

## **Barry A. Klinger**

Physical Oceanographer

George Mason University Department of Climate Dynamics  
4400 University Drive MS 6A2, Fairfax, VA 22030, bklinger@gmu.edu

### **Current Research Interests**

Numerical, analytical, and laboratory modeling of geophysical fluid dynamics processes relevant to ocean general circulation and climate dynamics.

### **Education**

S.B., Physics, Massachusetts Institute of Technology (MIT), 1985

Ph.D., Physical Oceanography, MIT-Woods Hole Oceanographic Institution, March, 1992.  
Doctoral Thesis: Eddy generation at a convex corner by a coastal current in a rotating system.  
Faculty advisor: Dr. J. A. Whitehead

### **Appointments**

Associate Professor of Oceanography, George Mason University, 2000-present  
Adjunct Research Scientist, COLA, 2000-present

Assistant Professor of Oceanography, Nova Southeastern University Oceanographic Center, 1994--2000.

Postdoctoral Associate, MIT Center for Meteorology and Physical Oceanography, 1992--1994.  
Faculty advisor: Professor John Marshall.

### **Previous Research Experience**

Performed diagnostics on a spectral model of a barotropic jet while working for Professor Glenn Flierl at MIT (1985-1986). As an undergraduate research assistant, calculated expression for magnetohydrodynamic waves generated by the Space Shuttle, and measured the rotation period of a neutron star system.

## Textbook

Klinger, B. A., and T. W. N. Haine, 2018: *Ocean Circulation in Three Dimensions*, Cambridge University Press, in press.

## Publications

Garuba, O. A., and B. A. Klinger, 2018: The role of individual surface flux components in the passive and active ocean heat uptake, *J. Clim.*, 31, early online release.

Garuba, O. A., and B. A. Klinger, 2016: Ocean heat uptake and interbasin transport of passive and redistributive surface heating, *J. Clim.*, 29, 7507-7527.

Zhao, X., E. Maibach, J. Gandy, J. Witte, H. Cullen, B. Klinger, K. Rowan, J. Witte, and A. Pyle, 2013: Climate change education through TV weathercasts: Results of a Field Experiment, *Bull. Amer. Meteor. Soc.*, early online release.

Huang, B., Z.-H. Hu, E. K. Schneider, Z. Wu, Y. Xue., and B. Klinger, 2011: Influences of tropical-extratropical interaction on the multidecadal AMOC variability in the NCEP climate forecast system, *Climate Dyn.*, DOI 10.1007/s00382-011-1258-z.

Klinger, B. A., and C. Cruz, 2009: Decadal response of global circulation to Southern Ocean zonal wind stress perturbation, *J. Phys. Oceanogr.*, 39, 1888-1904.

Klinger, B. A., B. Huang, B. Kirtman, P. Schopf, and J. Wang, 2006: Monthly climatologies of ocean friction velocity cubed, *J. Clim.*, 19, 5716-5724.

Klinger, B. A., C. Cruz, and P. Schopf, 2006: Targeted Shapiro filter in an ocean model, *Ocean Modelling*, 13, 148-155.

Klinger, B. A., S. Drijfhout, J. Marotzke, and J. Scott, 2004: Remote wind-driven overturning in the absence of the Drake Passage Effect. *J. Phys. Oceanogr.*, 34, 1036-1049.

Solomon, A., J. P. McCreary, R. Kleeman, and B. A. Klinger, 2003: Interannual and decadal variability in a coupled ocean-atmosphere model of the Pacific region. *J. Climate*, 16, 383-405.

Klinger, B. A., S. Drijfhout, J. Marotzke, and J. Scott, 2003: Sensitivity of basin-wide meridional overturning to diapycnal diffusion and remote wind forcing in an idealized Atlantic-Southern Ocean geometry. *J. Phys. Oceanogr.*, 33, 249-266.

Klinger, B. A., J. P. McCreary, and R. Kleeman, 2002: The relationship between oscillating subtropical wind and equatorial temperature. *J. Phys. Oceanogr.*, 32, 1507-1521.

Klinger, B. A., 2000: Acceleration of general circulation model convergence by exponential extrapolation. *Ocean Modelling*, 2, 61--72.

Klinger, B. A., and J. Marotzke, 2000: Meridional heat transport by the subtropical cell. *J. Phys. Oceanogr.*, 30, 696--705.

Marotzke, J., and B. A. Klinger, 2000: Dynamics of equatorially asymmetric thermohaline circulations. *J. Phys. Oceanogr.*, 30, 950-970.

Kleeman, R., J. P. McCreary, and B. A. Klinger, 1999: A mechanism for generating ENSO decadal variability. *Geophys. Res. Lett.*, 26, 1743--1746.

Klinger, B. A., and J. Marotzke, 1999: Behavior of double hemisphere thermohaline flows in a single basin. *J. Phys. Oceanogr.*, 29, 382--399.

Lu, P., J. P. McCreary, and B. A. Klinger, 1998: A numerical investigation of the source waters of the Pacific Equatorial Undercurrent. *J. Phys. Oceanogr.*, 28, 62--84.

- Klinger, B. A., J. Marshall, and U. Send, 1996: Representation and parameterization of deep convective plumes by mixing. *J. Geophys. Res.*, 101, 18,175-18,182.
- Klinger, B. A., 1996: A kinematic model of wind-driven meridional heat transport. *J. Phys. Oceanogr.*, 26, 131-135.
- Klinger, B. A. and J. Marshall, 1995: Regimes and scaling laws for rotating deep convection in the ocean. *Dyn. Atmos. Oceans*, 21, 227-256.
- Klinger, B. A., 1994: Inviscid current separation from rounded capes. *J. Phys. Oceanogr.* 24, 1805-1811.
- Klinger, B. A., 1994: Baroclinic eddy generation at a sharp corner in a rotating system. *J. Geophys. Res.*, 99, 12,515-12,532.
- Klinger, B. A., 1993: Gyre formation at a corner by rotating barotropic coastal flows along a slope. *Dyn. Atmos. Oceans*. 19, 27-64.
- Whitehead, J. A., M. E. Stern, G. R. Flierl and B. A. Klinger, 1990: Experimental observations of baroclinic eddies on a sloping bottom. *J. Geophys. Res.* 95, 9585-9610.

### **Review Articles**

- Soloviev, A., and B. Klinger, 2001: Open Ocean Convection, *Encyclopedia of Ocean Sciences*, Steele, J., S. Thorpe and K. Turekain, ed., Academic Press, London, UK, in press.

### **Presentations**

- Klinger, B. A., 2018: Ocean Circulation and Heat Uptake, invited talk, Second Annual Earth Day Research Symposium, University of Maryland Baltimore County, April 2018.
- Klinger, B. A., and O. A. Garuba, 2016: Pathways of Atlantic subpolar heat uptake, 2016 Ocean Sciences Meeting, New Orleans, February 2016.
- Garuba, O. A. and B. A. Klinger, 2016: Mechanisms of Ocean Heat Uptake, invited talk, University of Oslo Department of Geosciences.
- Garuba, O. A., and B. A. Klinger, 2015: Passive advection and redistribution in ocean basins, AGU 2015 Joint Assembly, 3-7 May.
- Klinger, B. A., and O. A. Garuba, 2012: Comparison of decadal AMOC variability among climate models, AMOC PI Meeting, boulder, CO, August 2012.
- Klinger, B. A., 2012: A cause of inter-model variation in 21<sup>st</sup> century meridional overturning projections, Ocean Sciences Meeting, Salt Lake City, February 2012.
- Rowan, K. E., Baldwin, P. K., Witte, H. J., Klinger, B. A., Maibach, E. W., & Brown, B. C. (2010, August). "Early adopter" TV meteorologists: Do they use NAS best practices when explaining climate change? Presentation at the preconference on Climate Change Communication in connection with the annual meeting of the Association for Education in Journalism and Mass Communication, Denver, CO.
- Rowan, K. E., Klinger, B. A., Witte, H. J., Baldwin, P. K., Brown, B. C., & Maibach, E. W. (2011, January). Communicating climate change in a weathercasting context: "Early adopter" TV meteorologists and their educational methods. Presentation at the annual meeting of the American Meteorological Association, Seattle, WA.

- Rowan, K. E., Baldwin, P. K., Klinger, B. A., Witte, H. J. Brown, B. C. (2011, February). Best practices of TV meteorologists who already communicate climate change. Presentation at the annual meeting of the American Association for the Advancement of Science
- Klinger, B. A., and M. Harrison, 2010: Meridional wind stress and the circulation and SST of the eastern South Pacific, poster, Ocean Sciences Meeting, Portland, Feb., 2010.
- Klinger, B. A., M. J. Harrison, and P. Schopf, 2009: Subsurface pathways and eastern Pacific sea surface temperature, accepted American Geophysical Union Fall Meeting, San Francisco, December, 2009.
- Cruz, C. A., and B. Klinger, 2009: Time dependent response of SST and overturning to Southern Ocean wind perturbation, poster, First US Atlantic Meridional Overturning Circulation Annual Meeting, Annapolis, MD, May 2009.
- Klinger, B. A., 2008: Ocean Circulation and Climate, Mid-Atlantic Senior Physicists Group, American Physical Society Headquarters (15 October, 2008).
- Klinger, B. A., and C. Cruz, 2008: How Southern Ocean winds can change global currents, invited talk, GMU Computational Data Sciences Colloquium (20 March, 2008), and invited talk, University of South Carolina Marine Science Seminar Series (7 November, 2008).
- Cruz, C., and Klinger, B. A., 2008: Sensitivity of Meridional Overturning Response to Switched-on Southern Ocean Wind, AGU/ASLO Ocean Sciences 2008, Orlando, FL.
- Klinger, B. A., and C. Cruz, 2006: Decadal response of global circulation to perturbation in Southern Ocean wind stress, talk given at COLA, GFDL, WHOI, and MIT, June-July.
- Klinger, B. A., C. Cruz, and P. Schopf, 2005: Targeted Shapiro filter for ocean models. Presented at Layered Ocean Models Meeting, Miami, FL, Jan 2005.
- Klinger, B. A., S. Drijfhout, J. Marotzke, and J. Scott, 2004: Remote wind-driven overturning in the absence of the Drake Passage Effect. Presented at Ocean Sciences Meeting, Portland, OR, January 2004.
- Klinger, B. A., 2001: Subpolar winds and global ocean circulation. Presented at Center for Ocean-Land-Atmosphere Studies.
- Klinger, B. A., J. Marotzke, and S. Drijfhout, 1999: Southern winds and northern overturning: Is the problem solved? Presented at Massachusetts Institute of Technology, June, 1999.
- Klinger, B. A., J. P. McCreary, and R. Kleeman, 1999: The effect of mid-latitude decadal windstress oscillations on Pacific equatorial SST, *1999 Layered Ocean Model Users' Workshop*, University of Miami.
- Klinger, B. A., and J. Marotzke, 1998: Wind-driven meridional heat transport by the Subtropical Cell, *Eos Trans. AGU*, 79, F484.
- Kleeman, R., J. P. McCreary, and B. A. Klinger, 1998: Interannual and decadal variability in a coupled ocean-atmosphere model of the Pacific region, *Eos Trans. AGU*, 79, F484.
- Marotzke, J., and B. Klinger, 1997: Boundary mixing and the dynamics of 3-dimensional thermohaline circulations: spinup of interhemispheric flow. *IAMAS/IAPSO Joint Assemblies*, Melbourne.
- Klinger, B. A., and J. Marotzke, 1996: Double hemisphere thermohaline flows in a single basin. *Eos Trans. AGU*, 77, F423.
- Klinger, B. A., 1994: A kinematic model of wind-driven meridional heat transport. *Eos Trans. AGU*, 75 Suppl., 396.

Klinger, B. A., J. Marshall, U. Send, 1993: A new parameterization of deep water formation for use in ocean climate models. *Eos Trans. AGU, 75 Suppl.*, 189.

Klinger, B. A., J. Marshall, 1993: Scalings laws for convective elements in rotating deep convection. *Ninth Conference on Atmospheric and Oceanic Waves and Stability.*

Klinger, B. A., 1992: Gyre formation at a corner by rotating barotropic coastal currents over a sloping bottom. *Eos Trans. AGU, 72 Suppl.*, 32.

Klinger, B. A., 1990: Gyre formation at a sharp corner by rotating baroclinic boundary currents. *Eos Trans. AGU, 70 Suppl.*, 1407.

### **University Service**

Co-Chair, MS Climate Proposal Committee, 2017-2018.

Represented GMU at UCAR Annual Meeting, Boulder, CO, October 2013.

Curriculum Committee, College of Science, 2006-present (chair, 2011-2013).

Acting chair, Climate Dynamics Program, several periods during 2005-2006 term.

Graduate Coordinator, Climate Dynamics PhD Program, 2003-present.

Climate Dynamics Graduate Recruitment Committee, 2002-present (chair, 2002-2003, 2007-2008, 2011-present)

Author (with J. Shukla and P. Schopf), Climate Dynamics Ph.D. Program Proposal, 2002.

Faculty search committees, Nova Southeastern University: 1996: 1998: 1999 (chair).

### **Professional Service**

Served on NSF Ocean Sciences Panel (twice); served on NOAA Climate panel, served on DOE INCITE panel.

Co-chair, Atlantic Ocean Working Group, CLIVAR Workshop on Shallow Tropical/Subtropical Overturning Cells and their Interaction with the Atmosphere, Venice, Italy, 2000.

Associate Editor, *J. Phys. Oceanogr.*, 1997-2000.

Review on average about 10 papers and proposals per year.

### **Community Service**

Gave talks on ocean modeling, climate, and global warming to students at the Washington Youth Summit on the Environment (WYSE), GMU, June of 2011, 2012, 2013.

“Global Warming: Science and Virginia Impacts,” talk at Prince William Forest [national] Park, October, 2011 and at Rock Creek [national] Park, February 2012..

Gave talk on “Global Warming: The Known, the Unknown, and the Unknowable,” *Focus the Nation* event, George Mason University, Jan, 2008.

Gave talk on “How wind, heating and cooling, and the Earth’s rotation conspire to produce gigantic, unexpected Patterns of the Deep,” Osher Lifelong Learning Institute at George Mason University, March, 2007.

Served on physical oceanography panel to review questions for the National Ocean Sciences Bowl, a quiz contest administered by the Consortium for Oceanographic Research and Education (CORE) to promote interest in oceanography among high school students, 2003.

Gave presentation at Middle School on physical oceanography and climate, Broward County, Florida, 2000.

Wrote op-ed piece on proposed cuts in environmental research, *Miami Herald*, September 11, 1995, p. A9. Quoted in other Florida papers on oceanography and meteorology.

### **Teaching and Advising Experience**

George Mason University (graduate):

- General Circulation of the Ocean,
- Physical Basis of Climate Change.
- Physical Climate System
- Physical and Dynamical Oceanography,
- Topics in Longterm Climate (with J. Kinter),
- Geophysical Fluid Dynamics,
- The Hydrosphere (with L. Chiu),

George Mason University (undergraduate):

- Physical Oceanography;
- Global Climate Change: Weather, Climate and Society (w/ P. Schopf)
- Atmospheric Thermodynamics

Nova Southeastern University (graduate): Concepts in Physical Oceanography (6 yr).

MIT (undergraduate): Electricity and Magnetism.

GMU advising (Ph.D.): C. Cruz (graduated Fall 2010), A. Hazra (2009), O. Garuba (2010-2015), O. Gozdz (2016-2017).

Advised 1 undergraduate student (Jason Gavril) and 2 masters students (Susan Finkle and Michael Hopkins), all at Nova Southeastern University.

Recent membership on dissertation committees:

- Climate Dynamics PhD: E. LaJoie, X. Yan, G. Fang, K. Kodama, Y. Liang
- Environmental Science PhD: A. Roland
- Earth System Science MS: S. Young

## **Grants**

“Collaborative Research: The Role of Ocean Dynamical Feedback and Air-Sea Interaction in the Climate Response to Global Warming,” NSF Atmospheric Science, PI, \$57,000, 7/2013-12/2015.

“Enabling TV meteorologists to provide viewers with climate-related science education based on ICE “best practices,” NSF, with E. Maibach (PI) et al., 1.5 months salary total, 2 years starting Sep., 2009.

“Examining Oceanic Tropical Biases in Climate Models”, NOAA, with Paul Schopf (PI), 3 years starting August 2007, approximately \$400,000.

“Coupled Ocean-Atmosphere Modeling for Hurricane Prediction,” NASA, with Paul Schopf (PI), 1 year. This is one part of a larger, COS-wide proposal. Direct funding: \$100,000.

Global Circulation Variability Induced by Southern Ocean Winds, National Science Foundation, 3 years starting April 2003, \$404,000, P. Schopf is a co-PI.

Competing Deep Water Formation Sources in Global Thermohaline Circulation  
National Science Foundation, 1998--2002, \$267,000.

A Numerical Investigation of ENSO Decadal Variability (with J. P. McCreary)  
National Oceanographic and Atmospheric Administration, 1997—2002.

Dynamics of Three Dimensional Thermohaline Circulations.  
National Science Foundation, 1995-1998, \$264,000.