

# Mitch Bushuk

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## Research Interests

Sea ice variability and predictability, ice-ocean-atmosphere interactions, geophysical fluid dynamics, data analysis methods

## Education

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| 2010–2015 | PhD, Mathematics and Atmosphere-Ocean Science<br>Center for Atmosphere Ocean Science, Courant Institute of Mathematical Sciences,<br>New York University<br>PhD advisor: Dimitris Giannakis<br>Thesis: A Statistical and Dynamical Study of Arctic Sea-Ice Variability |
| 2005–2009 | Honours BSc, Mathematics and Physics joint specialist, University of Toronto   |

## Research Experience

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| 2017-present | Research Scientist, Geophysical Fluid Dynamics Laboratory, University Corporation for Atmospheric Research |
| 2017-present | Visiting Research Collaborator, Princeton University   |
| 2015-2017    | Postdoctoral Research Associate, Geophysical Fluid Dynamics Laboratory, Princeton University               |
| 2010-2015    | Graduate Research Assistant, Courant Institute of Mathematical Sciences, New York University               |
| 2007-2008    | Undergraduate Research Assistant, Department of Physics, University of Manitoba                            |
| 2006         | Undergraduate Research Assistant, Department of Chemistry, University of Manitoba                          |

## Publications

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| 2017 | Bushuk, M., R. Msadek, M. Winton, G. Vecchi, R. Gudgel, A. Rosati, X. Yang: Skillful regional prediction of Arctic sea ice on seasonal timescales. <i>Geophys. Res. Lett.</i> , 44, 49534964, doi: 10.1002/2017GL073155.  |
| 2017 | Bushuk, M. and D. Giannakis: The Seasonality and Interannual Variability of Arctic Sea-Ice Reemergence. <i>J. Climate</i> , 30, 4657–4676, doi: 10.1175/JCLI-D-16-0549.1.   |
| 2017 | Shean, D., K. Christianson, K. Larson, S. Ligtenberg, I. Joughin, B. Smith, C. Stevens, D. Holland, M. Bushuk: GPS-derived estimates of surface mass balance and ocean-induced basal melt for Pine Island Glacier ice shelf, Antarctica. <i>The Cryosphere</i> , 11, 2655–2674, doi: 10.5194/tc-2016-288. |

2017	Bushuk, M., R. Msadek, M. Winton, G. Vecchi, R. Gudgel, A. Rosati, X. Yang: Summer enhancement of Arctic sea-ice volume anomalies in the September-ice zone. <i>J. Climate</i> , 30, 2341–2362, doi: 10.1175/JCLI-D-16-0470.1.
2016	Christianson, K., M. Bushuk, P. Dutrieux, B. Parizek, I. Joughin, R. Alley, D. Shean, P. Abrahamsen, S. Anandakrishnan, K. Heywood, T. Kim, S. Lee, K. Nicholls, T. Stanton, M. Truffer, B. Webber, A. Jenkins, S. Jacobs, R. Bindshadler, D. Holland: Sensitivity of Pine Island Glacier to observed ocean forcing. <i>Geophys. Res. Lett.</i> , 43, 10817–10825, doi: 10.1002/2016GL070500.
2015	Bushuk, M. and D. Giannakis, 2015: Sea-ice reemergence in a model hierarchy. <i>Geophys. Res. Lett.</i> , 42, 5337-5345, doi: 10.1002/2015GL063972.
2015	Bushuk, M., D. Giannakis, and A. J. Majda, 2015: Arctic sea-ice reemergence: The role of large-scale oceanic and atmospheric variability. <i>J. Climate</i> , 28, 5477-5509, doi: 10.1175/JCLI-D-14-00354.1.
2014	Bushuk, M., D. Giannakis, and A. J. Majda, 2014: Reemergence mechanisms for North Pacific sea ice revealed through nonlinear Laplacian spectral analysis. <i>J. Climate</i> , 27, 6265-6287, doi: 10.1175/JCLI-D-13-00256.1.

### Submitted/In Preparation

Submitted	Blanchard-Wrigglesworth, E. and M. Bushuk: Robustness of Arctic sea-ice predictability in GCMs. Submitted to <i>Clim. Dyn.</i>
Submitted	Bushuk, M., R. Msadek, M. Winton, G. Vecchi, X. Yang, A. Rosati, R. Gudgel: Regional Arctic sea-ice prediction: Potential versus operational seasonal forecast skill. Submitted to <i>Clim. Dyn.</i>
In prep	Bushuk, M., D. M. Holland, T. P. Stanton, A. A. Stern and C. Gray: Ice Scallops: A laboratory and numerical investigation of the ice-ocean interface. To be submitted to <i>J. Fluid Mech.</i>

### Teaching Experience

Fall 2017	Guest Lecturer, Introduction to Physical Oceanography, Princeton University
Fall 2016	Guest Lecturer, Introduction to Physical Oceanography, Princeton University
Spring 2014	Teaching Assistant, Math for Economics III, New York University
Fall 2013	Teaching Assistant, Math for Economics II, New York University
Spring 2013	Teaching Assistant, Math for Economics I, New York University
Fall 2012	Teaching Assistant, Calculus I, New York University

### Student Mentoring

Summer 2018	David Bonan, Hollings Internship Program, GFDL
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2017-2018	Yanzheng Shen, University of Toronto Physics Mentorship Program
2016-2017	Bryce Wu, University of Toronto Physics Mentorship Program
2015-2016	Subin Kim, University of Toronto Physics Mentorship Program
Summer 2013	Brandon Wabah, New York University Abu Dhabi undergraduate summer research program, NYU

## Field Experience

2013	Pine Island Glacier, Antarctica: GPS and seismic data collection, maintenance of automatic weather station
2011 & 2012	Jakobshavn and Sermilik fjords, Greenland: conductivity-temperature-depth (CTD) ocean data, deployment and retrieval of ocean moorings, xCTD probes, and GPS devices.

## Laboratory Experience

2012 & 2013	Cold Regions Research and Engineering Laboratory, New Hampshire: Designed and performed experiments to study ice scallops. Measured flow, ice geometry and heat fluxes using PIV, LIDAR, and fast thermistors.
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## Professional Service

- Member of AMS Polar Meteorology and Oceanography Committee
- Reviewer for Climate Dynamics, The Cryosphere, Geophysical Research Letters, Journal of Geophysical Research - Atmospheres, Journal of Climate, Nature Scientific Reports, Quarterly Journal of the Royal Meteorological Society, Swiss Data Science Center
- Member of AGU

## Academic Awards

2015-2017	Princeton AOS Postdoctoral Fellowship
2014	Moses A. Greenfield Research Prize for outstanding interdisciplinary studies by a current student
2011-2014	NSERC Postgraduate Scholarship, Doctoral level
2010-2011	NSERC Canadian Graduate Scholarship, Master's Level (Declined and accepted Postgraduate Scholarship, Master's level, for study abroad)
2010-2015	New York University MacCracken Graduate Scholarship
2005-2009	University of Toronto National Scholarship
2008-2009	3T0 M&P and Associates Scholarship

2008-2009	Coxeter Scholarship in Mathematics
2008-2009	Dickson JA and CP Scholarship
2008-2009	Reuben Wells Leonard Scholarship in the Physical Sciences
2007-2008	NSERC Undergraduate Student Research Award
2007-2008	William R. Hossack Memorial Scholarship in Mathematics and Physics
2007-2008	3T0 M&P and Associates Scholarship
2007-2008	Reuben Wells Leonard Scholarship in the Physical Sciences
2007-2008	William Mulock Prize in Mathematics and Physics
2006-2007	NSERC Undergraduate Student Research Award
2006-2007	C.L. Burton Scholarship in Mathematics and Physics
2004-2005	Governor General's Medal
2005	Whitey Howard Memorial Scholarship

## Invited Seminar Talks

Apr 4, 2017	Research Seminar, Météo France and CNRM
Nov 16, 2016	Research Seminar, University of Manitoba
Nov 9, 2016	Research Seminar, GFDL
Oct 12, 2016	CAOS Colloquium, Courant Institute, NYU
Feb 5, 2015	Atmosphere Ocean Climate Dynamics Seminar, Yale
Jan 7, 2015	Sack Lunch Seminar, MIT
Dec 9, 2014	Research Seminar, GFDL
Oct 8, 2014	Topics in Atmospheric and Oceanic Sciences Seminar, Stony Brook University

## Conference Presentations\*

\*These presentations are talks, unless specified as poster

Dec 11, 2017	AGU Fall Meeting, New Orleans
Nov 2, 2017	GFDL Science Symposium, Princeton
July 13, 2017	Sea Ice Workshop, University of Washington, Seattle
June 26, 2017	Arctic Modeling Workshop, NASA, Washington, D.C.
June 6, 2017	Canadian Meteorological and Oceanographic Society Congress, Toronto
June 4, 2017	Canadian Snow and Sea Ice Evolution Network (CanSISE) Workshop, Toronto
Mar 27, 2017	Polar Predictability Workshop, Alfred Wegener Institute
Feb 1, 2017	GFDL Poster Expo, Princeton (poster)
Jan 26, 2017	AMS Annual Meeting, Seattle

Nov 2, 2016	FAMOS Meeting, Woods Hole Oceanographic Institution (poster)
May 5, 2016	Polar Prediction Workshop, Lamont Doherty Earth Observatory
Feb 3, 2016	Sea Ice Forecasting Workshop, NCAR
Jan 28, 2016	MURI Workshop, NYU
Dec 18, 2015	AGU Fall Meeting, San Francisco (poster)
Nov 20, 2015	Regional Climate Symposium, Rutgers University (poster)
Apr 9, 2015	Polar Predictability Workshop, University of Reading
Dec 18, 2014	AGU Fall Meeting, San Francisco
Jan 20, 2014	MURI Workshop, NYU
July 12, 2013	SIAM Annual Meeting, San Diego.
June 6, 2013	AOS Days, Johns Hopkins University
May 26, 2013	Sea Level Rise Meeting, NYU Abu Dhabi
Aug 16, 2012	Greenland Summer School, Tasiilaq, Greenland
Mar 14, 2012	Sea Level Rise Meeting, NYU Abu Dhabi
Nov 11, 2011	Graduate Student Symposium, Princeton (poster)
July 26, 2011	Greenland Summer School, Illulisat, Greenland.
June 21, 2011	AOS Days, MIT