

Stephanie Waterman

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Department of Earth, Atmospheric and Planetary Science
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Department of Physical Oceanography
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Research Interests: Dynamical oceanography. Geophysical fluid dynamics, in particular turbulent flow rectification and eddy-mean flow interactions. The dynamics of western boundary current jets and their associated recirculation gyres, in particular the role of eddy fluxes in these systems.

Education

- Ph.D. **Physical Oceanography** Sep. 2003 - Oct. 2008 (expected)
Massachusetts Institute of Technology (MIT), Cambridge, USA
and Woods Hole Oceanographic Institution (WHOI), Woods Hole, USA
- Thesis title: *Eddy-mean flow interactions in western boundary current jets*
Advisors: Nelson Hogg and Steven Jayne, WHOI
- M.Sc. **Aeronautics** Sep. 2001 - Jun 2002
California Institute of Technology (Caltech), Pasadena, USA
- B.App.Sc. **Engineering Physics** Sep. 1997 - May 2001
Queen's University, Kingston, Canada
- Thesis title: *Fluid flow control via the excitation of the small-scale structure of turbulence*
Advisor: Andrew Pollard

Research Experience

- Woods Hole Oceanographic Institution**, Woods Hole, USA Jun. 2003 - present
Graduate Research Assistant, Department of Physical Oceanography
- Examined eddy-mean flow interactions in unstable jets using analytical analysis, laboratory studies, and numerical simulation.
 - Applied idealized theory to the dynamics of western boundary current jets using in-situ observations, high-resolution ocean general circulation models, and quasi-geostrophic process-model studies.
- California Institute of Technology**, Pasadena, USA Sep. 2002 - Sep. 2003
Graduate Research Assistant, Graduate Aeronautical Laboratories
- Designed and performed wind tunnel experiments on dynamic vortex interaction and its effect on the lift and drag of an airfoil.
 - Set-up three-dimensional Defocusing Digital Particle Image Velocimetry system and applied it to water tunnel experiments on box fish hydrodynamics.
- Queen's University**, Kingston, Canada Jun. 2001 - Sep. 2001
Summer Research Assistant, Departments of Physics and Mechanical Engineering
- Explored mathematical methods of visualizing coherent structures in simulated turbulent jet flow and investigated the effects of passive flow control using numerical simulation.
- Dalhousie University**, Halifax, Canada Jun. 1999 - Sep. 1999
Summer Research Assistant, Departments of Physics and Oceanography
- Performed laboratory experiments on the differential mixing of heat and salt by breaking internal waves.

Fellowships/Awards

- Graduate Student Council Teaching Award for the School of Science, MIT 2008
- American Geophysical Union (AGU) Outstanding Student Talk Award 2008
- AGU Outstanding Student Paper Award 2006
- Presidential Fellowship, MIT 2003 - 2004
- Russel R. Vought Fellowship, Caltech 2001 - 2002
- Commonwealth Scholarship 2001
- National Science and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship 2001
- NSERC Undergraduate Student Research Award 2001, 1999
- Engineering Physics Award (top rank in Engineering Physics class), Queen's University 1999
- Lillie Prize for Calculus (top rank in calculus of all engineering students), Queen's University 1998
- Chancellor's Scholarship, Queen's University 1997 - 2001

Teaching Experience

- MIT-WHOI Joint Program in Oceanography**, Cambridge, USA Sep. 2007 - Jan. 2008
 Teaching Assistant, graduate course in Fluid Dynamics of Oceans and Atmospheres
 Instructor: Joseph Pedlosky
- *Taught weekly recitation classes, assisted students individually, and graded coursework and final exam.*
 - *Awarded, based on a nomination from the students, the Graduate Teaching Award for the School of Science presented to a faculty member and/or a teaching assistant for excellence in teaching graduate courses.*

- EOS English Language School**, Suwon, South Korea Sep. 2002 - May 2003
 Teacher of English as a foreign language

Field Experience

- R/V Melville**, Recovery of KESS moorings, XPT and CTD surveys May 2006
 12 days. Chief Scientist: Steven Jayne
- R/V Atlantis**, CLIMODE ASIS/FILIS trail drift and shipboard sampling Jan. 2006
 14 days. Chief Scientist: Terry Joyce
- R/V Thompson**, Deployment of KESS moorings, launch of KEO buoy and profiling floats Jun. 2004
 15 days. Chief Scientists: Nelson Hogg and Steven Jayne

Service

- Mentor in the Graduate Student Mentoring Program, MIT Sep. 2005 - present
- Representative to the WHOI International Committee, WHOI Oct. 2005 - present
- Seminar Coordinator, Physical Oceanography Student Seminar, WHOI Oct. 2005 - Oct. 2006
- Student Representative to the WHOI Educational Assembly and the Joint Committee on Physical Oceanography, MIT-WHOI Oct. 2005 - Oct. 2006

Professional Society Membership

- European Geosciences Union Mar. 2008 - present
- American Meteorological Society Jun. 2007 - present
- American Geophysical Union Feb. 2006 - present
- American Association for the Advancement of Science Sep. 2005 - Sep. 2006

Publications

Peer reviewed:

- Joyce, T. M., J. Dunworth-Baker, R. S. Pickart, D. Torres and **S. Waterman**, 2005. On the Deep Western Boundary Current south of Cape Cod. *Deep Sea Research Part II*, v. 52, no. 3-4, p. 615-625.

In preparation:

- **Waterman, S.N.** and S.R. Jayne. Eddy-driven recirculations from a localized, transient forcing.
- **Waterman, S.N.** and S.R. Jayne. Eddy-mean flow interactions in the downstream development of an unstable western boundary current jet.
- **Waterman, S.N.**, S.R. Jayne and N.G. Hogg. Eddy-mean flow interactions in the Kuroshio Extension and their relation to simple dynamical models.

Non-peer reviewed:

- Hebert, D., B. Ruddick, J.R. Saylor and **S. Waterman**, 2001. Differential mixing of salt and heat by breaking internal waves. *Eos Transactions of the American Geophysical Union*, 81(48), p. 724.

Select Conference Proceedings & Presentations

Conference Proceedings:

- **Waterman, S.N.**, S.R. Jayne and N.G. Hogg, 2008. Eddy-mean flow interactions in western boundary current jets. *Geophysical Research Abstracts*, 10, Abstract EGU2008-A-00550.
- **Waterman, S.N.** and N. Hogg, 2006. Low-frequency motions in the Kuroshio region and their relation to simple dynamical models. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract OS11B-1484.
- Jayne, S.R., N.G. Hogg, L. Rainville and **S.N. Waterman**, 2006. Low frequency variability of the deep ocean below western mid-latitude jets: new data from the Kuroshio Extension. *Eos Trans. AGU*, 87(36), Ocean Sci. Meet. Suppl., Abstract OS54B-03.
- Rainville, L., S. Jayne, N. Hogg and **S. Waterman**, 2006. Upper ocean observations from moorings across the Kuroshio Extension during KESS. *Eos Trans. AGU*, 87(36), Ocean Sci. Meet. Suppl., Abstract OS53E-02.
- **Waterman, S.N.** and S.R. Jayne, 2006. Zonal jet and recirculation gyres from the rectification of localized oscillatory forcing: a laboratory, numerical and theoretical study. *Eos Trans. AGU*, 87(36), Ocean Sci. Meet. Suppl., Abstract OS45L-03. (**Winner of AGU Outstanding Student Paper Award**)
- McIlwain, S., T. Holme, **S. Waterman** and A. Pollard, 2002. Effects of single, dual and quadruple tabs on the near field of round jets. Proceedings, IUTAM Symposium on Turbulent Mixing and Combustion, Kluwer Academic Pub., Dordrecht 2002, Pollard and Candel (*eds.*), pp 377-385.
- **Waterman, S.**, T. Holme, S. McIlwain and A. Pollard, 2002. Investigation of various structure identification methods and the effects of tabs on the near field of round jets. Proceedings of FEDSM02, 2002 ASME Fluids Engineering Division Summer Meeting, Montreal, July, 2002.
- Hebert, D., B. Ruddick, J.R. Saylor and **S. Waterman**, 2000. Differential mixing of salt and heat by breaking internal waves. *Eos Trans. AGU*, 81 (48), Fall Meet. Suppl., Abstract OS12C-02.

Select Presentations:

- **Waterman, S.N.**, S.R. Jayne and N.G. Hogg, 2008. Eddy-mean flow interactions in western boundary current jets. Presented at the 2008 Ocean Sciences Meeting, Orlando, March 2008. (**Winner of AGU Outstanding Student Talk Award**)
- **Waterman, S.** and S. Jayne, 2007. Eddy-mean flow interactions in western boundary current jets. Presented at the AMS 16th Conference on Atmospheric and Oceanic Fluid Dynamics, Santa Fe, June 2007.
- **Waterman, S.N.** and S.R. Jayne, 2005. Zonal jet and recirculation gyres from the rectification of localized oscillatory forcing. Presented at the Chapman Conference on Jets and Annular Structures in Geophysical Fluids, Savannah, January 2006.
- **Waterman, S.N.** and S.R. Jayne, 2005. Recirculation gyres from the rectification of localized, oscillatory forcing. Presented at the Eddies and Ocean Circulation Meeting, Cambridge, October 2005. (**invited**).

- **Waterman, S.N.** and S.R. Jayne, 2005. Rectification of localized oscillatory forcing. Presented at the NCAR Geophysical Turbulence Program Workshop on Coherent Structures, Boulder, July, 2005.
- Ruddick, B., D. Hebert, J.R. Saylor and **S. Waterman**, 2001. Differential mixing of salt and heat by breaking internal waves. Presented at the Oceanography Society Biennial Scientific Meeting, Miami, April, 2001.