

ROBERT E. TODD

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RESEARCH INTERESTS

Boundary, coastal, and Equatorial current systems (e.g., Gulf Stream and Loop Current, the California Current System, Middle Atlantic Bight shelf break, Pacific Equatorial Undercurrent, Indian Equatorial currents), upper ocean processes, thermohaline structure, autonomous observations.

APPOINTMENTS

Assistant Scientist (9/2013–present), Postdoctoral Investigator (11/2012–9/2013), Postdoctoral Scholar (5/2011–11/2012); Physical Oceanography Department, Woods Hole Oceanographic Institution, Woods Hole, MA

Graduate Research Assistant (7/2005–5/2011), Scripps Institution of Oceanography, La Jolla, CA

EDUCATION

Ph.D., Oceanography (4/2011), M.S., Oceanography (12/2006), Scripps Institution of Oceanography, UC San Diego

B.S., Physics, Applied Mathematics, and Marine Science (5/2005), North Carolina State University

PUBLICATIONS

Refereed Publications:

12. **Todd, R.E.** (2017b), High-frequency internal waves and thick bottom mixed layers observed by gliders in the Gulf Stream, *Geophys. Res. Lett.*, doi:10.1002/2017GL072580, in press.
11. Rudnick, D.L., K. Zaba, **R.E. Todd**, R.E. Davis (2017), A climatology of the California Current System from a network of underwater gliders, *Prog. Oceanogr.*, doi:10.1016/j.pocean.2017.03.002, in press.
10. **Todd, R.E.**, D.L. Rudnick, J.T. Sherman, W.B. Owens, L. George (2017), Absolute velocity estimates from autonomous underwater gliders equipped with Doppler current profilers, *J. Atmos. Oceanic Technol.*, 34(2), 309–333, doi:10.1175/JTECH-D-16-0156.1.
9. **Todd, R.E.**, W.B. Owens, D.L. Rudnick (2016), Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations, *J. Phys. Oceanogr.*, 46(1), 327–348, doi:10.1175/JPO-D-15-0112.1.
8. Cenedese, C., **R.E. Todd**, G.G. Gawarkiewicz, W.B. Owens, A.Y. Shcherbina (2013), Offshore transport of shelf waters through interaction of vortices with a shelfbreak current, *J. Phys. Oceanogr.*, 43(5), 905–919, doi:10.1175/JPO-D-12-0150.1.
7. **Todd, R.E.**, G.G. Gawarkiewicz, W.B. Owens (2013), Horizontal scales of variability over the Middle Atlantic Bight shelf break and continental rise from finescale observations, *J. Phys. Oceanogr.*, 43(1), 222–230, doi:10.1175/JPO-D-12-099.1.

6. Gawarkiewicz, G.G., **R.E. Todd**, A.J. Plueddemann, M. Andres, J.P. Manning (2012), Direct interaction between the Gulf Stream and the shelfbreak south of New England, *Sci. Rep.*, 2, 553, doi:10.1038/srep000553.
5. **Todd, R.E.**, D.L. Rudnick, M.R. Mazloff, B.D. Cornuelle, R.E. Davis (2012), Thermohaline structure in the California Current System: observations and modeling of spice variance, *J. Geophys. Res.*, 117, C02008, doi:10.1029/2011JC007589.
4. Johnston, T.M.S., D.L. Rudnick, G.S. Carter, **R.E. Todd**, S.T. Cole (2011), Internal tidal beams and mixing near Monterey Bay, *J. Geophys. Res.*, 116, C03017, doi:10.1029/2010JC006592.
3. **Todd, R.E.**, D.L. Rudnick, M.R. Mazloff, R.E. Davis, B.D. Cornuelle (2011b), Poleward flows in the southern California Current System: Glider observations and numerical simulation, *J. Geophys. Res.*, 116, C02026, doi:10.1029/2010JC006536.
2. **Todd, R.E.**, D.L. Rudnick, R.E. Davis, M.D. Ohman (2011a), Underwater gliders reveal rapid arrival of El Niño effects off California's coast, *Geophys. Res. Lett.*, 38, L03609, doi:10.1029/2010GL046376.
1. **Todd, R.E.**, D.L. Rudnick, R.E. Davis (2009), Monitoring the greater San Pedro Bay region using autonomous underwater gliders during fall of 2006, *J. Geophys. Res.*, 114, C06001, doi:10.1029/2008JC005086.

Manuscripts in Preparation

1. Mallen, A., E. Spiller, L. Pratt, **R.E. Todd** (2017), Lagrangian data assimilation at depth: Assimilating glider data into a two-layered coastal upwelling model, in preparation.

Other Publications

6. Goni, G.J., S. Glenn, J. Dong, R. Curry, **R.E. Todd**, R. Domingues, T. Miles, G. Seroka, J. Morell, G.G. Gawarkiewicz, F. Bringas, J. Heiderich (2017), Underwater glider observations for Atlantic tropical cyclone studies and forecasts, Autonomous and Lagrangian Sensors and Platforms (ALPS II) white paper. Available at <https://alps-ocean.us/white-papers/>.
5. **Todd, R.E.** (2017a), On the potential for sustained Gulf Stream monitoring with autonomous underwater gliders, Autonomous and Lagrangian Sensors and Platforms (ALPS II) white paper. Available at <https://alps-ocean.us/white-papers/>.
4. Rudnick, D.L., K.D. Zaba, **R.E. Todd**, and R.E. Davis, A climatology using data from the California Underwater Glider Network. Publicly available dataset, doi:10.21238/S8SPRAY7292.
3. **Todd, R.E.** and W.B. Owens, Gliders in the Gulf Stream. Publicly available dataset, doi:10.21238/S8SPRAY2675.
2. Carroll, J.W., S. Carpenter, B. Ehrlich, K. Harrison, G. Maddrey, K. Martell, S. Miller, N. Sasser, S. Sutton, **R. Todd**, D. Tysinger, L. Wingler (2014), *A Time Travel Dialogue*. Open Book Publishers. Cambridge, UK. doi:10.11647/OBP.0043.
1. **Todd, R.E.** (2011), Upper ocean processes observed by underwater gliders in the California Current System, Ph.D. Thesis, Scripps Institution of Oceanography, UC San Diego, 168 pp.

RESEARCH FUNDING

Currents, Turbulence, and Hydrography Measured by Gliders during Monsoon Intra-seasonal Oscillations. **R.E. Todd** and L.S. St. Laurent. ONR Oceanic Control of Monsoon Intra-Seasonal Oscillations in the Tropical Indian Ocean and the Bay Of Bengal (MISO-BOB) DRI, \$1,811,619, January 2017–September 2021.

Finescale Structure and Dynamics of the Gulf Stream. **R.E. Todd**. NSF Physical Oceanography, \$1,162,494, October 2016–September 2019.

High-Resolution Observations in the Gulf Stream using Autonomous Underwater Gliders. **R.E. Todd**. ONR Physical Oceanography, \$139,965, June 2016–May 2018.

Collaborative Research: An Observational and Modeling Study of the Physical Processes Driving Exchanges between the Shelf and the Deep Ocean At Cape Hatteras. **R.E. Todd**, M. Andres, G.G. Gawarkiewicz. NSF Physical Oceanography, \$1,865,131, April 2016–March 2020.

Temporal and spatial variability within the Arabian Sea from autonomous glider observations. **R.E. Todd**. ONR Northern Arabian Sea Circulation–autonomous research (NASCar) DRI, \$543,214, May 2015–November 2018.

Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations. **R.E. Todd**. WHOI Independent Research and Development, \$38,532, April–December 2015.

Monitoring the Gulf Stream with autonomous underwater gliders. **R.E. Todd**. Jointly funded by the WHOI Oceans and Climate Change Institute, the W. Van Alan Clark, Jr. Chair for Excellence in Oceanography, Eastman Chemical Company, and NOAA \$135,401, March 2015–June 2016.

Integrated rapid-response observations and ocean ensemble optimization to improve storm intensity forecasts in the northeast US. G.G. Gawarkiewicz and 18 Co-PIs including **R.E. Todd**. NOAA, \$5,497,000, September 2013–August 2016.

Advancing glider-based Doppler current estimates: Ground truthing and improving data processing. **R.E. Todd**, W.B. Owens. WHOI Access to the Sea, \$66,964, June 2012–June 2014.

FELLOWSHIPS AND AWARDS

Postdoctoral Scholarship, Woods Hole Oceanographic Institution, 2011–2012

Outstanding Student Paper Award, 2010 American Geophysical Union Fall Meeting

Achievement Rewards for College Scientists (ARCS) Foundation, Inc. Scholarship, Los Angeles Chapter, 2010

UCSD Chancellor's Fellowship, 2005–2009

National Defense Science and Engineering Graduate Fellowship, 2005–2008

Phi Kappa Phi Graduate Fellowship, 2005–2006

Woods Hole Oceanographic Institution Summer Student Fellowship, Summer 2004

TEACHING AND ADVISING

Thesis advisor for Julie Jakoboski (MIT-WHOI, with W.B. Owens and K.B. Karnauskas, 2015–present) and Joleen Heiderich (MIT-WHOI, 2016–present). Summer Student Fellowship advisor for Joleen Heiderich (2014).

Instructor, MIT-WHOI Coastal Physical Oceanography course (12.862): Co-taught a graduate course on dynamical processes from estuaries to the outer continental shelf. Fall 2014, Fall 2016.

Guest Lecturer, MIT-WHOI Introduction to Observational Physical Oceanography (12.808): Guest lecture on autonomous underwater glider observations. Fall 2015.

Instructor, Woods Hole Partnership Education Program: Co-developed and co-taught a physical oceanography module for undergraduate students from underrepresented groups. Summers 2012–2013.

Visiting Scientist, Sea Education Association, MIT-WHOI Joint Program Orientation cruise: Introduced new graduate students to sea-going oceanography and the Middle Atlantic Bight shelfbreak frontal region in collaboration with Sea Education Association. Summer 2012.

Teaching Assistant, UCSD, SIO 30: The Oceans. Lower division undergraduate course covering physical, biological, chemical, and geological oceanography. Attended lectures, led two discussion sessions per week, and held office hours. Fall 2009.

Supplemental Instruction Leader and Tutor, NCSU Undergraduate Tutorial Center. Led discussion sessions for undergraduate physics courses and tutored undergraduate mathematics and physics. Regular training in effective teaching methods. Spring 2002–Spring 2005.

FIELD EXPERIENCE

Principal investigator or collaborator for WHOI-based autonomous underwater glider operations totaling over 1,200 glider-days since 2011. See <http://gliders.who.edu>. Collaborator in 4 major multi-investigator field programs (TEMPESTS, NASCar, PEACH, MISO-BOB).

Spray glider operations, Seychelles, 1 day, Seychelles Coast Guard Patrol Ship *Etoile*, March 2017.

Spray glider operations, Florida Strait off Miami, 4 days, April, July, and October 2015, August 2016.

Spray glider operations, Middle Atlantic Bight shelf, 2 days, R/V *Tioga*, January and April 2016.

Spray glider and XSpar operations, Middle Atlantic Bight shelf, 2 days, M/V *Warren Jr.*, June 2015.

Slocum glider operations, Middle Atlantic Bight shelf, 2 days, R/V *Tioga* and R/V *Discovery*, March and July 2014.

Spray glider, mooring, and CTD operations, Line W, northwestern Atlantic, 15 days, R/V *Knorr*, August 2012.

MIT-WHOI Joint Program Orientation cruise, Middle Atlantic Bight shelfbreak, 9 days, SSV *Corwith Cramer*, June-July 2012.

CTD surveys of shelfbreak front, Middle Atlantic Bight south of Cape Cod, 2 days, R/V *Tioga*, July 2011.

Spray glider recovery and deployment, Philippine Sea off Palau, 5 days total, R/V *Kemedukl*, September 2009, February and November 2010.

Spray glider recovery and deployment, Santa Barbara Channel, California, 1 day, August 2009.

SeaSoar surveys along 158°W, north of Oahu, Hawaii, 13 days, R/V *Kilo Moana*, December 2007.

Glider operations (Spray and Seaglider) and Underway CTD surveys in the Kuroshio, off Taiwan and the Philippines, 22 days total, R/V *Melville*, July and October 2007.

SeaSoar surveys as part of the AESOP program, off Monterey, California, 31 days, R/V *Wecoma*, August 2006.

Equipment testing and CTD casts, off San Diego, California, 1 day, R/V *Robert Gordon Sproul*, August 2005.

Duke/UNC Oceanographic Consortium ROV Training Cruise, Onslow Bay, North Carolina, 4 days, R/V *Cape Hatteras*, October 2003.

WORKSHOP PARTICIPATION

Twentieth Session of the Ocean Observations Panel for Climate (OOPC-20). Woods Hole, MA. 14–17 March 2017.

Autonomous and Lagrangian Platforms and Sensors (ALPS II) workshop. La Jolla, CA. 21–24 February 2017.

Implementation of Multi-Disciplinary Sustained Ocean Observation (IMSOO) workshop, organized by the Global Ocean Observing System (GOOS) and IEEE OceanObs Research Coordination Network. Miami, FL. 8–10 February 2017.

U.S. Underwater Glider workshop, organized by the Interagency Ocean Observation Committee (IOOC). ‘Sustained Monitoring’ discussion leader. Pearlington, MS. 18-19 January 2017.

Velocity Measurements from Gliders (with ADCPs) Workshop, as part of the 7th EGO Conference on Autonomous Ocean Gliders and their Applications. Southampton, UK. 27 September 2016. Organizer.

CINAR Shelfbreak Ecosystem Workshop. Providence, RI. 7–8 January 2013

Oceanography of the Continental Shelf and Slope: Pioneer Array Science Workshop. New Bedford, MA. 4–5 June 2012.

Velocity Measurements from Gliders Workshop, Ocean Sciences Meeting. Salt Lake City, UT. 21 February 2012.

SERVICE

Reviewer for *Geophys. Res. Lett.*, *J. Geophys. Res.*, *J. Phys. Oceanogr.*, *J. Atmos. Oceanic Technol.*, *Prog. Oceanogr.*, *Deep-Sea Res. I*, *J. Mar. Res.*, *Oceanogr.*, *Biogeosciences*, National Science Foundation, CONICYT (Chile), Alaska Coastal Marine Institute

Member, OOPC Boundary Current/Shelf Sea Interaction task team. 2017–present.

Guest Editor, *Oceanography*, Vol. 30, No. 2, Autonomous and Lagrangian Platforms (ALPS), 2017.

Panelist, XBT Program Review, NOAA Ocean Observing and Monitoring Division, Miami, FL, 6–7 February 2017.

Member, OceanGliders Boundary Ocean Observing Network (BOON) task team, 2016–present.

Organizer, ‘Velocity Measurements from ADCPs on Gliders’ workshop at 7th EGO Conferences, Southampton, UK, 27 September 2016.

Session Chair, 2016 Ocean Sciences Meeting, Coastal Seas and Deep Ocean Connections: Observing and Modeling for Process and Climate Studies

Member, WHOI Marine Operations Committee, 2015–present.

Member, WHOI Coastal Ocean Institute Advisory Committee, 2015–2016.

Member, WHOI Physical Oceanography Department, Scientific Staff Recruitment Committee, 2014, 2015–present.

Coordinator, WHOI Physical Oceanography Seminar series, 2013–2015.

Member (Postdoctoral Representative), WHOI Educational Council, 2011–2012.

WHOI Postdoctoral Association, Vice President and Physical Oceanography Representative, 2011–2012.

Member (Student Representative), SIO Oceans and Atmospheres Faculty Search Committee, Spring 2010.

Member (Student Representative), SIO Marine Operations Committee, 2009–2010.

Member (Student Representative), SIO Physical Oceanography Curriculum Review, 2009.

Organizing Committee, International Meeting of Students in Physical Oceanography 2008.

MEMBERSHIPS AND CERTIFICATIONS

American Geophysical Union, Member

Phi Beta Kappa Honor Society, Member

Phi Kappa Phi Honor Society, Member

Scuba Diving: AAUS Scientific Diver (100ft, expired), IANTD Nitrox, DAN O₂ Administration, Medic First Aid/CPR/AED/O₂, PADI Rescue Diver

LECTURES

April 2017 (Invited), Department of Estuarine and Ocean Sciences Seminar, University of Massachusetts Dartmouth, New Bedford, MA. *New views of the Gulf Stream*.

February 2017 (Invited plenary), Autonomous and Lagrangian Platforms and Sensors (ALPS II) workshop, La Jolla, CA. *Autonomous and Lagrangian studies of coastal and boundary current systems*.

September 2016 (Invited), Physical Oceanography and Climate Seminar, National Oceanography Centre, Southampton, UK. *Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations* (with W.B. Owens and D.L. Rudnick).

November 2015, Physical Oceanography Seminar, Woods Hole Oceanographic Institution, Woods Hole, MA. *Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations* (with W.B. Owens and D.L. Rudnick).

May 2015 (Invited), School of Oceanography, University of Washington, Seattle, WA. *Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations* (with W.B. Owens and D.L. Rudnick).

March 2015 (Invited), Graduate School of Oceanography, University of Rhode Island, Narragansett, RI. *Potential vorticity structure in the North Atlantic western boundary current from underwater glider observations* (with W.B. Owens and D.L. Rudnick).

June 2013 (Invited), Dept. of Ocean, Earth, and Atmospheric Sciences, Old Dominion University, Norfolk, VA. *Cross-shelfbreak exchange in the Middle Atlantic Bight*.

May 2013 (Invited), Physical Oceanography Seminar, Woods Hole Oceanographic Institution, Woods Hole, MA. *Cross-shelfbreak exchange in the Middle Atlantic Bight*.

May 2013 (Invited), CASPO Seminar, Scripps Institution of Oceanography, La Jolla, CA. *Western boundary current influences on the coastal ocean*.

March 2013 (Invited), Sack Lunch Seminar, Dept. of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA. *Cross-shelfbreak exchange in the Middle Atlantic Bight*.

February 2013 (Invited), Physics Colloquium, California Polytechnic State University, San Luis Obispo, CA. *Cross-shelfbreak exchange in the Middle Atlantic Bight*.

January 2013 (Invited), CASPO Seminar, Scripps Institution of Oceanography, La Jolla, CA. *Cross-shelfbreak exchange in the Middle Atlantic Bight*.

October 2011, Physical Oceanography seminar, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI. *Thermohaline structure in coastal systems*.

September 2011, Physical Oceanography seminar, Woods Hole Oceanographic Institution, Woods Hole, MA. *Thermohaline structure in coastal systems*.

November 2010, Coastal Ocean Fluid Dynamics Laboratory seminar, Woods Hole Oceanographic Institution, Woods Hole, MA. *Mesoscale and submesoscale processes observed by underwater gliders in the California Current System*.

SELECTED CONFERENCE PRESENTATIONS (PRESENTING AUTHOR ONLY WHILE AT WHOI)

Todd, R.E. High-frequency internal waves and thick bottom mixed layers observed by gliders in the Gulf Stream. ONR Physical Oceanography Program Review, Herndon, VA. 30 March 2017.

Todd, R.E. Hydrographic and velocity structure in the Equatorial Indian Ocean from underwater glider observations. ONR Physical Oceanography Program Review, Herndon, VA. 29 March 2017.

Todd, R.E. Gliders in the Gulf Stream: Lee waves and bottom mixed layers. Autonomous and Lagrangian Platforms and Sensors (ALPS II) workshop, La Jolla, CA. 21–24 February 2017. Poster.

Todd, R.E. Gliders in the Gulf Stream: Lee waves and bottom mixed layers. U.S. Underwater Glider Workshop, Pearlington, MS. 18-19 January 2017. Poster.

Todd, R.E. Arthur and Hermine: Glider-based observations of two tropical systems in the MAB. Mid-Atlantic Bight Physical Oceanography and Meteorology Meeting. Fall River, MA. 27 October 2016.

Todd, R.E.. New views of the Gulf Stream. 7th EGO Conference on Autonomous Ocean Gliders and their Applications. Southampton, UK. 27 September 2016.

Todd, R.E.. New views of the Gulf Stream. Ocean Sciences meeting. New Orleans, LA. 26 February 2016.

Todd, R.E., J. Heiderich, G.G. Gawarkiewicz. Storms and stratification on the Middle Atlantic Bight shelf. Mid-Atlantic Bight Physical Oceanography and Meteorology Meeting. Gloucester Point, VA. 30 October 2014.

Todd, R.E., W.B. Owens, D.L. Rudnick. Potential vorticity in the Loop Current and Gulf Stream. Ocean Sciences Meeting. Honolulu, HI. 27 February 2014. Poster.

Todd, R.E., W.B. Owens, D.L. Rudnick. Potential vorticity in the Gulf Stream and Loop Current. Mid-Atlantic Bight Physical Oceanography and Meteorology Meeting. Narragansett, RI. 17 October 2013.

Todd, R.E., Doppler current measurements from Spray gliders. 2013 Nortek Technical Symposium. San Diego, CA. 20 September 2013.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Horizontal scales of variability over the Middle Atlantic Bight shelfbreak and continental rise from finescale observations. Gordon Research Conference and Seminar, Coastal Ocean Circulation. Biddeford, ME. 8–14 June 2013. Poster.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Horizontal scales of variability over the Middle Atlantic Bight shelfbreak and continental rise from finescale observations. WHOI Postdoctoral Symposium. Woods Hole, MA. 17 October 2012. Poster.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Horizontal scales of variability over the Middle Atlantic Bight shelfbreak and continental rise from finescale observations. CINAR 5 Year Review. Woods Hole, MA. 6 September 2012. Poster.

Todd, R.E., Processing Methods for Doppler Current Measurements from Gliders. Velocity Measurements from Gliders workshop, Ocean Sciences Meeting. Salt Lake City, UT. 21 February 2012.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Finescale Observations of the Middle Atlantic Bight Shelfbreak and Slope. Ocean Sciences Meeting. Salt Lake City, UT. 21 February 2012.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Glider observations of the MAB shelfbreak and slope. Oral Presentation. WHOI Postdoctoral Symposium. Woods Hole, MA. 20 October 2011.

Todd, R.E., G.G. Gawarkiewicz, W.B. Owens. Glider observations of the MAB shelfbreak and slope. Mid-Atlantic Bight Physical Oceanography and Meteorology Meeting. Cambridge, MD. 11 October 2011.