ABIGAIL S BODNER

Department of Earth, Environmental and Planetary Sciences, Brown University
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EDUCATION

PhD in Physical Oceanography *Expected 2020*
Advisor: Dr. Baylor Fox-Kemper
Department of Earth, Environmental and Planetary Sciences
Brown University

ScM in Applied Mathematics *Expected 2020*
Division of Applied Mathematics
Brown University

MSc in Atmospheric Dynamics *2019*
Advisor: Dr. Nili Harnik
Department of Earth Sciences
Tel Aviv University

BSc in Earth Sciences and Mathematics (Double Major) *2014*
Tel Aviv University

INTERESTS

My interests span a broad range of problems involving climate dynamics, geophysical fluid dynamics and turbulence. I primarily use theory and models to study the non-linear interaction between small scale processes and larger scale dynamics.

THESES

PhD Thesis *2015 - Present*
Building toward a more complete understanding of ocean submesoscales in the presence of turbulence, I developed a modified theory to account for the effects of turbulence on frontal evolution, and am now extending these findings to a more realistic environment using Large Eddy Simulations (LES). The final aspect of this work will be to implement new scaling laws of arrested frontal width, under different forcing parameter ranges, in submesoscale-permitting models and parameterizations in coarse resolution models.

MSc Thesis *2014-2019*
Using an idealized model, I studied the effects of stationary waves generated by topography on large scale atmospheric circulation. Under certain conditions, it was found that the presence of topography in the midlatitudes leads to jet vacillation cycles, which have implications to quasi-stationary wave growth in the atmosphere.

RESEARCH EXPERIENCE AND TRAINING

Community Earth System Model (CESM) Tutorial *Summer 2019*
Run by the National Center for Atmospheric Research (NCAR) in Boulder, CO.

Kavli Institute for Theoretical Physics Graduate Fellow *Spring 2018*
Program for Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons (University of California Santa Barbara).

Fundamental Aspects of Turbulent Flows in Climate Dynamics *Summer 2017*
Summer school program run by Ecole de Physique des Houches (Les Houches, France).

Research Assistant under Dr. Nili Harnik *AY 2013-2014*
Detecting wave disturbances in the stratosphere influenced by the Circumglobal Teleconnection Pattern (Tel Aviv University).

Senior Year Project in Geophysical Fluid Dynamics *Spring 2014*
Under the guidance of Dr. Eyal Heifetz, worked on a revised solution for a Non-Boussinesq stratified shear flow (Tel Aviv University).

Research Assistant under Dr. Alon Ziv *Spring 2013*
Relating the creep and slip rate of tectonic plate movements for the National Earthquake Early Warning System (Tel Aviv University).

PUBLICATIONS

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams, P.P. Sullivan: "A perturbation method to understanding the effects of turbulence on frontogenesis". *JFM, Under Review.*

A. Bodner, B. Fox-Kemper: "The failure of potential vorticity signifies the limit of the submesoscale". *In Preparation.*

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams, P.P. Sullivan: "Frontal evolution in the presence of submesoscale instabilities and turbulence". *In Preparation.*

A. Bodner, N. Harnik and O. Lachmy : "Flow regimes and vacillation cycles in the presence of topography". *In Preparation.*

SELECTED PRESENTATIONS

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams and P.P. Sullivan: "Frontal Formation in the Presence of Submesoscale Instabilities and Turbulence", Atmospheric and Oceanic Fluid Dynamics Meeting, AMS, Portland, ME, June 2019. *Oral.*

A. Bodner, B. Fox-Kemper: "Hidden Dangers in Potential Vorticity", Sources and Sinks of Ocean Mesoscale Eddy Energy Workshop (US CLIVAR), Tallahassee, FL, March 2019. *Oral.*

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams and P.P. Sullivan: "A Novel Approach to Understanding the Effects of Turbulence and Instabilities on Frontogenesis", Symposium on Geophysical Fluid Dynamics, Sde Boker, Israel, January 2019. *Oral.*

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams and P.P. Sullivan: "A Novel Approach to Understanding the Effects of Turbulence and Instabilities on Frontogenesis", CARTHE All Hands Meeting ,Miami, FL, November 2018. *Oral.*

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams and P.P. Sullivan: "A Perturbation Method to Understanding the Effects of Turbulence and Instabilities on Frontogenesis", Ocean Sciences Meeting, TOS/ASLO/AGU, Portland, OR, February 2018. *Oral*.

A. Bodner, B. Fox-Kemper, L.P. Van Roekel, J.C. McWilliams and P.P. Sullivan: "Arrest of Frontogenesis by Submesoscales and Turbulence", Ocean Sciences Meeting, TOS/ASLO/AGU, New Orleans, LA, February 2016. *Poster*.

A. Bodner, N. Harnik and O. Lachmy: "Global Circulation Regimes in the Presence of Stationary Planetary Wave Forcing", Geophysical Fluid Dynamics Seminar, Weizmann Institute, Israel, July 2015. *Oral*.

A. Bodner, N. Harnik and O. Lachmy: "Global Circulation Regimes in the Presence of Stationary Planetary Wave Forcing", 20th conference on Atmospheric and Oceanic Fluid Dynamics, Minneapolis, MN, June 2015. *Poster*.

A. Bodner, N. Harnik and O. Lachmy: "Effects of Stationary Forcing on Global Circulation Regimes", Symposium on Geophysical Fluid Dynamics, Sde Boker, Israel, January 2015. *Poster*.

INVITED TALKS

A. Bodner: "Frontal evolution in the presence of submesoscale instabilities and turbulence", Atmosphere, Ocean, and Climate Dynamics Seminar, Yale University, April 2019.

A. Bodner: "On the interaction between submesoscales and turbulence: from theory to implementation in global climate models", The Center for Atmosphere Ocean Science, Courant Institute of Mathematical Sciences, New York University, October 2019 (Scheduled).

TEACHING EXPERIENCE

Studying the Ocean from the Classroom to the Bay *Summer 2018 & 2019*
Course designer and co-instructor in Summer@Brown pre-college program (Brown University).

Principles in Planetary Climate *Fall 2018*
Teaching assistant under Professor Jung-Eun Lee (Brown University).
Guest lecture: "Large Scale Dynamics in the Ocean and Atmosphere".

Teaching Consultant Program, Brown University Sheridan Center. *Fall 2017*

Climate Change: Fact or Fiction? *Summer 2017*
Course designer and instructor in Summer@Brown middle school program (Brown University).

Reflective Teaching Program, Brown University Sheridan Center. *Fall 2016*

Continuum Mechanics - Fluids *Spring 2015*
Teaching assistant under Professor Eyal Heifetz (Tel Aviv University).

Climate Theory *Spring 2015*
Teaching assistant under Professor Nili Harnik (Tel Aviv University).

Laboratory Experiments in Atmospheric Sciences *Fall 2014*
Teaching assistant under Professor Nili Harnik (Tel Aviv University).

Earth Sciences Teacher *2012-2013*
High school senior year research project (Shay Agnon High School, Israel).

Mathematics Teacher *2009-2014*
Middle school gifted children program (Bar-Ilan University).
High school and pre-college students (Raz Etgarim Educational Center, Israel).
At-risk youth (Haklai Boarding school, Israel).

HONORS AND AWARDS

Student Oral Presentation Award at the Atmospheric and Oceanic Fluid Dynamics Meeting of the American Meteorological Society *June 2019*

Associate of Sigma Xi Scientific Research Honor Society *2019*

Gulf of Mexico Research Initiative Scholar *2018*

Departmental First Year Fellowship, Brown University *AY 2015-2016*

Rana Samuels Ofran MSc Student Excellence Award *AY 2014-2015*

SERVICE

Reviewer for the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report

Reviewer for Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

Reviewer for Journal of Physical Oceanography *2017-Present*

Graduate School Community Fellow *2018-2019*

First Year Graduate Student Mentor *2018-2019*

International Student Representative and Event Organizer *2016-2018*

Leadership Alliance - Graduate Student Panel *2018*

Volunteer at the Division of Fluid Dynamics Meeting (APS DFD) *November 2015*

PROFESSIONAL AFFILIATIONS

Affiliate Graduate Student in the Institute at Brown for Environment & Society (IBES)

Consortium for Advanced Research on Transport of Hydrocarbon in the Environment (CARTHE)

Graduate Fellow of the Rhode Island Consortium for Coastal Ecology Assessment Innovation & Modeling (C-AIM).

American Geophysical Union

American Meteorological Society

American Physical Society

SOFTWARE LANGUAGES

Matlab, Python, Fortran, C, Latex.