

Ross Tulloch

CONTACT INFORMATION	54-1516 Dept. of Earth, Atmospheric and Planetary Sciences Massachusetts Institute of Technology 77 Massachusetts Ave, Cambridge, MA 02139-4307	(617)253-0098 tulloch@ocean.mit.edu http://ocean.mit.edu/~tulloch
RESEARCH INTERESTS	Role of the ocean in climate, ocean variability and predictability, eddy mixing, baroclinic instability and geophysical turbulence.	
EDUCATION	Courant Institute of Mathematical Sciences, New York University Ph.D. in Atmosphere-Ocean Science and Mathematics, Jan 2009 <ul style="list-style-type: none">• Dissertation Topic: Geostrophic turbulence near stratification discontinuities• Advisor: Shafer Smith• Awards: Henry MacCracken and Dean's Dissertation Fellowships Simon Fraser University, Canada M.S. in Applied and Computational Mathematics, Aug 2003 <ul style="list-style-type: none">• Dissertation Topic: Next-order free surface quasigeostrophic dynamics• Advisor: David Muraki• Awards: NSERC PGS-A and C.D. Nelson Scholarships B.A.Sc. in Engineering Science, Electronics Option, Aug 2002 <ul style="list-style-type: none">• Awards: APEGBC Achievement Award	
CURRENT EMPLOYMENT	Postdoctoral Associate, Massachusetts Institute of Technology Sponsor: John Marshall	
PAST EMPLOYMENT	NOAA Climate and Global Change Postdoctoral Fellow 2009-2011 Host: John Marshall, MIT	
PUBLICATIONS	R. Tulloch, R. Ferrari, O. Jahn, A. Klocker, J. LaCasce, J. R. Ledwell, J. Marshall, M.-J. Messias, K. Speer and R. Watson, 2014: Direct Estimate of Lateral Eddy Diffusivity Upstream of Drake Passage, <i>J. Phys. Oceanogr.</i> , doi: 10.1175/JPO-D-13-0120.1. (PDF) M. Bates, R. Tulloch, J. Marshall and R. Ferrari, 2014: Rationalizing the Spatial Distribution of Mesoscale Eddy Diffusivity in Terms of Mixing Length Theory, <i>J. Phys. Oceanogr.</i> , doi: 10.1175/JPO-D-13-0130.1. (PDF) J. H. LaCasce, R. Ferrari, J. Marshall, R. Tulloch, D. Balwada and K. Speer, 2014: Float-Derived Isopycnal Diffusivities in the DIMES experiment, <i>J. Phys. Oceanogr.</i> , doi: 10.1175/JPO-D-13-0175.1. (PDF) M. Buckley, D. Ferreira, J.-M. Campin, J. Marshall and R. Tulloch, 2012: On the relationship between decadal buoyancy anomalies and variability of the Atlantic Meridional Overturning Circulation, <i>J. Climate</i> , doi: 10.1175/JCLI-D-11-00505.1. (PDF) R. Tulloch and J. Marshall, 2012: Exploring mechanisms of variability and predictability of Atlantic meridional overturning circulation in two coupled climate models, <i>J. Climate</i> , 4067–4080. (PDF)	

R. Tulloch, C. Hill and O. Jahn, 2011: Possible Spreadings of Buoyant Plumes and Local Coastline Sensitivities Using Flow Syntheses from 1992 to 2007, *Monitoring And Modeling The Deepwater Horizon Oil Spill: A Record-Breaking Enterprise*, AGU Monograph 2011 ([PDF](#))

Yongsheng Xu, Lee-Lueng Fu, and R. Tulloch, 2011: The global characteristics of the wavenumber spectrum of ocean surface wind, *J. Phys. Oceanogr*, 1576–1582. ([PDF](#))

R. Tulloch, J. Marshall, C. Hill and K. S. Smith, 2011: Scales, growth rates and spectral fluxes of baroclinic instability in the ocean, *J. Phys. Oceanogr*, 1057–1076 ([PDF](#))

R. Tulloch, J. Marshall and K. S. Smith, 2009: Interpretation of the propagation of surface altimetric observations in terms of planetary waves and geostrophic turbulence, *J. Geophys. Res. Oceans*, doi:10.1029/2008JC005055 ([PDF](#))

R. Tulloch and K. S. Smith, 2009: A note on the numerical representation of surface dynamics in quasigeostrophic turbulence: Application to the nonlinear Eady model, *J. Atmos. Sci.*, 1063–1068 ([PDF](#))

R. Tulloch and K. S. Smith, 2009: Quasigeostrophic turbulence with explicit surface dynamics: Application to the atmospheric energy spectrum, *J. Atmos. Sci.*, 450–467 ([PDF](#))

R. Tulloch, *Geostrophic dynamics at surfaces in the atmosphere and ocean*, Ph.D. Thesis, New York University, 2009 ([PDF](#))

R. Tulloch and K. S. Smith, A theory for the atmospheric energy spectrum: Depth-limited temperature anomalies at the tropopause, *Proc. Natl. Acad. Sci.*, v103, no. 40, 14690-14694, 2006 ([PDF](#))

R. Tulloch, *Free-Surface Quasigeostrophy: Bridging the gap between surface quasigeostrophy and shallow-water*, M.Sc. Thesis, Simon Fraser University, 2003 ([PDF](#))

PAPERS IN PREP. R. Tulloch and J. Marshall, Global variation eddy mixing and its collocation with steering levels in an idealized ocean model, in revision

R. Tulloch, R. Ferrari, J. Marshall and J. Ledwell, Observed and Simulated Tracer Diffusivity Upstream of the Drake Passage, to be submitted

R. Tulloch, R. Ferrari, J. Lacasce and J. Marshall, Observed and Simulated Float Diffusivity Upstream of the Drake Passage, in progress

M. Bates, R. Tulloch, and J. Marshall, Estimated global eddy mixing rates from observations, in progress

R. Tulloch and J. Marshall, AMOC, the Mann Eddy and reconstructing 20th century AMOC variability from data

TALKS *Geography of baroclinic instability and eddy mixing in the ocean*, M.I.T., Cambridge, MA (May 2012)

Geography of baroclinic instability and eddy mixing in the ocean, Stony Brook University, Stony Brook, NY. (May 2012)

Role of eddies in the ocean, University of Chicago, Chicago, IL. (February 2012)

Analysis of AMOC in CM2.1 and CCSM3, and Inferring AMOC variability from data, GFDL-NCAR-MIT Collaborative Meeting, Boulder, CO. (September 2011)

Meridional overturning circulation variability: similarities and differences between CCSM3 and CM2.1, GFDL-NCAR-MIT Collaborative Meeting, Princeton, NJ. (February 2011)

Possible spreadings of buoyant surface plumes using flow syntheses from 1992-2007, AGU Fall Meeting, San Francisco, CA. (December 2010)

Geography of baroclinic instability and mixing in the ocean, University of Rhode Island, Narragansett, RI. (December 2010)

Predictability and non-normal dynamics in models, U.S. Atlantic Meridional Overturning Circulation (AMOC) Annual Meeting, Miami, FL. (June 2010)

Baroclinic instability and mixing in the ocean, McGill University, Montreal, QC. (April 2010)

Interaction between Rossby waves and turbulence in the ocean, AGU Ocean Science Meeting, Portland, OR. (February 2010)

Spatial variability of stirring and mixing in the ocean, Ocean Climate Model Development Meeting, Geophysical Fluid Dynamics Laboratory, Princeton, NJ. (October 2009)

Scales, growth rates and spectral fluxes of baroclinic instability in the ocean: Observations and insights from an eddying aqua-planet, Woods Hole Oceanographic Institution, Woods Hole, MA. (October 2009)

Interpretation of sea surface height propagation in terms of Rossby waves and geostrophic turbulence, AGU Fall Meeting, San Francisco, CA. (December 2008)

What dynamics does the mesoscale ocean surface reflect? The horizontal transition scale between buoyancy-driven and PV-driven baroclinic instability, AGU Ocean Sciences Meeting, Orlando, FL. (March 2008)

A baroclinic model for the atmospheric energy spectrum, Turbulent Theory and Modeling Workshop, The National Center for Atmospheric Research (February 2008)

The effect of tropopause temperature anomalies on the atmospheric energy spectrum, Applied Mathematics Colloquium, Columbia University (November 2007)

A balanced model for the forward energy cascade near the tropopause, AMS 16th Conference on Atmospheric and Oceanic Fluid Dynamics, Santa Fe, NM. (June 2007)

TEACHING
EXPERIENCE

Spring	2011	Weather and Climate Laboratory	T.A.
Spring	2010	Weather and Climate Laboratory	T.A.
Spring	2007	Calculus II	Lecturer
Fall	2006	Computing in Finance	T.A.
Spring	2006	Calculus II	Lecturer
Fall	2005	Mathematical Patterns in Nature	T.A.
Spring	2005	Partial Differential Equations	T.A.
Fall	2004	Elementary Statistics	T.A.
Spring	2004	Business Calculus	T.A.
Fall	2003	Precalculus	T.A.

INDUSTRIAL AND
RESEARCH
INTERNSHIPS

Summer	2008	Hurricane model development, Risk Management Solutions, London U.K.
Spring	2002	Design & simulation of digital memories, VLSI Design Lab, SFU.
Summer	2000	Digital Design Engineer, Cogent ChipWare, Inc., Burnaby B.C.
Fall	1999	Product Engineer, PMC-Sierra, Inc., Burnaby, B.C.
Spring	1999	Digital Design Engineer, Nortel Networks Corp., Nepean Ont.