

ANDONE C. LAVERY

Physicist (Acoustics)
Woods Hole Oceanographic Institution (WHOI)
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RESEARCH

Acoustic scattering and propagation in continuous and discrete random media with specific applications to the biology and small-scale physical of ocean.

EDUCATION

1991 B.A. Honors, Mathematics, Cambridge University, England
1992 M.Math, Applied Mathematics & Theoretical Physics, Cambridge University, England
1995 M.S. Physics, Cornell University
1999 Ph.D. Physics, Cornell University
Thesis Title: *Charge transfer and trapping during low and hyperthermal energy oxygen ion scattering*. ISBN: 9780599426917. Advisor: Barbara H. Cooper (deceased).

PROFESSIONAL EXPERIENCE

1992-1995 Teaching Assistant, Physics Department, Cornell University
1995 Teacher Trainer, Physics Department, Cornell University
1995 – 1999 Graduate Research Assistant, Physics Department, Cornell University
1999 – 2001 Postdoctoral Scholar, Department of Applied Ocean Physics & Engineering, WHOI
2001 – 2002 Postdoctoral Investigator, Department of Applied Ocean Physics & Engineering, WHOI
2002 ONR Postdoctoral Fellow, Department of Applied Ocean Physics & Engineering, WHOI
2002 – 2007 Assistant Scientist, Department of Applied Ocean Physics & Engineering, WHOI
2007 – 2012 Associate Scientist without tenure, Department of Applied Ocean Physics & Engineering, WHOI
2012 – present Associate Scientist with tenure, Department of Applied Ocean Physics & Engineering, WHOI

HONORS AND AWARDS

1991 Girton College Academic Merit Award, Cambridge University
1992 Fulbright Scholarship
1995 **Clark Award for Excellence in Teaching**, Cornell University
1999 Woods Hole Oceanographic Institution Postdoctoral Scholarship
2002 Office of Naval Research Postdoctoral Fellowship in Ocean Acoustics
2006 Woods Hole Oceanographic Institution Coastal Ocean Institute Fellow
2013 Woods Hole Oceanographic Institution **Doherty Chair of Education**
2014 Acoustical Society of America Medwin Prize in Acoustical Oceanography

PROFESSIONAL AFFILIATIONS

Acoustical Society of America
American Physical Society
The Oceanography Society
IEEE Oceanic Engineering

PROFESSIONAL ACTIVITIES and COMMITTEES

2000	140th Acoustical Society of America, Chair Special Session Bioacoustical Oceanography
2000	140th Acoustical Society of America, Moderator for panel discussion
2003 – present	Acoustical Society of America, Acoustical Oceanography Technical Committee Member
2006, 2008	Acoustical Society of America, Acoustical Oceanography Paper Selection Committee (TPOM), Providence, RI and Paris, France
2006 – present	IEEE OES Technology Committee on Underwater Acoustics
2003, 2007, 2009 – 2011, 2013, 2014	Acoustical Society of America, Student Paper/Poster Judge
2007 – 2009	Acoustical Society of America, chair of sub-committee on on-site day-care
2009 – 2011	Acoustical Society of America, Women in Acoustics committee member
2009 – present	Associate Editor, Journal of the Acoustical Society of America, JASA-EL
2013 – present	Acoustical Society of America, Chair of Acoustical Oceanography Technical Committee
2013	165 th Acoustical Society of America, Chair Special Session Estuarine Acoustics
2014	168 th Acoustical Society of America, Chair Special Session Education in Acoustical Oceanography and Underwater Acoustics

WHOI ACTIVITIES AND COMMITTEES

2004 – 2006	WHOI Partnership Program
2004	Arnold Aarons Award for Excellence in Teaching, Advising and Mentoring Committee
2004 – 2005	Summer Student Fellowship Committee
2004 – 2010	Gender Equity Program Advisory Committee
2005, 2012	Department of Applied Ocean Physics and Engineering Chairman Selection Committee
2008, 2010, 2013	Coastal Ocean Institute Proposal Review Panel
2008 – 2012	Chair of Applied Ocean Physics and Engineering Postdoctoral Mentoring Committee
2009 – 2012	WHOI Postdoctoral Scholar Committee, AOPE Postdoctoral Scholar Coordinator
2012, 2014	Ad-hoc Committee for Y-T. Lin and David Ralston. Ad-hoc Committee for Gordon Zhang
2012 – present	MIT-WHOI Joint Committee on Applied Ocean Science and Engineering
2013	Lead Nominator for WHOI Leadership Award (successful nomination)
2013 – present	Scientific Staff Executive Committee
2014	AOPE Education Coordinator
2014	Chair, Ad-hoc Promotion Committee for Assistant to Associate Scientist in Biology

EDUCATIONAL ACTIVITIES: CLASSROOM TEACHING

1992-1995	Teaching Assistant, Cornell Physics Department, Cornell University: General Physics I (Physics 101/102), Fundamentals of Physics (Physics 207/208), Physics II: Heat and Electromagnetism (Physics 213), Physics III: Waves, Optics, and Particles (Physics 214)
2007, 2009	Wave scattering by rough surfaces and inhomogeneous media, WHOI/MIT Joint Program Graduate

STUDENTS SUPERVISEDWHOI Postdoctoral Scholars/Investigators

Tetjana Ross, Scholar (September 2003 - April 2005)
 Wu-Jung Lee, Investigator (January 2013- March 2013)
 Christopher Bassett, Scholar (October 2013 – present)

WHOI Ph.D. Students Supervised

Wu-Jung Lee, MIT/WHOI Joint Program (July 2007 – January 2013) (co-advised Stanton, Tyack)
 Jonathan Fincke, MIT/WHOI Joint Program (June 2012 – present) (co-advised Geyer)

WHOI Ph.D. Student Committees

Alexander Bergan, MIT/WHOI Joint Program (July 2011 – present) (advisor Lawson Biology)

WHOI Masters Students Supervised

Greg Dietzen, MIT/WHOI Joint Program (July 2006 – August 2008) (co-advised Stanton)

Ben Jones, MIT/WHOI Joint Program (June 2004 – August 2006) (co-advised Stanton)

WHOI/Cornell Masters Students Supervised

Robert Levine, WHOI/Cornell Master Program (January 2012 – present) (co-advised Lawson)

WHOI Undergraduate Summer Student Fellows

Yue Max Li, Swathmore College (June 2005 – September 2005)

V.K. Ravishankar, UCSD (May 2007 – August 2007)

Jon Fincke, University New Hampshire (May 2010 – August 2010)

Camille Pagniello (May 2013- August 2013)

Jennifer Frame (June 2014 – August 2014)

WHOI Guest Students

Paul Heslinga, Falmouth Academy (July 2006 – September 2006)

Zachary Soule (July 2011)

External Student Ph.D. Thesis Committee

Marcos Sastre-Cordova, University of Massachusetts at Dartmouth, Ph.D. (April 2008 - 2014)

External Student Master's Thesis Committee

Adam Baukus, University of Maine, Masters (January 2006 – March 2008)

Doris Leong, Dalhousie University, Masters (August 2006 – May 2009)

EDUCATIONAL ACTIVITIES: OUTREACH

1995 Committee Chair in Expand Your Horizons (EYH) Conference, Cornell University, Ithaca, NY. EYH encourages middle school girls to develop an interest in mathematics, engineering, and science

1996 Workshop Leader in Expand Your Horizons (EYH) Conference, Cornell University, Ithaca, NY

1996 Instructor in Microworld Festival, a K-12 outreach program, Cornell University, Ithaca, NY. Partnerships between scientists and school teachers to encourage young people into science.

1997 Workshop Leader for Symposium on Exploring the Quantum World, Cornell University, Ithaca, NY

2001- 2003, 2005- 2007, 2013 Science Fair Judge, Falmouth Academy High School, Falmouth, MA

2002, 2003 Science Project Tutoring at the Lawrence School, Falmouth, MA

2002, 2003, 2005, 2006, 2009 Science Fair Judge at the Falmouth High School, Falmouth, MA

2004 Classroom Workshop: Telling Your Story, WHOI

2004 Keynote Speaker for Expand Your Horizons (EYH) Conference, Ithaca, NY

2004 First-Lego League Challenge Advisory Committee, WHOI

2005 Invited Talk for Massachusetts Marine Educators Conference, WHOI. Partnership set up with a master teacher to develop K-12 high school demonstrations on acoustics and waves.

2009-2010, 2013 Arts Alive Instructor, Mullen-Hall Elementary School, Falmouth, MA

2011, 2012, 2013 2nd-4th Grade Math Hour Teacher, Mullen-Hall Elementary School, Falmouth, MA

2012 Keynote Speaker, Greenlight for Girls, University of Massachusetts at Dartmouth

2013 Guest Lecturer on Acoustical Oceanography for 5th graders at Morse Pond School, Falmouth, MA

2014 1st Grade Math and ELA Classroom Volunteer

OCEANOGRAPHIC CRUISES AND INSTRUMENT DEPLOYMENT/TESTING

Gulf of Maine BIOMAPER-II broadscale survey: **R/V OCEANUS** 3-13 December 1998

Gulf of Maine BIOMAPER-II broadscale survey: **R/V ENDEAVOR** 16-26 October 1999

Gulf of Maine BIOMAPER-II broadscale survey: **R/V ENDEAVOR** 4-13 December 1999

Hudson Canyon Acoustics and Microstructure Experiment: **R/V ENDEAVOR** 10-15 January 2004

Test Cruise for Broadband Acoustic System at Ft. Lauderdale: **R/V STEPAN** 16 November 2005

Acoustic Scattering from Charles River Plume: **R/V TIOGA** 19-21 May 2006

Multibeam Survey of Humpback Whale Prey Field: **R/V TIOGA** 5-15 August 2006

Connecticut River Turbulence and Acoustics Experiment: **R/V TIOGA** 16-21 November 2008

Connecticut River Turbulence and Acoustics Experiment: **R/V TIOGA** 16-20 November 2009

Broadband Acoustic Scattering from Copepods in Stellwagen Bank: **R/V Tioga** 22-23 June 2010

Hudson River Turbulence and Acoustics Experiment: **R/V TIOGA** 1 December 2010

Stellwagen Bank REMUS-100 Broadband Acoustics System Testing: R/V TIOGA	11-13 July 2011
Acoustic Scintillation System Testing, Victoria, BC, Canada	17-23 June 2012
SIMRAD Broadband Transceiver Testing, University of New Hampshire, NH	25-27 June 2012
Connecticut River Scintillation Experiment: R/V TIOGA & R/V Connecticut	3-12 December 2012
Laboratory Measurements of Scattering from Ice and Oil Trapped under Ice, Cold Regions Research and Engineering Laboratory (CRREL), Lebanon, NH	June 2013
SIMRAD Broadband Transceiver Testing, University of New Hampshire, NH	June 2013, October 2013
Deployment of Simrad EK80 Wideband System, F/V Karen Elizabeth	January 2014
Laboratory Measurements of Scattering from Ice and Oil Trapped under Ice, Cold Regions Research and Engineering Laboratory (CRREL), Lebanon, NH	October 2014 – January 2015
Broadband Acoustic Quantification of Methane Gas Seeps, E/V Nautilus, Gulf of Mexico	April 2015

MEETINGS ATTENDED

American Physical Society March Meeting, San Jose, CA	March 1995
American Physical Society March Meeting, Kansas City, MO	March 1997
American Physical Society March Meeting, Los Angeles, CA	March 1998
International Conference on Inelastic Ion-Surface Collisions, South Padre Island, TX	January 1999
American Physical Society March Meeting, Atlanta, GA	March 1999
Gordon Conference on Dynamics at Surfaces, Andover, NH	August 1999
International Conference on Acoustics, Noise and Vibration, Montreal, Canada	August 2000
Oceans 2000 Marine Technology Society & IEEE, Providence, RI	September 2000
140th Meeting of the Acoustical Society of America, Newport Beach, CA	December 2000
The Oceanography Society Scientific Meeting, Miami, FL	April 2001
International Conference on Fish Bioacoustics, Chicago, IL	May 2001
141st Meeting of the Acoustical Society of America, Chicago, IL	June 2001
142nd Meeting of the Acoustical Society of America, Fort Lauderdale, FL	December 2001
International Council for the Exploration of the Sea (ICES), Montpellier, France	June 2002
Impact of Environmental Variability on Acoustic Predictions and Sonar Performance Lerici, La Spezia, Italy	September 2002
145th Meeting of the Acoustical Society of America, Nashville, TN	April 2003
The Oceanography Society Scientific Meeting, New Orleans, LA	June 2003
AGU Ocean Sciences Meeting, Portland, OR	January 2004
ONR Sponsored High-Frequency Ocean Acoustics, San Diego, CA	March 2004
147th Meeting of the Acoustical Society of America, New York, NY	May 2004
7th European Conference on Underwater Acoustics (ECUA 2004), Delft, The Netherlands	July 2004
148th Meeting of the Acoustical Society of America, San Diego, CA	November 2004
150 th Meeting of the Acoustical Society of America, Minneapolis, MN	October 2005
151 st Meeting of the Acoustical Society of America, Providence, RI	June 2006
49 th International Hydrodynamics Colloquium on Turbulence Revisited, Liege, BE	May 2007
153 rd Meeting of the Acoustical Society of America, Salt Lake City, UT	June 2007
AGU Ocean Sciences Meeting, Orlando, Florida	March 2008
157 th Meeting of the Acoustical Society of America, Portland, OR	May 2009
Conference on Underwater Acoustic Measurements (UAM09), Nafplion, Greece	June 2009
159 th Meeting of the Acoustical Society of America, Baltimore, MD	April 2010
160 th Meeting of the Acoustical Society of America, Cancun, Mexico	November 2010
161 st Meeting of the Acoustical Society of America, Seattle, WA	May 2011
162 st Meeting of the Acoustical Society of America, San Diego, CA	October 2011
Ocean Sciences Meeting, Salt Lake City, Utah	February 2012
ONR Program Review, Stennis Space Center, MS	April 2013
165 th Meeting of the Acoustical Society of America, Montreal, Canada	June 2013
Underwater Acoustics Conference, Corfu, Greece	June 2013
166 th Meeting of the Acoustical Society of America, San Francisco, CA	December 2013
167 th Meeting of the Acoustical Society of America, Providence, RI	May 2014

International Council for the Exploration of the Sea (ICES), WGFASST, New Bedford, MA
 168th Meeting of the Acoustical Society of America, Indianapolis, IN

May 2014
 October 2014

WORKSHOPS ATTENDED

Bioacoustical Oceanography Workshop, New Hampshire	July 1998
Pilot Census of Marine Life in the Gulf of Maine and Georges Bank Ecosystem Woods Hole, MA	May 2000
Third Annual NW Atlantic Herring Acoustic Workshop, Walpole, Maine	March 2001
Global Ocean Ecosystem Dynamics (GLOBEC) Workshop, Santa Barbara, CA	April 2001
ICES, Fisheries Acoustics Science and Technology (FAST) Working Group, Seattle, WA	April 2001
Pilot Census of Marine Life in the Gulf of Maine and Georges Bank Ecosystem Woods Hole, MA	May 2001
Shallow Water 2006 Planning Meeting, Minneapolis, MN	October 2005
Shallow Water 2007 Post-Experiment Meeting, San Diego, Ca	January 2007
Space07 Planning Meeting, Boston, MA	May 2007
Acoustic Backscatter Modeling Workshop, Friday Harbor, WA (remote participation)	January 2008
ONR Physical Oceanography Site Review, Chicago, IL	June 2009
SPACE08 Data Analysis Workshop, Woods Hole, MA	February 2010
Acoustic Challenges in Aquatic Ecosystem Assessment Workshop, Seattle, WA	May 2011
ONR Ocean Acoustics Shelfbreak Acoustics Workshop, Seattle, WA	May 2011
SPACE08 Data Analysis Workshop, Scripps, San Diego, CA	February 2012
Experiment Planning Workshop, CRREL, NH	May 2014

REFEREED PUBLICATIONS (pdfs available at www.whoi.edu/people/alavery/)

- 1998 Keller, C.A., Lavery, A.C., and Cooper, B. H. "Positive- and negative-ion formation in low-energy O^+ - Cu(001) scattering," *Physical Review B* **58(16)**, 10959-10968.
- 1999 Lavery, A.C., Sosolik, C.E., and Cooper, B. H. "Charge transfer dynamics of low energy oxygen ion beams scattered from Cu(001)," *Nuclear Instruments and Methods in Physics Research B* **157**, 42-47.
- 1999 Lavery, A.C., Sosolik, C.E., and Cooper, B.H. "Corrugation effects in oxygen surface trapping at hyperthermal energies," *Physical Review Letters*. **83(25)**, 5286-5289.
- 1999 Lavery, A.C, Sosolik, C.E., and Cooper, B.H. "Energy- and angle-dependent trends in the trapping probability of O^+ incident on Cu(001)," *Instruments and Methods in Physics Research B* **157**, 214-219.
- 2000 Sosolik, C.E., Lavery, A.C., Dahl, E.B., and Cooper, B.H. "A technique for accurate measurements of ion beam current density using a Faraday cup," *Review of Scientific Instruments* **71(9)**, 3326-3330.
- 2000 Lavery, A.C., Sosolik, C.E., Keller, C.A., and Cooper, B.H. "Charge transfer and memory loss in keV oxygen-ion scattering from Cu(001)," *Physical Review B* **61(3)**, 2291-2301.
- 2000 Lavery, A.C., Sosolik, C.E., and Cooper, B.H. "Surface trapping during hyperthermal energy scattering," *Physical Review B* **62(23)**, 16126-16137.
- 2002 Lavery, A.C, Stanton, T.K., McGehee, D.M., and Chu, D. "Three-dimensional modeling of acoustic backscattering from fluid-like zooplankton," *Journal of the Acoustical Society of America* **111(3)**, 1197-1210.
- 2003 Sosolik, C.E., Hampton, J.R., Lavery, A.C., Cooper, B.H., and Marston, J.B. "Thermally enhanced neutralization in hyperthermal energy ion scattering," *Physical Review Letters* **90(1)**, 013201:1-013201:4.
- 2003 Chu, D., Jech, J.M., and Lavery, A.C. "Inference of geometrical and behavioral parameters of individual fish from echo-trace-analysis," *Deep-Sea Res. I* **50(4)**, 515-527.
- 2003 Benfield, M.C., Lavery, A.C., Wiebe, P.H., Greene, C.H., Stanton, T.K. and Copley, N. J. "Distributions of physonect siphonulae in the Gulf of Maine and their potential as important sources of acoustic scattering," *Canadian Journal of Fisheries and Aquatic Sciences* **60**, 759-772. DOI:10.1139/F03-065
- 2003 Lavery, A.C., Schmitt, R.W., and Stanton, T.K. "High-frequency acoustic scattering from turbulent oceanic microstructure: The importance of density fluctuations," *Journal of the Acoustical Society of America* **114(5)**, 2685-2697.
- 2004 Powers, J., Manson, J.R., Sosolik, C.E., Hampton, J.R., Lavery, A.C., and Cooper, B.H. "Temperature-dependent scattering of hyperthermal energy K^+ ions," *Physical Review B* **70**, 115413-115421.

- 2007 Lavery, A.C., and Ross, T. “Acoustic scattering from double-diffusive microstructure,” *Journal of the Acoustical Society of America* **122(3)**, 1449-1462.
- 2007 Lavery, A. C., Wiebe, P. H., Stanton, T.K., Lawson, G.L., Benfield, M.C., and Copley, N.J. “Determining dominant scatterers of sound in mixed zooplankton populations,” *Journal of the Acoustical Society of America* **122(6)**, 3304-3326.
- 2008 Jones*, B. A., Stanton, T. K., Lavery, A. C., Johnson, M. P., Madsen, P. T., and Tyack, P. L., “Classification of broadband echoes from prey of a foraging Blainville’s beaked whale,” *Journal of the Acoustical Society of America* **123(3)**, 1753-1762.
- 2009 Jones*, B. A., Lavery, A. C., Stanton, T. K. “Use of the distorted wave Born approximation to predict scattering by inhomogeneous objects: Application to squid,” *Journal of the Acoustical Society of America* **125(1)**, 73-88.
- 2009 Ross, T. and Lavery, A.C. “Laboratory observations of double-diffusive convection using high-frequency broadband acoustics,” *Experiments in Fluids* **46(2)**, 255-264. DOI:10.1007/s00348-008-0570-9.
- 2010 Ross, T. and Lavery, A.C. “Acoustic detection of oceanic double-diffusive convection: A feasibility study,” *J. Atmos. Ocean. Tech.* **27**, 580–593, doi: 10.1175/2009JTECHO696.1.
- 2010a Lavery, A.C., Chu, D., and Moum, J. “Measurements of acoustic scattering from zooplankton and oceanic microstructure using a broadband echosounder,” *ICES Journal of Marine Science* **67(2)**, 379-394.
- 2010b Lavery, A.C., Chu, D., and Moum, J. “Observations of broadband acoustic backscattering from nonlinear internal waves: assessing the contribution from microstructure,” *IEEE Journal of Oceanic Engineering* **34(4)**, 695-709.
- 2010 Geyer, W.R., Lavery, A.C., Scully, M.E., and Trowbridge, J.H. “Mixing by shear instability at high Reynolds number,” *Geophysical Research Letters* **37**, doi: 10.1029/2010GL045272.
- 2012 Leong*, D., Ross, T., and Lavery, A.C. “Anisotropy in high-frequency broadband acoustic backscattering from internal solitary waves,” *Journal of the Acoustical Society of America* **132(2)**, 670-679.
- 2012 Lee*, W-J., Lavery A. C., and Stanton, T.K.. “Laboratory measurements of broadband acoustic backscattering from live squid,” *Journal of the Acoustical Society of America* **131(6)**, 4461-4475.
- 2012 Ross, T., and Lavery, A.C. “Acoustic scattering from density and salinity gradients: Modeling of oceanic pycnoclines,” *Journal of the Acoustical Society of America Express Letters* **131(1)**, EL54-EL60, DOI: 10.1121/1.3669394.
- 2012 Deane, G.B, Preisig, J.C., Tindle, C.T., Lavery, A.C., and Stokes. M.D. “Deterministic forward scatter from surface gravity waves,” *Journal of the Acoustical Society of America* **132(6)**, 3673–3686.
- 2013 Wiebe, P.H., Lawson, G.L., Lavery, A.C., Copley, N.J., Horgan, E., and Bradley, A., “Improved agreement of net and acoustical methods for surveying euphausiids by mitigating avoidance using a net based LED strobe light system,” *ICES Journal of Marine Science*, doi:10.1093/icesjms/fst005.
- 2013 Lavery, A.C., Geyer, W.R., Scully, M.E. “Broadband acoustic quantification of stratified turbulence,” *Journal of the Acoustical Society of America*, **134(40)**: 40-54.
- 2013 Deane, G.B, Preisig, J.C., Lavery, A.C. “The suspension of large bubbles near the surface by turbulence and their role in absorbing forward-scattered sound,” *IEEE Journal of Oceanic Engineering*. doi: 10.1109/JOE.2013.2257573
- 2014 Bassett*, C., Lavery, A., Maksym, T., Wilkinson, J.P. “Laboratory measurements of high-frequency, acoustic broadband backscattering from sea ice and crude oil,” *Journal of Acoustical Society of America Express Letters* **137: EL32 –EL38**, doi: 10.1121/1.490242.

* Indicates a student or postdoc.

MANUSCRIPTS SUBMITTED

Jech, J.M., Horne. J.K., Chu, D., Demer, D.A., Francis, D.T.I., Gorska, N., Jones, B., Lavery, A.C., Stanton, T.K., Macaulay, G., Reeder, D.B., and Sawada, K. “Comaprison among ten models of acoustic backscattering from simple shapes: Applications to ecosystem research,” submitted to the *Journal of the Acoustical Society of America*.

Lawson, G.L., Hückstädt, L.A., Lavery, A.C., Jaffré, F.M., Wiebe, P.H., Fincke*, J.R., Crocker, D.E., and Costa, D.P. “Development of an Animal-Borne ‘Sonar Tag’ for Quantifying Prey: Test Deployments on Northern Elephant Seals” submitted to *Animal Biotelemetry*.

MANUSCRIPTS IN PREP

Lawson, G.L., Lavery, A.C., Wiebe, P.H., Fincke*, J.R., and Copley, N.J. “Broadband volume scattering strength measurements of krill,” in prep, to be submitted to the *Journal of the Acoustical Society of America Express Letters*.

Lavery, A.C. Lawson, G.L., Jech, M., and Bassett*, C. “Calibration and Field Application of a Commercial Broadband Echosounder for distinguishing large zooplankton and small fish without swimbladders” to be submitted to *ICES Journal of Marine Science*.

CONFERENCE PROCEEDINGS

- 2000 Lavery, A.C., Stanton, T.K., McGehee, D.E., and Chu, D. “Three dimensional acoustic scattering models for elongated fluid-like zooplankton,” *Proceedings of International Conference on Acoustics, Noise, and Vibration*, Montreal, Canada.
- 2002 Lavery, A.C., and Stanton, T.K. “Acoustic scattering models of zooplankton,” *Bioacoustics Journal, Special Issue on Fish Bioacoustics*, eds. A. N. Popper, J. F. Webb and R. R. Fay, Vol. 12, 268-271.
- 2002 Lavery, A.C., Stanton, T.K., and Wiebe, P.H. “Variability in high frequency acoustic backscattering in the water column,” in “*Impact of Littoral Environmental Variability on Acoustic Predictions and Sonar Performance*,” Eds. N.G. Pace and F.B. Jensen, Kluwer Academic Publishers, 63-70.
- 2005 Lavery, A.C., Benfield, M.C., Wiebe, P.H., and Stanton, T.K. “High-frequency volume backscatter in the upper water column: Imaging zooplankton and oceanic microstructure,” *Proceedings of the Seventh European Conference on Underwater Acoustics*, ECUA 2004, ed. D.G. Simmons, Vol. 1, pp 351-361.
- 2005 Schmitt, R.W., Nandi, P., Ross, T., Lavery, A.C., and Holbrook W.S. “Acoustic detection of thermohaline staircases in the ocean and laboratory,” *Proceedings of 2005 MTS/IEEE Oceans*, Washington D.C., 17-23 Sept. 2005, Vol. 2, pp. 1052 – 1055. DOI: 10.1109/OCEANS.2005.1639893.
- 2011 Wiebe, P.H., Lawson, G.L., Lavery, A.C., Copley, N.J., Horgan, E., and Bradley, A. “Agreement of net and acoustical methods for surveying euphausiids using a net based LED strobe light system” *ICES Annual Science Conference*, Gdańsk, Poland. Session F: Applications of optical and image based technologies in the ecosystem approach to fisheries management.
- 2013 Lavery, A.C., Geyer, W.R., and Scully, M.E. “Quantification of stratified turbulence using acoustic propagation and broadband acoustic backscattering techniques,” *Proceedings of Meetings in Acoustics (POMA)*, Vol. 19, 005005. DOI: 10.1121/1.4798946
- 2013 Geyer, W.R., Traykovski, P., and Lavery, A.C. “The impact of acoustic oceanographic methods on estuarine dynamics research,” (Invited Paper) *Proceedings of Meetings in Acoustics (POMA)*, Vol. 19, 005001. DOI: 10.1121/1.4799117.
- 2013 Lavery, A.C. “High-frequency acoustic scattering and propagation techniques in highly-stratified shear flows: Useful tools for characterizing mixing?” (Invited Paper) *1st International Conference and Exhibition on Underwater Acoustics*, Corfu, Greece, 23-28 June, edited by J.S. Popodokis and Leif Bjorno: 1179-1186.
- 2014 Bassett*, C., Lavery, A.C., Maksym, T., and Wilkinson, J. W. “Laboratory measurements of high-frequency, broadband acoustic scattering of growing sea ice and oil beneath sea ice,” *Proceedings of Meetings in Acoustics*, POMA Vol. 21, 070008; <http://dx.doi.org/10.1121/1.4893927>.
- 2014 Wilkinson, J., Maksym, T., Bassett*, C., Lavery, A., Singh, H., Chayes, D., Elosegui, P., Wadhams, P., Ulrich-Evers, K., Jochmann, P., “Experiments on the detection and movement of oil spilled under sea ice,” *Proceedings of the HYDRALAB IV Joint User Meeting*, Lisbon, July 2014.

INVITED PRESENTATIONS

- 2001 Lavery, A.C. and T.K. Stanton, "Acoustic scattering models of zooplankton," International Conference on Fish bioacoustics: Sensory Biology, Behavior, and Practical Applications, Chicago, IL.
- 2003 Lavery, A.C., Benfield, M.C., Stanton, T.K., Wiebe, P.H., and Greene, C.H. "High-frequency acoustic scattering from gas-bearing zooplankton," Special Session on Bioacoustical Resonance Spectroscopy at the 145th Meeting of the Acoustical Society of America, Nashville, TN.
- 2004 Lavery, A.C., Schmitt, R.W., Stanton, T.K., and Wiebe, P.H. "High-frequency acoustic scattering from microstructure and zooplankton," AGU Ocean Sciences Meeting, Portland, OR.
- 2004 Lavery, A.C. Keynote Speaker, Expand Your Horizons Outreach Program, Ithaca, NY.
- 2004 Lavery, A.C., Benfield, M.C., Wiebe, P.H., and Stanton, T.K. "Multi-frequency acoustic volume backscatter in the upper water column: imaging mixed zooplankton populations and oceanic microstructure in the Gulf of Maine," 7th European Conference on Underwater Acoustics, Delft, The Netherlands.
- 2005 Lavery, A.C. Invited Speaker, Massachusetts Marine Educators Conference, Woods Hole, MA.
- 2005 Lavery, A.C., Lawson, G.L., and Wiebe, P.H. "Lessons learned from multi-frequency acoustic studies of zooplankton and micronekton in the Western Antarctic Peninsula and the Gulf of Maine," 150th Meeting of the Acoustical Society of America, Minneapolis, MN.
- 2008 Lavery, A.C. (presented by T. Stanton) "Broadband acoustic scattering from nonlinear internal waves," 155th Meeting of the Acoustical Society of America, Paris, France.
- 2008 Lavery, A.C., Wiebe, P.H., Stanton, T.K., Lawson, G.L., Benfield, M.C., and Copley, N. (presented by T. Stanton) "Use of multi-frequency acoustic scattering techniques to investigate mixed zooplankton populations," 155th Meeting of the Acoustical Society of America, Paris, Fr.
- 2009 Lavery, A.C. "On the use of broadband acoustic scattering techniques and associated signal processing techniques for observing physical and biological scattering features in the ocean," 157th Meeting of the Acoustical Society of America, Portland, OR.
- 2009 Lavery A.C. "Use of broadband acoustic scattering techniques for high-resolution imaging, detection, and quantification of physical and biological scattering features in the ocean," Conference on Underwater Acoustic Measurements, Nafplion, Greece.
- 2010 Lavery A.C. "High-frequency acoustic scattering and propagation in shallow coastal waters: the influence of, and application to, internal waves, surface gravity waves, turbulence and microstructure," University of Delaware, MD.
- 2011 Lavery, A.C., "Broadband acoustic scattering from temperature and salinity microstructure," Scripps, San Diego, CA, October 2011.
- 2011 Lavery, A.C., "Development of broadband acoustic scattering techniques for coastal oceanography," Cornell University, Ithaca, NY, November 2011.
- 2012 Lavery, A.C., "Acoustical Oceanography, and how I became a scientist," Green Light for Girls, University of Massachusetts Dartmouth, MA, June 2012.
- 2013 Lavery, A.C., "Acoustic scattering and propagation in strongly salt-stratified shear flow", University of Massachusetts Dartmouth, SMAST, MA, April 2013
- 2013 Lavery, A.C. "High-frequency acoustic scattering and propagation techniques in highly-stratified shear flows: Useful tools for characterizing mixing?," 1st International Conference and Exhibition on Underwater Acoustics, Corfu, Greece, June 2013.
- 2013 Lavery, A.C., "High-frequency acoustic scattering and propagation techniques for studies of zooplankton ecology and small scale physical processes in the context of ocean observatories," 1st International Conference and Exhibition on Underwater Acoustics, Corfu, Greece, June 2013.
- 2014 Lavery, A.C., "Advances in remote inference of physical and biological parameters using acoustic scattering techniques: Mapping the ocean in broadband color," Medwin Prize Talk, 167th Meeting of the Acoustical Society of America, Providence, RI, May 2014.
- 2014 Lavery, A.C. "An Introduction to the Acoustical Oceanography Technical Committee," 167th Meeting of the Acoustical Society of America, Providence, RI, May 2014.
- 2014 Lavery, A.C., "Remote inference of biological parameters using broadband acoustic color," WHOI-NEFSC Special seminar series on Fisheries and Ecosystem Acoustics, Woods Hole, MA.

CONTRIBUTED PRESENTATIONS FIRST AUTHOR (PUBLISHED ABSTRACTS)

- 1995 Lavery, A. C., Goodstein, D. M., DiRubio, C., and Cooper, B. H. "Probing surface atom vibrations with hyperthermal ion scattering," American Physical Society March Meeting, San Jose, CA.
- 1997 Lavery, A. C., Keller, C. A, and Cooper, B. H. "Charge transfer dynamics of low energy reactive ion beams scattered from *Cu(001)*," American Physical Society March Meeting, Kansas City, MO
- 1998 Lavery, A. C., Sosolik, C. E, and Cooper, B. H. "Oxygen trapping at a *Cu(001)* surface," American Physical Society March Meeting, Los Angeles, CA.
- 1999 Lavery, A. C., Sosolik, C. E, and Cooper, B. H. "Oxygen trapping at a *Cu(001)* surface," Twelfth International Conference in Inelastic Ion-Surface Collisions, South Padre Island, TX.
- 1999 Lavery, A. C., Sosolik, C. E, and Cooper, B. H. "Surface corrugation effects during hyperthermal energy scattering," American Physical Society Centennial Meeting, Atlanta, GA.
- 2000 Lavery, A. C., Stanton, T. K., McGehee, D. E., and Chu, D. "Three-dimensional acoustic scattering models of elongated fluid-Like zooplankton," International Conference on Acoustics, Noise and Vibration, Montreal, Canada.
- 2000 Lavery, A. C., Stanton, T. K., McGehee, D. E., and Chu, D. "Three-dimensional acoustic scattering models of elongated fluid-Like zooplankton," 140th Meeting of the Acoustical Society of America, Newport Beach, CA.
- 2001 Lavery, A. C., and Stanton, T. K. "Bioacoustics of fish and zooplankton at WHOI: Recent developments," International Council for the Exploration of the Sea (ICES) Fisheries Acoustics Science and Technology Working Group (FAST), Seattle, WA.
- 2001 Lavery, A. C., and Stanton, T. K. "Acoustic classification of individual zooplankton using artificial neural networks," 141st Meeting of the Acoustical Society of America, Chicago, IL.
- 2002 Lavery, A. C., Stanton, T. K., and Wiebe, P. H. "Variability in high-frequency acoustic scattering in the water column," Impact of Environmental Variability on Acoustic Predictions and Sonar Performance, Lerici, La Spezia, Italy.
- 2004 Lavery, A. C., Wiebe, P. H., Schmitt, R. W., Stanton, T. K., Ross, T., Lawson, G., Copley, N., and Fisher, K. "High-frequency acoustic volume scattering from zooplankton and moving oceanic microstructure", 75th Anniversary of the Acoustical Society of America, New York, NY.
- 2007 Lavery, A. C. "Imaging turbulent oceanic microstructure using high-frequency broadband acoustic scattering," 49th International Hydrodynamics Colloquium on Turbulence Revisited, Liege, Belgium.
- 2007 Lavery, A. C. and Dezhang Chu "High-frequency broadband acoustic scattering from microstructure and zooplankton in the presence of internal waves," 153rd Meeting of the Acoustical Society of America, Salt Lake City, UT.
- 2008 Lavery, A.C. and Ross, T. (presented by T. Ross) "Acoustic scattering from double-diffusive interfaces," 155th Meeting of the Acoustical Society of America, Paris, France.
- 2008 Lavery, A. C. and Dezhang Chu "Observations of broadband acoustic backscattering from nonlinear internal waves during the SW06/NLIWI experiment: identification of dominant scattering mechanisms," AGU Oceans Sciences, Orlando, FL.
- 2012 Lavery, A.C., Geyer, W.R., Scully, M.E. Lawson, G.L., Wiebe, P.H., Lee, W-J., Stanton, T.K., and Fincke, J.R. "Development of high-frequency broadband acoustic scattering techniques for imaging, classification, and quantification of stratified turbulence and zooplankton," Ocean Sciences, Salt Lake City, UT.
- 2013 Lavery, A.C., Geyer, W.R., Scully, M.E "Quantification of stratified turbulence using acoustic propagation and broadband scattering techniques" 165th Meeting of the Acoustical Society of America, Montreal, CA.
- 2014 Lavery, A.C., Lawson, G., Jech, M., Chu, D., Andersen, L. N., Condiotty, J., Weber, T., Lanzoni, C., and MaCauley, G. "Standard Target Calibration of Simrad EK80 Wide Band Transceivers (WBTs)," International Council for the Exploration of the Sea (ICES), Working Group on Fisheries Acoustics, Science and Technology (WGFAST), New Bedford, MA.
- 2014 Lavery, A.C. "An Introduction to the Acoustical Oceanography Technical Committee," 167th Meeting of the Acoustical Society of America, Providence, RI, May 2014. J. Acoust. Soc. Am. **135**, p. 2181.

- 2014 Lavery, A.C. "Graduate studies in Ocean Acoustics in the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program," 167th Meeting of the Acoustical Society of America, Indianapolis, IN, October 2014. *J. Acoust. Soc. Am.* **136**, p. 2200.

OTHER FIRST AUTHOR PRESENTATIONS

- 1998 Lavery, A. C., Sosolik, C. E, and Cooper, B. H. "Trapping trends in hyperthermal energy oxygen scattering from *Cu*(001)," Physics Department, Cornell University, Ithaca, NY.
- 1999 Lavery, A. C., Sosolik, C. E, and Cooper, B. H. "Collisional dynamics of oxygen and carbon ions scattering from a *Cu*(001) surface," Chemistry Department, Cornell University, Ithaca, NY.
- 2001 Lavery, A. C., and Stanton, T. K. "Acoustic scattering models of individual zooplankton," British Antarctic Survey, Cambridge, England.
- 2001 Lavery, A. C., and Stanton, T. K. "Acoustic scattering models of individual zooplankton," Southampton Oceanography Center, Southampton, England.
- 2002 Lavery, A. C. "High-frequency acoustic scattering from zooplankton: from models to surveys," Department of Applied Ocean Physics and Engineering, Woods Hole Oceanographic Institution.
- 2003 Lavery, A. C. "High-frequency acoustic imaging of microstructure and zooplankton," Summer Student Fellows Lecture Series, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2004 Lavery, A. C. "Probing the ocean interior with high-frequency acoustics," Presentation to the Naval Command Collage, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2004 Lavery, A. C. "Laboratory measurements of multi-frequency and broadband acoustic scattering from turbulent and double-diffusive microstructure," Presentation to the Office of Naval Research WHOI Site Review, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2005 Lavery, A. C. "Laboratory measurements of broadband acoustic scattering from double-diffusive microstructure," BOUY Lunch Talk, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2005 Lavery, A. C. Jones, B., Stanton, T., Johnson, M, Madsen, P, and Tyack, P. "Prey classification by foraging beaked whales," Presentation to the Office of Naval Research, Washington D.C.
- 2006 Lavery, A. C. Jones, B., Stanton, T., Johnson, M, Madsen, P, and Tyack, P. "Prey classification by foraging beaked whales," Presentation to the Office of Naval Research, Washington D.C.
- 2006 Lavery A. C. "High-frequency broadband acoustic scattering from temperature and salinity microstructure: non-linear internal waves and estuarine plumes," Ocean Acoustics Laboratory, AOPE, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2007 Lavery, A. C. and Chu, D. "Preliminary SW06 data analysis," Ocean Acoustics Laboratory, AOPE, Woods Hole Oceanographic Institution, Woods Hole, MA.
- 2007 Lavery, A. C. and Chu, D. "High-frequency broadband acoustic scattering from microstructure and biology in non-linear internal waves," SW06 Workshop sponsored by ONR, San Diego, CA.
- 2008 Lavery, A. C. "Broadband acoustic backscattering from zooplankton and oceanic microstructure during the SW06/NLIWI experiment," Department of Applied Ocean Physics and Engineering, Woods Hole Oceanographic Institution.
- 2008 Lavery, A. C. "Broadband acoustic scattering from nonlinear internal waves during the SW06/NLIWI experiment: determination of dominant scatterers," SMAST, University of Massachusetts, Dartmouth, MA.
- 2008 Lavery, A. C. "Characterization of the surface wave field and bubbles during RACE08 using an upward looking broadband acoustic backscattering system: an update and implications for SPACE08," ONR Project Review, Woods Hole Oceanographic Institution.
- 2008 Lavery, A. C. "Development of an autonomous broadband acoustic scattering system for remote characterization of zooplankton," ONR Site Review, Woods Hole Oceanographic Institution.
- 2009 Lavery A. C. "The intersection of physical oceanography, acoustics, and signal processing with application to underwater acoustic communications," Presentation to Fran Herr and Radm Carr, Woods Hole Oceanographic Institution.
- 2009 Lavery, A. C. "Development and application of broadband acoustic scattering techniques to coastal waters and ecosystems," Dalhousie University.

- 2009 Lavery, A.C. and Geyer, R. "Turbulence and acoustic scattering in a stratified shear flow Part 2: Acoustics," ONR Physical Oceanography Review, Chicago, IL.
- 2010 Lavery, A.C. "Wave Physics and Signals at WHOI," J.P. Open House, Applied Ocean Physics and Engineering, WHOI, MA.
- 2010 Lavery, A.C. and Geyer, R.W. "Measurements of the Three-Dimensional Structure of Turbulence and Microstructure using Broadband Acoustic Backscatter," Presentation to the Office of Naval Research Physical Oceanography Program, Washington D.C.
- 2010 Lavery, A.C. "Acoustic Scattering at WHOI," Presentation to the Office of Naval Research Ocean Acoustics Program as part of the National Naval Responsibility Workshop, Washington D.C.
- 2011 Lavery, A.C., Lawson, G.L, and Wiebe, P.H., 2011. "Field demonstration of a broadband acoustical backscattering system mounted on a REMUS-100 for remote characterization of zooplankton," Presentation to ONR Marine Mammal Program Managers, WHOI, July 2011.
- 2011 Lavery, A.C., "Broadband acoustic scattering from salinity microstructure in the Connecticut River," COFDL Talk, Woods Hole Oceanographic Institution, October 2011.
- 2012 Lavery, A.C., "Broadband acoustic imaging and quantification of stratified turbulence," AOPE Seminar, Woods Hole Oceanographic Institution, January 2012.
- 2012 Lavery, A.C., "Ocean Acoustics and Signals Laboratory at WHOI," Joint Program Open House Seminar, Woods Hole Oceanographic Institution, January 2012.
- 2013 Lavery A.C., "Overview of acoustic scattering techniques for detection, imaging, and quantification of scatterers in the context of remediation of the Hanover Waste Treatment Site " DOE Webinar presentation to R. Rimando at U.S. Department of Energy, Office of Environmental Management, January 2013.
- 2013 Lavery, A.C., "High-Frequency Acoustic Propagation in Shallow, Energetic, Highly-Salt- Stratified Environments," ONR Program Review, Stennis Space Center, MS, April 2013.
- 2013 Lavery, A.C., "Ocean Acoustics at WHOI," Presentation to Admiral Conner, July 2013.
- 2013 Lavery, A.C., "Looking" at Ocean Acidification: Studying the Ocean using Sound (Acoustical Oceanography) & how I became a scientist along the way," Morse Pond Middle School, Falmouth, MA, November 2013.
- 2014 Lavery, A.C., "Advances in remote inference of physical and biological parameters using acoustic scattering techniques: Mapping the ocean in broadband color," AOPE Seminar (Practice Medwin Prize Talk), Woods Hole Oceanographic Institution, April 2014.
- 2014 Lavery, A.C., "Can Acoustic Scattering Techniques Help Address Science Questions in Coastal Oceanography?" Lecture for Class on Field Methods in Coastal Oceanography, Woods Hole Oceanographic Institution, August 2014.

CONFERENCE PRESENTATIONS WITH STUDENTS AND POSTDOCS (PUBLISHED ABSTRACTS)

- 2014 Levine*, R. M.; Lawson, G. L.; Wiebe, P. H.; Lavery, A. C.; Greene, C. H. Temporal and spatial variability in euphausiid abundance and species composition at the northwest atlantic shelf break and its canyons (Abstract ID: 17198), Ocean Sciences, Hawaii
- 2014 Lavery, A. C.; Pagniello*, C.; Lawson, G. L.; Wiebe, P. H.; Copley, N. J. Characterization of a strong scattering layer in the northeast pacific (Abstract ID: 16351), Ocean Sciences, Hawaii
- 2014 Fincke*, J.R. and Lavery, A.C. Sensing stratified turbulence and shear instability using an acoustic high frequency broadband backscatter array. *J. Acoust. Soc. Am.* **135**, 2306. <http://dx.doi.org/10.1121/1.4877602>
- 2014 Bassett*, C., Lavery, A.C., and Maksym, T. Laboratory measurements of high-frequency, broadband acoustic scattering of growing sea ice and oil beneath sea ice. *J. Acoust. Soc. Am.* **135**, 2302. <http://dx.doi.org/10.1121/1.4877579>
- 2012 Lee*, W-J., Stanton, T.K., and Lavery, A.C. Estimating numerical density of scatterers in monotype aggregations using the statistics of broadband echoes: Applications to fish echoes. *J. Acoust. Soc. Am.* **132**, 1882. <http://dx.doi.org/10.1121/1.4754900>
- 2012 Lawson, G.L., Lavery, A.C., Wiebe, P.H., Fincke*, J.R., and Copley N.J. Recent development and application of active acoustic techniques for studies of zooplankton ecology and implications for ocean observatories. *J. Acoust. Soc. Am.* **132**, 1915. <http://dx.doi.org/10.1121/1.4755026>

- 2012 Lavery, A.C., Lawson, G.L., Wiebe, P.H., Stanton, T.K., Fincke*, J.R., and Copley N.J. Acoustic characterization of thecosome pteropods and recent field measurements in the context of ocean acidification. *J. Acoust. Soc. Am.* **132**, 1882. <http://dx.doi.org/10.1121/1.4754903>
- 2012 Lee*, W-J., Lavery, A.C., Stanton, T.K. Interpretation of the compressed pulse output for broadband acoustic scattering from inhomogeneous weakly scattering objects. *J. Acoust. Soc. Am.* **128**, 2460. <http://dx.doi.org/10.1121/1.3508811>
- 2012 Lavery, A. C., Geyer, W. R., Scully, M. E., Lawson, G. L., Wiebe, P. H., Lee*, W. J., Stanton, T. K., and Fincke*, J. R. Development of high-frequency broadband acoustic scattering techniques for imaging, classification, and quantification of stratified turbulence. Salt Lake City Ocean Sciences Abstract ID: 11460
- 2012 Fincke*, J.R., Lavery, A. C., Lawson, G. L., Wiebe, P. H., Jaffre, F., Packard, G.J. A high-frequency broadband acoustic backscattering system for imaging, classification, and quantification of water-column scatterers from autonomous vehicles. Salt Lake City Ocean Sciences Abstract ID: 11667
- 2009 Lee*, W-J., Stanton, T.K., and Lavery, A.C. Broadband acoustic backscattering from live squid: Experiment and analysis. *J. Acoust. Soc. Am.* **125**, 2550. <http://dx.doi.org/10.1121/1.4783645>
- 2008 Ross*, T., and Lavery, A.C. High-frequency broadband acoustic scattering for investigating double- diffusive convection. *J. Acoust. Soc. Am.* **123**, 3213. <http://dx.doi.org/10.1121/1.2933395>
- 2006 Jones*, B.A., Lavery, A.C., and Stanton, T.K. An advanced 3-D scattering model for squid. *J. Acoust. Soc. Am.* **120**, 3106. <http://dx.doi.org/10.1121/1.4787570>
- 2005 Jones*, B.A., Stanton, T.K., Lavery, A.C., Johnson, M.P., Madsen, P.T., and Tyack, P.L. A scattering analysis of echoes due to biosonar signals emitted by foraging beaked whales. *J. Acoust. Soc. Am.* **118**, 1909. <http://dx.doi.org/10.1121/1.4809093>
- 2004 Ross*, T., Lavery, A.C., Lueck, R., Wiebe, P., and Lawson, G. Ocean acoustic backscattering: When you can ignore acoustic scatter from turbulence and when you can't. *J. Acoust. Soc. Am.* **115**, 2583. <http://dx.doi.org/10.1121/1.4809296>