smith, M. and J. Thomson. Pancake ice dynamics and kinematics from stereo video. IGS Symposium on Sea Ice, Winnipeg, Canada
- *2018, oral*. Smith, M. and J. Thomson. Pancake ice dynamics using shipboard stereo imagery. AGU Fall Meeting, Washington D.C.
- *2018, oral*. Smith, M. and J. Thomson. Event-driven release of upper ocean heat in the autumn Canadian Arctic Ocean. Forum for Arctic Modeling and Observational Synthesis (FAMOS), Bergen, Norway.
- *2018, oral*. Smith, M. and J. Thomson. Waves, turbulence, and thin sea ice at the autumn air-ice-ocean interface. POLAR2018, Davos, Switzerland.
- *2018, poster*. Smith, M.M., and J. Thomson. Surface turbulence production and suppression at the air-ice-ocean interface. Ocean Sciences Meeting, Portland.
- *2017, oral*. Smith, M.M., S. Stammerjohn, O. Persson, L. Rainville, G. Liu, W. Perrie, and J. Thomson. Observations of storm-driven mixing in the autumn Arctic Ocean. IGS Symposium on Polar Ice, Polar Climate, Polar Change, Boulder.
- *2017, oral*. Smith, M., and J. Thomson. Surface turbulence in the presence of pancake ice in the autumn Arctic Ocean. AMS Annual Meeting, Seattle.
- *2016, poster*. Smith, M., and J. Thomson. Observations of wave-enhanced mixing in the autumn Arctic Ocean. AGU Fall Meeting, San Francisco.
- *2016, poster*. Smith, M., and J. Thomson. Observations of fetch-limited waves in the emerging Arctic Ocean. WISE Meeting (Waves In Shallow-water Environments), Venice, Italy.
- *2016, oral*. Smith, M., and J. Thomson. Scaling observations of distanced-limited waves in the seasonally ice-covered Beaufort Sea. Ocean Sciences Meeting, New Orleans.
- *2014, poster*. Smith, M., and J. Thomson, W.E. Rogers. Large-Scale Patterns of Waves in Partial Ice Cover in the Arctic Ocean. AGU Fall Meeting, San Francisco.
- *2014, poster*. Smith, M.M., B. Raubenheimer, and S. Elgar. Ocean Sciences Meeting, Honolulu.

AWARDS

NCAR/CISL University Large Allocation Request	2020-2021
2nd Place Oral Presentation by a Student, IGS Symposium on Sea Ice	2019
Nece Award for Outstanding PhD, UW Department of Civil & Environmental Engineering	2019
Marie Skłodowska-Curie Actions Seal of Excellence	2019
Andy Studebaker Travel Award (UW CEE) to attend AGU Fall Meeting in Washington D.C.	2018
NSF Travel Award to attend the SCAR Open Science Conference in Davos, Switzerland	2018
APECS Travel Award to attend the POLAR meeting in Davos, Switzerland	2018
Best Oral Presentation by a Student, IGS Symposium on Polar Ice	2017

IGS Symposium Student Travel Award	2017
Valle Fellowship, UW Department of Civil & Environmental Engineering	2014-2015
Sarah and James Bowdoin Scholar	2014
Honors in Earth & Oceanographic Science, Bowdoin College	2014
WHOI Summer Student Fellow Travel Award to attend Ocean Sciences in Honolulu	2013
American Geophysical Union Student Travel Award to attend Ocean Sciences in Honolulu	2013

OUTREACH

Monthly outreach activities with a 5th grade class, Maywood Hills Elementary School, Bothell, Washington	Nov 2019-May 2020
Pacific Science Center Science Communication Fellow	2019-present
Polar Science Weekend Volunteer and Table Lead	2014-present
Board of Directors of ‘ <i>Engage</i> : Communicating Science Effectively’	2017-2019
Making Connections Math & Science Tutor	2016-2018
Seattle Girls’ School Mentor	2016-2018
UW Engineering Discovery Days Volunteer	2015-2019

PUBLIC PRESENTATIONS

Community Talk for Camden Conference, hosted by the Rockland Library: “A Year in the Ice: Insights into the changing Arctic Ocean from the MOSAiC expedition”	2021
Ready Set Transfer Academy Seminar, South Seattle College: ‘Polar Oceanography’	Nov. 2017
UW Science Now Series, Seattle Town Hall: ‘Understanding the Changing Arctic Ocean’	Mar. 2017
Scholars’ Studio @the Commons, UW: ‘Waves of Change’	May 2016
National Ocean Sciences Bowl (NOSB) Webinar presentation: ‘Earth’s Frozen Oceans: Properties and Importance of Sea Ice	2021

SERVICE

INSTITUTIONAL

APL Mentoring Program Advisory Committee	2021
Departmental Steward & Bargaining Committee Member for UAW4121 - University of Washington Academic Student Employee & Postdoc Union	2017-present
Undergraduate Research Advisor: University of Washington, 3 students	2017-2020

SCIENTIFIC COMMUNITY

Reviewer for NSF Proposals	2021
Expert Reviewer for IPCC WGII Sixth Assessment Report	2021

Primary Session Convener at vEGU Annual Meeting	2021
Member of the Steering Committee for MPOWIR (Mentoring Physical Oceanography Women to Increase Retention)	2020-present
Peer Reviewer: Ocean Modelling, Remote Sensing, Journal of Glaciology	2019-present
CryoMentor at AGU Fall Meeting	2019
Seattle Society for Women in Marine Science (SWMS) Steering Committee	2017-present

CERTIFICATIONS

AAUS Scientific SCUBA diver	2015-2019
NPFVOA Safety Equipment and Survival Procedures	2014