ANDREY SHCHERBINA

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RESEARCH INTERESTS

Long-term observations and process studies:

- Submesoscale turbulence, from estuaries to open ocean
- Combined effects of wind, wave, and buoyancy forcing in the upper ocean
- High-latitude dense water formation and cross-shelf transport

RESEARCH EXPERIENCE

Waves, Langmuir Cells, and the Upper Ocean Boundary Layer DRI 2014 –
Preparing to conduct Lagrangian Float observations of Langmuir turbulence.
APL (Co-PI: E. D'Asaro, R. Harcourt)

The Under-Ice Float 2014 –
Developing control algorithms and sampling strategy for the UnderIce float, a new autonomous platform for sea ice and upper ocean observations.
APL (Co-PI: E. D'Asaro, B. Light, J. Deming)

Salinity Processes in the Upper-Ocean Regional Study (SPURS) 2012 –
Investigating the role of upper-ocean boundary layer processes in formation of North Atlantic Salinity maximum.
APL (Co-PI: E. D'Asaro)

Lateral Mixing Experiment 2011 – 2014
Studying the effects of submesoscale frontal processes on lateral ocean mixing.
APL (in collaboration with E. D'Asaro and C. Lee)

Wave Impacts on Upper Ocean Mixing 2010 – 2014
Characterizing the contribution of wave-driven Langmuir turbulence to ocean mixed layer dynamics. Contrasting Lagrangian turbulence observations in a lake and in the open ocean.
APL (in collaboration with E. D'Asaro, R. Harcourt, and J. Thomson)

Columbia River Estuary Dynamics 2009 – present
Autonomous Underwater Vehicle operations in support of NSF Coastal Margin

Observation and Prediction initiative.
APL (in collaboration with C. McNeil)

Evolution of Thermohaline Intrusions 2007 – 2010
Investigated dynamics and three-dimensional structure of thermohaline frontal intrusions. Developed methods for optimal adaptive mapping of small- and mesoscale frontal features with a towed instrument and data analysis techniques.
APL (in collaboration with M. Gregg and M. Alford)

Wintertime Coastal Current dynamics 2004 – 2007
Led a multi-year program of field studies of wintertime evolution of a coastal current east of Cape Cod. Combined autonomous underwater vehicle (AUV), moored, and shipboard observations to establish a low-cost coastal observing system. Used in-situ observations and process-oriented numerical modeling to describe the joint effects of wintertime wind and buoyancy forcing on coastal circulation.
Woods Hole Oceanographic Institution, Woods Hole, MA (Co-PI: G. Gawarkiewicz)

Okhotsk Sea Dense Shelf Water (DSW) formation 2000 – 2004
Observed brine rejection as the primary mechanism of deep sea water (DSW) ventilation. Combined hydrographic observations with process-oriented numerical modeling investigating the role of tidal mixing and baroclinic eddy transport in DSW evolution. Estimated the rates of formation and export of DSW based on in-situ mooring and satellite data.
Scripps Institution of Oceanography, La Jolla, CA (Advisor: L. Talley)

Internal wave energy distribution in Japan/East Sea 1998 – 2000
Demonstrated enhancement of upward-propagating internal wave energy in deep layers of the basin using lowered and shipboard ADCP data. Observed trapping of near-inertial internal waves in the subpolar front region.
Scripps Institution of Oceanography, La Jolla, CA (Advisor: L. Talley)

North Pacific Intermediate Water (NPIW) dynamics 1995 – 1998
Investigated the effects of vertical momentum transfer and non-linear mixing using analytical models and observations. Showed that these factors can be potentially important forcing mechanisms of the NPIW layer.
P.P.Shirshov Institute of Oceanology, Moscow, Russia (Advisor: N. Maximenko)

EDUCATION

Ph. D. in Physical Oceanography 1998 – 2004
Scripps Institution of Oceanography, University of California, San Diego
Dissertation title: *Dense water formation on the northwestern shelf of the Okhotsk Sea*
Advisors: Dr. Lynne D. Talley, Dr. Daniel L. Rudnick

M. S. in Physical Oceanography, *summa cum laude* 1991 – 1998
Moscow Institute of Physics and Technology, Moscow, Russia
Dissertation title: *The role of vertical mixing and friction in North Pacific Intermediate Water dynamics.*
Advisor: Dr. Nikolai Maximenko

GRANTS AND FUNDING

Woods Hole Oceanographic Institution Postdoctoral Scholarship 2004 – 2005

Wintertime watermass modification on the Outer Cape Cod Shelf 2005 – 2006
(Coastal Ocean Institute, Woods Hole Oceanographic Institution, with G. Gawarkiewicz)

Autonomous underwater vehicle studies of wintertime evolution of the coastal current system East of Cape Cod, MA 2006 – 2008
(Sea Grant, Woods Hole Oceanographic Institution, with G. Gawarkiewicz)

High-resolution near-surface turbulence measurements using Lagrangian floats
(NASA, with E.D'Asaro) 2012 – 2014

Waves, Langmuir Cells, and the Upper Ocean Boundary Layer DRI 2014 – 2017
(ONR, with E.D'Asaro, R.Harcourt, J.-H. Liang)

The Under-Ice Float 2014 – 2015
(Paul G. Allen Family Foundation, with E.D'Asaro, B. Light, J. Deming)

A pilot autonomous underwater vehicle (AUV) study of the Columbia 2014 – 2015
River mouth dynamics: synthesis and expansion
(APL internal, with C. McNeil)

TEACHING EXPERIENCE

Teaching Assistant 2005
MIT/WHOI joint program graduate student orientation cruise
Teaching Fellow 2005
Introduction to Observational Physical Oceanography, MIT/WHOI graduate-level course
Informal seminar leader 2006
Regional Ocean Modeling System (ROMS) graduate student seminar

AWARDS AND HONORS

Soros Student Scholarship 1996, 1997, 1998
Tabata award for outstanding student presentation, Mombetsu, Japan 2001
Best presentation award, 3rd Physical Oceanography Dissertation Symposium 2005

INVITED PRESENTATIONS

North Pacific ventilation: brine rejection and dense water formation in the Okhotsk Sea 2005
International Pacific Research Center, University of Hawaii, outstanding young researcher seminar series
A density battle off Outer Cape Cod 2006
Cape Cod National Seashore Salt Pond Visitor Center

SEAGOING EXPERIENCE

Barents Sea, R/V Vavilov. Underway ADCP and mooring operations, data analysis 1997

Japan/East Sea, R/V Khromov. Underway and lowered ADCP operations, data analysis. 1999

North Pacific, R/V Melville. Lowered ADCP and CTD operations 2002

South Atlantic/Antarctica, R/V Vavilov. Supervision of lowered ADCP operations 2003

Outer Cape Cod, R/V Tioga (>15 one-day cruises). Planning and supervision of AUV REMUS, ADCP and mooring operations; data analysis 2005 – 2007

New Jersey shelfbreak, R/V Tioga. Supervision of AUV REMUS operations. 2005

Chukchi Sea shelf, small-boat operations. AUV REMUS operations and data analysis. 2005

New Jersey shelfbreak, R/V Endeavor. Towed adaptive sampling 2006

North Pacific subtropical front, R/V Wecoma. Towed adaptive sampling of small-scale frontal structures, real-time data visualization. 2007

Columbia River plume, R/Vs Point Sur, Wecoma. Adaptive sampling of fresh water plume with shipboard and autonomous instrumentation; AUV REMUS operations and data analysis 2009 – 2013

Gulf Stream region, R/Vs Endeavor, Knorr (Lateral Mixing Experiment). Adaptive sampling of submesoscale features with towed and autonomous instrumentation. 2011, 2012

Sargasso Sea, R/V Knorr (SPURS experiment). Lagrangian float deployment 2012

PUBLICATIONS

1. Shcherbina, A.Y., E.A. D'Asaro, S.C. Riser, and W.S. Kessler (2015). Variability and interleaving of upper-ocean water masses surrounding the North Atlantic Salinity Maximum. *Oceanography*, revision submitted.
2. Shcherbina, A.Y., et al. (2014). The LatMix Summer Campaign: Submesoscale Stirring in the Upper Ocean, *Bull. Amer. Meteor. Soc.*, revision submitted.
3. D'Asaro, E., J. Thomson, A. Shcherbina, R. Harcourt, M. Cronin, M. Hemer, and B. Fox-Kemper (2014). Quantifying upper ocean turbulence driven by surface waves, *Geophys. Res. Lett.*, 41(1), 102-107.
4. Shcherbina, A.Y., E.A. D'Asaro, C.M. Lee, J.M. Klymak, M.J. Molemaker, and J.C. McWilliams (2013). Statistics of vertical vorticity, divergence, and strain in a developed submesoscale turbulence field, *Geophys. Res. Lett.*, 40(17), 4706-4711.
5. Thomson, J., E. D'Asaro, M. Cronin, W. Rogers, R. Harcourt, and A. Shcherbina (2013). Waves and the equilibrium range at Ocean Weather Station P, *J. Geophys. Res.*, 118(11), 5951-5962.
6. Alford, M.H., A.Y. Shcherbina, and M.C. Gregg (2013). Observations of near-inertial internal gravity waves radiating from a frontal jet. *J. Phys. Oceanogr.*, 43, 1225–1239.
7. Wilson, C., T.A. Villareal, M.A. Brzezinski, J.W. Krause, and A.Y. Shcherbina (2013). Chlorophyll bloom development and the Subtropical Front in the North Pacific. *J. Geophys. Res.*, 118, 1473–1488.
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, 905–919.
9. Shcherbina, A.Y., M.C. Gregg, M.H. Alford, and R.R. Harcourt (2010). Three-dimensional structure and temporal evolution of submesoscale thermohaline intrusions in the North Pacific subtropical frontal zone, *J. Phys. Oceanogr.*, 40, 1669–1689.
10. Shcherbina A.Y., M.C. Gregg, M. H. Alford, and R.R. Harcourt (2009). Observations of thermohaline intrusions in the North Pacific subtropical frontal zone. *J.Phys.Oceanogr.*, 39, 2735–2756.
11. Shcherbina, A.Y., G.G. Gawarkiewicz, C.A. Linder, and S.R. Thorrold (2008). Mapping bathymetric and hydrographic features of Glover's Reef, Belize, with a REMUS autonomous underwater vehicle, *Limnol. Oceanogr.*, 53, 2264-2272.
12. Shcherbina, A.Y., and G.G. Gawarkiewicz (2008). A coastal current in winter: Autonomous underwater vehicle observations of the coastal current east of Cape Cod. *J. Geophys. Res.*, 113, C07030.

13. Shcherbina, A.Y., and G.G. Gawarkiewicz (2008). A coastal current in winter: 2. Wind forcing and cooling of a coastal current east of Cape Cod, *J. Geophys. Res.*, *113*, C10014.

14. Panteleev G.G., M.N. Koshlyakov, E.G. Morozov, R.Yu. Tarakanov, A.Y. Goldin, A.Y. Shcherbina, M. Ikeda (2006). Numerical modeling of currents in the Drake Passage with assimilation of the experimental data of 2003. *Oceanology*, 46(6), 821-833.

15. Talley, L.D., D.-H. Min, V.B. Lobanov, V.A. Luchin,V.I. Ponomarev, A.N. Salyuk, A.Y. Shcherbina, P.Y. Tishchenko, and I. Zhabin (2006). Japan/East Sea water masses and their relation to the sea's circulation, *Oceanography*, 19, 32-49.

16. Shcherbina, A.Y., D. L. Rudnick, and L. D. Talley (2005). Ice-draft profiling from bottom-mounted ADCP, *J. Atmos. Oceanic Technol.*, 22(8), 1249-1266.

17. Shcherbina, A.Y., L.D. Talley, and D.L. Rudnick (2004). Dense water formation on the northwestern shelf of the Okhotsk Sea: 1. Direct observations of brine rejection, *J.Geophys. Res.*, 109, C09S08.

18. Shcherbina, A.Y., L. D. Talley, and D. L. Rudnick (2004). Dense water formation on the northwestern shelf of the Okhotsk Sea: 2. Quantifying the transports, *J. Geophys. Res.*, 109, C09S09.

19. Shcherbina, A.Y., L. D. Talley, and D. L. Rudnick (2003). Direct observations of North Pacific ventilation: brine rejection in the Okhotsk Sea, *Science*, 302(5652), 1952-1955.

20. Shcherbina, A.Y., L. Talley, E. Firing, and P. Hacker (2003). Near-surface frontal zone trapping and deep upward propagation of internal wave energy in the Japan/East Sea. *J.Phys.Oceanogr.* 33, 900-912.

21. Maksimenko, N., A. Shcherbina, R. Gus'kina, and A. Kharlamov (1997). Spatial structure and dynamics of the Northwest Pacific Intermediate Water. *Okeanologiya [Oceanology]* 37, 805-811.

22. Maksimenko, N.A., and A.Y. Shcherbina (1996). Fine structure of intermediate water in the North-West Pacific. *Meteorologiya I Gidrologiya [Meteorology & Hydrology]* 7, 71-77.

Maximenko N.A., and A.Y. Shcherbina (1996). Fine-structure of the North Pacific Intermediate Water layer. Proceedings of the Workshop on the Okhotsk Sea and Adjacent Areas, *PICES Scientific Report No.6*, 104-110.