

TIMOTHY K. STANTON

Scientist Emeritus
Woods Hole Oceanographic Institution
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B.S. Physics, Oakland University, 1974
M.S. Physics, Brown University, 1976
Ph.D. Physics, Brown University, 1978

OVERALL EXPERIENCE

Underwater acoustics, theory and experiment,
Wave scattering from volume inhomogeneities and rough interfaces (marine biota, microstructure,
seafloor, sea surface, sea ice),
Echo statistics

POSITIONS HELD

Scientist Emeritus, 2015-present; Senior Scientist, 1994-2015; Associate Scientist with Tenure, 1988-1993, Woods Hole Oceanographic Institution
University Affiliate, 2015-present, Applied Research Laboratory, University of Texas
J. Seward Johnson Chair and Education Coordinator, 2005 to Feb. 2012; Department of Applied Ocean Physics and Engineering, Woods Hole Oceanographic Institution
Department Chair, 1997-2001; Interim Department Chair June/July 1992, Department of Applied Ocean Physics and Engineering, Woods Hole Oceanographic Institution
Laboratory Head, Ocean Acoustics Lab, Woods Hole Oceanographic Institution, 1989-1996
Associate Scientist, 1986-1988; Assistant Scientist (and Project Associate), 1980-1985; University of Wisconsin-Madison
Lecturer, University of Wisconsin-Madison, 1984
Senior Engineer, Submarine Signal Division, Raytheon Co., 1978-1980
Research Assistant, Brown University, 1975-1978

AWARDS

A.B. Wood Medal for Distinguished Contributions to Underwater Acoustics. Awarded by the Institute of Acoustics, U.K., 1985
Fellow. Acoustical Society of America, 1996
Adams Chair. Awarded by WHOI, 2011.

EDITORSHIPS

Guest Co-Associate Editor for *Deep Sea Research*. Special Topics Issue on Bioacoustical Oceanography, 1998.
Associate Editor (Underwater Acoustics section) *Journal of the Acoustical Society of America*, 1989-1992 (159 papers).
Guest Associate Editor for *IEEE J. Ocean. Eng.* Special Issue on "Sound Reverberation and Electromagnetic Clutter," 1989.

PROFESSIONAL SOCIETIES

Acoustical Society of America
The Oceanography Society

SONAR R&D AND TESTING (Raytheon Co.)

Field team manager and data analyst for flow noise and transceiver testing of Advanced Lightweight Torpedo (MK50) prototype sonar at various Naval facilities (mostly NUWES/Dabob Bay Range) (9 months). 1-6 months each of other work: sonar array design in MK48/ADCAP Torpedo proposal and MK50 contract. Acoustic compatibility design in Mobile Tracking Range (MTR) proposal for Naval fleet maneuvers. Acoustic test design of array AN-WQS2. Technology projection concept formulation concerning Maritime Patrol Aircraft (MPA) sonobuoy signal processing. Fiber optic hydrophone research was concurrent with the engineering.

NAVY/ARMY FACILITIES AND SEA EXPERIENCE

NUSC/Newport, NUSC/Seneca Lake, NUWES/Keyport, NUWES/Dabob Bay, NUWES/Nanoose Bay, B.C., CRREL (Hanover, NH), Lake Michigan (southern basin), Atlantic Ocean (Continental Shelf near Cape Hatteras, Gulf of Maine, Georges Bank), Bay of Fundy, Nova Scotia, Gulf of Mexico (more than 1 year).

OTHER PROFESSIONAL ACTIVITIES

Co-Rapporteur of working group entitled, "*In Situ* Exploitable Properties of Aggregates: Other Properties," in ONR workshop on Aggregate Dynamics in the Sea, Asilomar Conference Center, Monterey, California, Sept 1986.

Chair of session entitled, "Underwater Acoustics X: Scattering from the Seafloor and Ice Canopy," *J. Acoust. Soc. Am.*, **80**, (Suppl. 1), (Fall) 1986.

Moderator of panel entitled, "Bioacoustical Measurement of Water Mass Boundaries," *J. Acoust. Soc. Am.*, **87**, (Suppl. 1), S77 (Spring) 1990.

Co-host of workshop and chair of working group entitled, "Macrozooplankton/ Micronekton," Section of GLOBEC Workshop on Acoustic Technology, April 1991.

Chair of working group on "Experimental Issues in Sediment Classification," in NRL workshop on Sediment Classification, Feb 1992.

Member of Technical Committee on Underwater Acoustics, Acoustical Society of America, 1991-1994.

Alternate Chair of Technical Committee on Acoustical Oceanography, Acoustical Society of America, 1991-1994.

Chair of "Ad Hoc Committee on PACS Numbers for Ocean Acoustics Sciences," Acoustical Society of America, 1992-1993.

Member (ex officio) of Underwater Acoustics Awards Committee, Acoustical Society of America, 1992.

Member (ex officio) of Acoustical Oceanography Awards Committee, Acoustical Society of America, 1992.

Member of committee to nominate officers of Acoustical Society of America, 1992-1993.

Chair of working group entitled, "Acoustics: System Design and Deployment Considerations," at International GLOBEC Workshop, Paris, April 1993.

Chair of Session entitled, "Fish Target Strength Models and Methods" at ICES International Symposium on Fisheries and Plankton Acoustics, Aberdeen, 1995.

Co-Chair of Sessions entitled, "Acoustical Oceanography: Acoustic Inversions of Fish and Plankton Ensembles (I & II)," Acoustical Society of America, St. Louis, Fall, 1995.

Member of Technical Advisory Committee for joint ASA/ICA 1998 meeting, 1996 to 1998.

Chair of Plenary Session for 1999 2nd EAA International Symposium on Hydroacoustics in Gdansk, Poland.

Chair of Technology Working Group, Census for Marine Life Workshop, 2000.

Member of Steering Committee for Census for Marine Life, Gulf of Maine; 2000-2002.

Organizer of Special Sessions (3) in Bioacoustics for Acoustical Society of America meeting in Newport Beach, 2000.

Chair and organizer of The Oceanography Society Conference for 2001.

Member of Scientific Steering Committee for 2001 3rd EAA International Symposium on Hydroacoustics in Gdansk, Poland.

Co-chair and co-organizer of The Oceanography Society – Oceanology International Americas Ocean Conference for 2003.

Member of IEEE OES Technology Committee on Underwater Acoustics; 2007-present

Chair and organizer of the Fish Acoustics Science Review (ONR), Nov. 2007.

Co-chair of session entitled "Fisheries/Geo/Bio/Seismo Acoustics-2", Oceans '08 MTS/IEEE Conference in Kobe, Japan, April 2008.

Co-chair of session entitled "Physics-based undersea clutter model verification and validation I & II," Acoustical Society of America, Portland, Spring, 2009.

Member of Technical Committee on Acoustical Oceanography, Acoustical Society of America, 2009-present.

Co-Chair and co-organizer of session entitled, "Physical acoustics and engineering acoustics: A man for all seasons: Tribute to Robert T. Beyer," Acoustical Society of America, San Antonio, Fall, 2009.

Member of Ad Hoc Committee on PACS numbers, Acoustical Society of America, 2010-2012

Member of PMW 120 Working Group on "Assessment and Exploitation of Marine Biological Effects on Reverberation and Sonar Performance" (AEMBERS). 2010

Co-chair and co-organizer of two sessions entitled, "Physics-based signal characterization, classification, and processing," Acoustical Society of America, Cancun, Fall 2010.

Co-chair and co-organizer of two sessions entitled, "Van Holiday Memorial Session," Acoustical Society of America, San Diego, Fall 2011.

Co-chair and co-organizer of two sessions entitled, "Memorial session in honor of Clarence S. Clay," Acoustical Society of America, Kansas City, Fall 2012.

Member of Membership Committee, Acoustical Society of America, 2013-2016.

Chair of session entitled, "Contributed papers in Acoustical Oceanography (poster session)," Acoustical Society of America, San Francisco, Fall 2013.

Member of Technical Program Organizing Committee (TPOM), Acoustical Oceanography, for Providence 2014 Meeting of Acoustical Society of America, Jan. 2014.

Co-chair and Co-organizer of two sessions entitled, "Using acoustics to study fish distribution and behavior," Acoustical Society of America, Providence, Spring 2014.

Chair of session entitled, "Acoustical Oceanography prize lecture," Acoustical Society of America, Providence, Spring 2014.

EDUCATIONAL ACTIVITIES

Subjects Taught

Physics Laboratory (Brown University, Fall 1975)

Linear Circuit Theory (University of Wisconsin, Spring 1984)

Acoustic Scattering Theory (MIT/WHOI, co-taught course, Spring 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009)

Bioacoustics (Friday Harbor Laboratory, University of Washington, 6 hours of lecture, 1993; 15 hours of lecture, 2007; 16 hours of lecture, 2009; 14 hours of lecture, 2011; 15 hours lecture in 2013; UCSC, 3 hours of lecture, 1995; 10 hours of lecture, 1997; MTS/IEEE Oceans14 Conference in Taipei, 4 hour tutorial, 2014)

Students Supervised

Dezhang Chu (Ph.D., 1989, Univ. of Wisc. (co-supervised with Clay))

Doron Weisbarth (Summer Student Fellow, 1989, WHOI)

J. Van Gurley (M.S., 1992, MIT/WHOI)

Dan DiPerna (Ph.D., 1993, MIT/WHOI)

Matt Johnson (M.S., 1993, MIT/WHOI)

Linda Martin (Ph.D., 1998, MIT/WHOI, co-advisor with Wiebe)

Joe Warren (Ph.D., 2000, MIT/WHOI, co-advisor with Wiebe)

Ben Reeder (Ph.D., 2002, MIT/WHOI)

Jeremy Marzuola (Summer Student Fellow, 2002, WHOI)

Gareth Lawson (Ph.D., 2006, MIT/WHOI, co-advisor with Wiebe)

Ben Jones (M.S., 2006, MIT/WHOI, co-advisor with Lavery; Ph.D., 2012, NPS, co-advisor with Colosi)

Greg Dietzen (M.S., 2008, MIT/WHOI, co-advisor with Lavery)

Saurav Bhatia (M.S., 2012, MIT/WHOI)

Wu-Jung Lee (Ph.D., 2013, MIT/WHOI, co-advisor with Lavery and Tyack)

Postdoctoral Fellows Supervised

Dezhang Chu, '89/'90

Duncan McGehee, '94-'96

Andone Lavery, '99-'01

Kyungmin Baik, '10-'12

Committees (MIT/WHOI Joint Program)

Admissions (1990, 1991, 2013)

Doctoral Oral Exam (1990, 1991, 1998)

Doctoral Written Exam Review (1989, 1990, 1991)

Thesis Committees/Defense Chair (seven students in addition to above)

JCAOSE Council (1996)

Chair/member of multiple activities as Education Coordinator (2005- Feb. 2012)

OTHER WHOI COMMITTEES

Ad Hoc Committees (10) for promotion from Assistant Scientist to Associate Scientist; Chair of Tyack's and Samelson's, member of 8 others
 Journal Club Committee, 1989-1990
 Ad Hoc Committee for Independent Study Award, 1990
 Committee on Work and Life, 1992-1993
 Ad Hoc Search Committee for Henry Stommel Award, 1993
 Ad Hoc Search Committee for New Director of WHOI, 1993
 Senior Scientist Executive Committee, 1995-1996
 Strategic Planning Committee for Education, 1996
Ex officio member of many committees as Dept. Chair, 1997-2001
 Director's Advisory Council, 1998-2000
 Chair, AOPE Space Committee, 2001-2004
 Search Committee for the Chief Scientist for Deep Submergence, 2003
 Advisory Committee for the Ocean Life Institute, 2003-2015
 Ad Hoc Committee for Independent Study Award, 2005
 Ad Hoc Committee for promotion of Tom Austin to Principal Engineer, 2008
 Chair, Search Committee for new Chair of AOPE Department, 2008
 Ad Hoc Committee for promotion of John Collins to Senior Research Specialist, 2011
 Ad Hoc Committee for promotion of Art Newhall to Senior Information Systems Specialist, 2014
 Chair, Recruitment Committee for AOPE Department, 2012-2015

REFEREED PUBLICATIONS

- 1978 Stanton, T.K. and R.T. Beyer, "The interaction of sound with noise in water," *J. Acoust. Soc. Am.*, **64**, 1667-1670.
- 1979 Stanton, T.K. and R.T. Beyer, "Complex wattmeter measurements in a reactive acoustic field," *J. Acoust. Soc. Am.*, **65**, 249-252.
- 1979 Stanton, T.K., R.G. Pridham, W.V. McCollough, and M.P. Sanguinetti, "On fiber-optic hydrophone noise-equivalent pressure," *J. Acoust. Soc. Am.*, **66**, 1893-1894 (L).
- 1981 Stanton, T.K. and R.T. Beyer, "The interaction of sound with noise in water II," *J. Acoust. Soc. Am.*, **69**, 989-992.
- 1981 Stanton, T.K. "Noise-equivalent pressure of a single-fiber interferometric acoustic sensor," *J. Acoust. Soc. Am.*, **69**, 311-312 (L).
- 1982 Stanton, T.K. "Effects of transducer motion on echo-integration techniques," *J. Acoust. Soc. Am.*, **72**, 947-949.
- 1983 Stanton, T.K. "Multiple scattering with applications to fish-echo processing," *J. Acoust. Soc. Am.*, **73**, 1164-1169.
- 1983 Powell, L.A. and T.K. Stanton, "A programmable microcomputer-based sonar-echo processor for real-time processing," *IEEE: J. Oceanic Eng.*, **OE-8 (4)**, 280-287.
- 1984 Stanton, T.K. "Sonar estimates of sea floor microroughness," *J. Acoust. Soc. Am.*, **75**, 809-818.
- 1984 Stanton, T.K. "Effects of second-order scattering on high resolution sonars" *J. Acoust. Soc. Am.*, **76**, 861-866.
- 1985 Stanton, T.K. "Volume scattering: Echo peak PDF," *J. Acoust. Soc. Am.*, **77**, 1358-1366.

- 1985 Stanton, T.K. "Sea surface scattering: Echo peak PDF," *J. Acoust. Soc. Am.*, **77**, 1367-1369.
- 1985 Stanton, T.K. "Echo fluctuations from the rough seafloor: Predictions based on acoustically measured microrelief properties," *J. Acoust. Soc. Am.*, **78**, 715-721.
- 1985 Stanton, T.K. "Density estimates of biological sound scatterers using sonar echo peak PDFs," *J. Acoust. Soc. Am.*, **78**, 1868-1873.
- 1986 Stanton, T.K. and C.S. Clay, "Sonar echo statistics as a remote sensing tool: Volume and Sea Floor," *IEEE J. Oceanic Eng.*, **OE-11**, 79-96.
- 1986 Stanton, T.K., K.C. Jezek, and A.J. Gow, "Acoustical reflection and scattering from the underside of laboratory grown sea ice: measurements and predictions," *J. Acoust. Soc. Am.*, **80**, 1486-1494.
- 1987 Stanton, T.K., R.D.M. Nash, R.L. Eastwood, and R.W. Nero, "A field examination of acoustical scattering from marine organisms at 70 kHz," *IEEE J. Oceanic Eng.*, **OE-12**, 339-348.
- 1987 Nash, R.D.M., J.J. Magnuson, C.S. Clay, and T.K. Stanton, "A synoptic view of the Gulf Stream front with 70 kHz sonar: Taking advantage of a closer look," *Can. J. Fish. Aquat. Sci.*, **44**, 2022-2024.
- 1988 Stanton, T.K. "Sound scattering by cylinders of finite length I: Fluid cylinders," *J. Acoust. Soc. Am.*, **83**, 55-63.
- 1988 Stanton, T.K. "Sound scattering by cylinders of finite length II: Elastic cylinders," *J. Acoust. Soc. Am.*, **83**, 64-67.
- 1989 Stanton, T.K. "Sound scattering by cylinders of finite length III: Deformed cylinders," *J. Acoust. Soc. Am.*, **86**, 691-705.
- 1989 Stanton, T.K. "Simple approximate formulas for backscattering of sound by spherical and elongated objects," *J. Acoust. Soc. Am.*, **86**, 1499-1510.
- 1989 Nash, R.D.M., J.J. Magnuson, T.K. Stanton, and C.S. Clay, "Depth and temperature distribution of peaks of 70 kHz acoustic scattering during day and night at the edge of the Gulf Stream-Echo Front 83," *Deep Sea Res.*, **36 (4)**, 587-596.
- 1990 Chu, D. and T.K. Stanton, "Application of Twersky's boss scattering theory to laboratory measurements of sound scattered by a rough surface," *J. Acoust. Soc. Am.*, **87**, 1557-1568.
- 1990 Nero, R.W., J.J. Magnuson, S.B. Brandt, T.K. Stanton, and J.M. Jech, "Finescale biological patchiness of 70 kHz acoustic scattering at the edge of the Gulf Stream - EchoFront 85," *Deep Sea Res.*, **37 (6)**, 999-1016.
- 1990 Stanton, T.K. "Sound scattering by spherical and elongated shelled bodies," *J. Acoust. Soc. Am.*, **88**, 1619-1633.
- 1990 Stanton, T.K. "Sound scattering by zooplankton," *Rapp. P.-v. Reun. Cons. int. Explor. Mer. (Journal for the International Council for the Exploration of the Sea)* **189**, 353-362.
- 1990 Jezek, K.C., T.K. Stanton, A.J. Gow, and M.A. Lange, "Influence of environmental conditions on acoustical properties of sea ice," *J. Acoust. Soc. Am.*, **88**, 1903-1912.

- 1990 Wiebe, P.H., C.H. Greene, T.K. Stanton, and J. Burczynski, "Sound scattering by live zooplankton and micronekton: Empirical studies with a dual beam acoustical system," *J. Acoust. Soc. Am.*, **88**, 2346-2360.
- 1991 Greene, C.H., T.K. Stanton, P.H. Wiebe, and S. McClatchie, "Acoustic estimates of antarctic krill," *Nature*, **349**, 110 (L).
- 1991 DiPerna, D., and T.K. Stanton, "Fresnel zone effects in the scattering of sound by cylinders of various lengths," *J. Acoust. Soc. Am.*, **90**, 3348-3355.
- 1992 Chu, D., T.K. Stanton, and P.H. Wiebe, "Frequency dependence of sound backscattering from live individual zooplankton," *ICES J. Mar. Sci.*, **49**, 97-106.
- 1992 Stanton, T.K., "Sound scattering by rough elongated elastic objects: I. means of scattered field," *J. Acoust. Soc. Am.*, **92**, 1641-1664.
- 1992 Stanton, T.K., and D. Chu, "Sound scattering by rough elongated elastic objects: II. fluctuations of scattered field," *J. Acoust. Soc. Am.*, **92**, 1665-1678.
- 1993 Chu, D., K.G. Foote, and T.K. Stanton, "Further analysis of target strength measurements of antarctic krill at 38 kHz and 120 kHz: Comparison with deformed cylinder model and inference of orientation distribution," *J. Acoust. Soc. Am.*, **93**, 2985-2988 (L).
- 1993 Gurley, J.V., and T.K. Stanton, "Sound scattering by rough elongated elastic objects. III. experiment," *J. Acoust. Soc. Am.*, **94**, 2746-2755.
- 1993 Stanton, T.K., C.S. Clay, and D. Chu, "Ray representation of sound scattering by weakly scattering deformed fluid cylinders: Simple physics and application to zooplankton," *J. Acoust. Soc. Am.*, **94**, 3454-3462.
- 1993 Stanton, T.K., D. Chu, P.H. Wiebe, and C.S. Clay, "Average echoes from randomly-oriented random-length finite cylinders: Zooplankton models," *J. Acoust. Soc. Am.*, **94**, 3463-3472.
- 1994 DiPerna, D., and T.K. Stanton, "Sound scattering by cylinders of noncircular cross section: A conformal mapping approach," *J. Acoust. Soc. Am.*, **96**, 3064-3079.
- 1994 Stanton, T.K., P.H. Wiebe, D. Chu, and L. Goodman, "Acoustic characterization and discrimination of marine zooplankton and turbulence," *ICES J. Mar. Sci.*, **51**, 469-479.
- 1994 Stanton, T.K., P.H. Wiebe, D. Chu, M. Benfield, L. Scanlon, L. Martin, and R.L. Eastwood, "On acoustic estimates of zooplankton biomass," *ICES J. Mar. Sci.*, **51**, 505-512.
- 1995 Stanton, T.K. and K.G. Foote, "Comments on 'A generalized target strength model for euphausiids, with applications to other zooplankton,' *J. Acoust. Soc. Am.*, **95**, 2452-2466 (1994)," *J. Acoust. Soc. Am.*, **98**, 1807-1809.
- 1996 Stanton, T.K., D. Chu and P.H. Wiebe, "Acoustic scattering characteristics of several zooplankton groups," *ICES J. Mar. Sci.*, **53**, 289-295.
- 1996 Martin, L.V., T.K. Stanton, J.F. Lynch and P.H. Wiebe, "Acoustic classification of zooplankton," *ICES J. Mar. Sci.*, **53**, 217-224.
- 1996 Wiebe, P.H., D.G. Mountain, T.K. Stanton, C.H. Greene, G. Lough, S. Kaartvedt, J. Dawson, and N. Copley, "Acoustical study of the spatial distribution of plankton on Georges Bank and the

- relationship between volume backscattering strength and the taxonomic composition of the plankton," *Deep-Sea Res. II*, **43**, 1971-2001.
- 1997 Wiebe, P.H., T.K. Stanton, M. Benfield, D. Mountain, and C. Greene, "High frequency acoustic volume backscattering in the Georges Bank coastal region and its interpretation using scattering models," *IEEE J. Ocean. Eng.*, **22**, 445-464.
- 1998 Stanton, T.K., D. Chu, P.H. Wiebe, L. Martin and R.L. Eastwood, "Sound scattering by several zooplankton groups I: Experimental determination of dominant scattering mechanisms," *J. Acoust. Soc. Am.*, **103**, 225-235.
- 1998 Stanton, T.K., D. Chu, and P.H. Wiebe, "Sound scattering by several zooplankton groups II: scattering models," *J. Acoust. Soc. Am.*, **103**, 236-253.
- 1998 Stanton, T.K., P.H. Wiebe, and D. Chu, "Differences between sound scattering by weakly scattering spheres and finite length cylinders with applications to sound scattering by zooplankton," *J. Acoust. Soc. Am.*, **103**, 254-264.
- 1998 Chu, D., and T.K. Stanton, "Application of pulse compression techniques to broadband acoustic scattering by live individual zooplankton," *J. Acoust. Soc. Am.*, **104**, 39-55.
- 1998 Benfield, M.C., P.H. Wiebe, T.K. Stanton, C.S. Davis, S.M. Gallager, and C.H. Greene, "Estimating the spatial distribution of zooplankton biomass by combining video plankton recorder and single-frequency acoustic data," *Deep Sea Res.*, **45**, 1175-1199.
- 1998 Martin Traykovski, L.V., T.K. Stanton, P.H. Wiebe, and J.F. Lynch, "Model based covariance mean variance classification techniques: Algorithm development and applications to the acoustic classification of zooplankton," *IEEE J. Ocean. Eng.*, **23**, 344-364.
- 2000 Stanton, T.K., D. Chu, P.H. Wiebe, R.L. Eastwood, and J.D. Warren, "Acoustic scattering by benthic and planktonic shelled animals," *J. Acoust. Soc. Am.*, **108**, 535-550.
- 2000 Stanton, T.K., "On acoustic scattering by a shell-covered seafloor," *J. Acoust. Soc. Am.*, **108**, 551-555.
- 2000 Stanton, T.K. and D. Chu, "Review and recommendations for modeling of acoustic scattering by fluid-like elongated zooplankton: Euphausiids and copepods," *ICES J. Mar. Sci.*, **57**(4), 793-807.
- 2001 Warren, J.D., T.K. Stanton, M.C. Benfield, P.H. Wiebe, D. Chu, and M. Sutor, "In situ measurements of acoustic target strengths of siphonophores, a gas-bearing zooplankter," *ICES J. Mar. Sci.*, **58**, 740-749.
- 2002 Warren, J.D., T.K. Stanton, D.E. McGehee, and D. Chu, "Influence of animal behavior on acoustic estimates of zooplankton properties," *IEEE J. Ocean Eng.*, **27**, 130-138.
- 2002 Lavery, A.C., T.K. Stanton, D.E. McGehee, and D. Chu, "Three-dimensional modeling of acoustic backscattering from fluid-like zooplankton," *J. Acoust. Soc. Am.*, **111**, 1197-1210.
- 2002 Wiebe, P.H., T.K. Stanton, C.H. Greene, M.C. Benfield, H.M. Sosik, T. Austin, J.D. Warren, and T. Hammar, "Biomapper-II: An integrated instrument platform for coupled biological and physical measurements in coastal and oceanic regimes," *IEEE J. Ocean. Eng.*, **27**, 700-716.
- 2003 Benfield, M.C., A. Lavery, P.H. Wiebe, C.H. Greene, T.K. Stanton, and N. Copley, "Distributions of physonect siphonulae in the Gulf of Maine and their potential as important sources of acoustic scattering," *Can. J. Fish. Aquat. Sci.*, **60**, 759-772.

- 2003 Stanton, T.K., D.B. Reeder, and J.M. Jech, "Inferring fish orientation from broadband-acoustic echoes," *ICES J. Mar. Sci.*, **60**, 524-531.
- 2003 Warren, J.D., T.K. Stanton, P.H. Wiebe, and H.E. Seim, "Inference of biological and physical parameters in an internal wave using multiple-frequency acoustic-scattering data," *ICES J. Mar. Sci.*, **60**, 1033-1046.
- 2003 Lavery, A.C., R.W. Schmitt, and T.K. Stanton, "High-frequency acoustic scattering from turbulent oceanic microstructure: the importance of density fluctuations," *J. Acoust. Soc. Am.*, **114**, 2685-2697.
- 2004 Stanton, T.K., D. Chu, and D.B. Reeder, "Non-Rayleigh acoustic scattering characteristics of individual fish and zooplankton," *IEEE J. Ocean. Eng.*, **29**, 260-268.
- 2004 Stanton, T.K. and D. Chu, "On the acoustic diffraction by the edges of benthic shells," *J. Acoust. Soc. Am.*, **116**, 239-244.
- 2004 Reeder, D.B. and T.K. Stanton, "Acoustic scattering by axisymmetric finite-length bodies: An extension of a 2-dimensional conformal mapping method," *J. Acoust. Soc. Am.*, **116**, 729-746.
- 2004 Reeder, D.B., J.M. Jech, and T.K. Stanton, "Broadband acoustic backscatter and high-resolution morphology of fish: Measurement and modeling," *J. Acoust. Soc. Am.*, **116**, 747-761.
- 2006 Lawson, G.L., P.H. Wiebe, C.J. Ashjian, D. Chu, and T.K. Stanton, "Improved parameterization of Antarctic krill target strength models," *J. Acoust. Soc. Am.*, **119**, 232-242.
- 2007 Stanton, T.K., D. Chu, and G.V. Norton, "Acoustic diffraction by deformed edges of finite length: Theory and experiment," *J. Acoust. Soc. Am.*, **122**, 3167-3176.
- 2007 Chu, D., T.K. Stanton, and A.D. Pierce, "Higher-order acoustic diffraction by edges of finite thickness," *J. Acoust. Soc. Am.*, **122**, 3177-3194.
- 2007 Lavery, A.C., P.H. Wiebe, T.K. Stanton, G.L. Lawson, M.C. Benfield, and N. Copley, "Determining dominant scatterers of sound in mixed zooplankton populations," *J. Acoust. Soc. Am.*, **122**, 3304-3326.
- 2008 Lawson, G.L., P.H. Wiebe, T.K. Stanton, and C.J. Ashjian, "Euphausiid distribution along the Western Antarctic Peninsula – (A) Development of robust multi-frequency acoustic techniques to identify euphausiid aggregations and quantify euphausiid size, abundance, and biomass," *Deep-Sea Research II*, **55**, 412-431.
- 2008 Lawson, G.L., P.H. Wiebe, C.J. Ashjian, and T.K. Stanton, "Euphausiid distribution along the Western Antarctic Peninsula – (B) Distribution of euphausiid aggregations and biomass and associations with environmental features," *Deep-Sea Research II*, **55**, 432-454.
- 2008 Jones, B.A., T.K. Stanton, A.C. Lavery, M.P. Johnson, P.T. Madsen, and P.L. Tyack, "Classification of broadband echoes from prey of a foraging Blainville's beaked whale," *J. Acoust. Soc. Am.*, **123**, 1753-1762.
- 2008 Stanton, T.K. and D. Chu, "Calibration of broadband active acoustic systems using a single standard spherical target," *J. Acoust. Soc. Am.*, **124**, 128-136.

- 2009 Jones, B.A., A.C. Lavery, and T.K. Stanton, "Use of the distorted wave Born approximation to predict scattering by inhomogeneous objects: Application to squid," *J. Acoust. Soc. Am.*, **125**, 73-88.
- 2010 Stanton, T.K., D. Chu, J.M. Jech, and J.D. Irish, "New broadband methods for resonance classification and high-resolution imagery of fish with swimbladders using a modified commercial broadband echosounder," *ICES J. Mar. Sci.*, **67**: 365-378.
- 2010 Stanton, T.K. and D. Chu, "Non-Rayleigh echoes from resolved individuals and patches of resonant fish at 2-4 kHz," *IEEE J. Ocean. Eng.*, **35**: 152-163.
- 2010 Chu, D. and T.K. Stanton, "Statistics of echoes from a directional sonar beam insonifying finite numbers of single scatterers and patches of scatterers," *IEEE J. Ocean. Eng.*, **35**: 267-277.
- 2012 Stanton, T.K., C. Sellers, and J.M. Jech, "Resonance classification of mixed assemblages of fish with swimbladders using a broadband echosounder at 1-6 kHz." *Can. J. Fish. Aq. Sci.*, **69**: 854-868.
- 2012 Lee, W.-J., A.C. Lavery, and T.K. Stanton, "Orientation dependence of broadband backscattering from live squid," *J. Acoust. Soc. Am.* **131**: 4461-4475.
- 2014 Bhatia, S., T.K. Stanton, and K. Baik, "Non-Rayleigh scattering by a randomly oriented elongated scatterer randomly located in a beam," *IEEE J. Ocean. Eng.*, 10.1109/JOE.2013.2293959.
- 2014 Lee, W.-J. and T.K. Stanton, "Statistics of echoes from mixed assemblages of scatterers with different scattering amplitudes and numerical densities," *IEEE J. Ocean. Eng.* **39**: 740-754. 10.1109/JOE.2013.2285657.
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- 2014 Stanton, T.K., D. Chu, J.M. Gelb, G.L. Tipple, and K. Baik. "Interpreting echo statistics of three distinct clutter classes measured with a midfrequency active sonar: Accounting for number of scatterers, scattering statistics, and beampattern effects," *IEEE J. Ocean. Eng.* 10.1109/JOE.2014.2346417.
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- 1993 Stanton, T.K., "Underwater Census," Earthwatch Radio interview regarding zooplankton scattering methods (Sea Grant Program, Inst. for Env. Studies, Univ. of Wisconsin).
- 1994 Stanton, T.K., "Blue Peter", BBC television interview regarding zooplankton scattering methods (U.K.).
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- 1998 Benfield, M.C. (Scientist - correspondent), Coverage of July 1998 cruise off Cape Cod, eight article-series in ABCNEWS.com science website.
- 2006 WHOI Oceanus article: "Listening for telltale echoes from fish: Sound waves resonating off swimbladders offer a new way to count fish." Coverage of data that led to 2010 ICES paper.
- 2010 WHOI Press release: "Now in broadband, acoustic imaging of the ocean." Coverage of the 2010 ICES paper (and Andone Lavery's paper in same issue). Press release picked up by more than one dozen media including Science News, Life Science World, Environment 360, and USA Today.
- 2013 Stanton, T.K., "Using sonars to study fish in the ocean," Rising Tide Charter School, Plymouth, MA (Oct).
- 2015 Stanton, T.K., "Chirp fish finders: The how's, what's, and why's of chirp technology," Falmouth Fishermen's Association, Falmouth, MA.

(plus many presentations and tours over the years to visitors at WHOI)

INVITED PRESENTATIONS

- 1985 Stanton, T.K., A.B. Wood Memorial Lecture: "Seafloor classification using sonar echo statistics," April 1985, in "International Conference on Scattering Phenomena in Underwater Acoustics," *Proc. Inst. Acoust.*, **7 (3)**.
- 1987 Stanton T.K., "Scattering of sound from the rough seafloor," *J. Acoust. Soc. Am.* (Fall).
- 1989 Stanton T.K., "Sonar classification of zooplankton," Narragansett Bay Chapter of the Acoustical Society of America, April.

- 1989 Stanton T.K., "Sound scattering by spherical and elongated objects," Physics Colloquium Dept. of Physics and Astronomy Hunter College, May.
- 1990 Stanton T.K., "Sound scattering by randomly rough elongated objects and related echo statistics," International Congress on Recent Developments in Air- and Structure-Borne Sound and Vibration, Auburn University, March 6-8th.
- 1990 Stanton T.K., "A field study of acoustic scattering by marine organisms at the Gulf Stream boundary and the need for better scattering models," *J. Acoust. Soc. Am.*, **87**, (Suppl. 1) S76 (Spring).
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- 1991 Stanton T.K., D. Chu, and K.G. Foote, "Acoustic scattering models of zooplankton," *J. Acoust. Soc. Am.*, **90**, 2240 (Fall).
- 1991 Jech, J.M, C.S. Clay, and T.K. Stanton, "On the linear dependence of temperature structure and acoustic backscatter at the western edge of the Gulf Stream using optimal least squares filtering," *J. Acoust. Soc. Am.*, **90**, 2241 (Fall).
- 1991 Stanton T.K., "Remote classification of zooplankton using sonar," Department of Ocean Engineering, University of Rhode Island (Oct).
- 1992 Stanton T.K., "Estimates of unresolved seafloor roughness using sonar echo statistics," Department of Survey Engineering, University of New Brunswick (Jan).
- 1993 Stanton T.K., "Acoustics: System design and deployment considerations," International GLOBEC Workshop, Paris (April).
- 1993 Stanton, T.K. "Acoustic imaging of marine organisms," Bioacoustics course at Friday Harbor Laboratories, University of Washington, Friday Harbor, WA.
- 1994 Stanton, T.K. "Sound scattering by marine objects," Marine Acoustics Society of Japan, Tokyo, Japan (Jan).
- 1994 Stanton, T.K. "Sound scattering by marine objects," NEC Corp., Tokyo, Japan (Jan).
- 1994 Stanton, T.K. "Review on the truncated cylinder scattering models of marine organisms," National Research Institute of Fisheries Engineering, Hasaki, Japan (Jan).
- 1995 Wiebe, P.H., T.K. Stanton, and C.H. Greene, "Acoustic backscattering by complex zooplankton assemblages on Georges Bank," *J. Acoust. Soc. Am.*, **98**, 2880 (Fall).
- 1995 Stanton, T.K., D. Chu, and P.H. Wiebe, "Dominant scattering mechanisms and associated scattering models for several zooplankton types," *J. Acoust. Soc. Am.*, **98**, 2881 (Fall).
- 1996 Stanton, T.K., "Sonar mapping of zooplankton: Tools and interpretation techniques," Department of Ocean Engineering, University of Rhode Island (April).
- 1998 Stanton, T.K., "Acoustic scattering models of several zooplankton groups and application to acoustic surveys of zooplankton," Institute of Marine Research, Bergen, Norway.

- 1998 Stanton, T.K., "Difficult problems and important problems in acoustic scattering by zooplankton," Institute of Marine Research, Bergen, Norway.
- 1998 Stanton, T.K., "Development of approximate scattering models of complex bodies for use in zooplankton acoustics," Department of Physics, University of Bergen, Bergen, Norway.
- 1998 Stanton, T.K., "From acoustic scattering models of zooplankton to acoustic surveys of large regions," IEE Colloquium on Recent Advances in Sonar Applied to Biological Oceanography, London (June).
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- 1999 Stanton, T.K., "Tethered sensor systems," The Oceanography Society, Reno (April).
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- 2002 Stanton, T.K., "Acoustic classification of zooplankton: laboratory methods, scattering models, and survey technology," The 3rd International Workshop on Acoustical Engineering and Technology, Harbin, China (Aug).
- 2002 Stanton, T.K., "Acoustic classification of zooplankton: laboratory methods, scattering models, and survey technology," Harbin Engineering University, Harbin, China (Aug).
- 2002 Stanton, T.K., "Science and Technology at WHOI," Harbin Engineering University, Harbin, China (Aug).
- 2002 Stanton, T.K., "Acoustic scattering by a shell-covered seafloor," Lamont-Doherty Earth Observatory – Columbia University (Sept).
- 2002 Stanton, T.K., "Acoustic reverberation by marine life," Naval War College at WHOI (Oct).
- 2002 Chu, D., T.K. Stanton, and P.H. Wiebe, "Model-based acoustic characterization and classification of irregular-shaped targets: Application to fisheries and zooplankton acoustics," *J. Acoust. Soc. Am.*, **112**, 2307 (Dec).
- 2003 Stanton, T.K., "Acoustic classification of zooplankton: Laboratory methods, scattering models, and survey technology," Department of Acoustics, Boston University (March).
- 2004 Lavery, A.C., R.W. Schmitt, T.K. Stanton, and P.H. Wiebe, "High-frequency acoustic volume scattering from microstructure and zooplankton," AGU Ocean Sciences Meeting, Portland, OR (Jan).
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- 2006 Stanton, T.K., D. Chu, J.M. Jech, and J.D. Irish, "A broadband acoustic system for resonance classification of swimbladder-bearing fish," *J. Acoust. Soc. Am.*, **120**, 3000 (Fall).
- 2008 Stanton, T.K., "Acoustic scattering models of marine organisms: Zooplankton, fish, and squid," National Research Institute of Fisheries Engineering, Hasaki, Kamisu, Ibaraki, Japan (April).
- 2008 Stanton, T.K., "Broadband acoustic studies of various marine organisms," National Research Institute of Fisheries Engineering, Hasaki, Kamisu, Ibaraki, Japan (April).
- 2008 Stanton, T.K., "Broadband acoustic sensing of the ocean," Marine Acoustics Society of Japan, Tokyo, Japan (April).
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- 2009 Stanton, T.K., "Sonar remote sensing of marine organisms," in Mini-symposium on marine biologics in active sonar, ARL/UT, Austin, Texas (Jan).
- 2009 Gauss, R.C., J.M. Fialkowski, R. Menis, E.L. Kunz, T.K. Stanton, C.J. Sellers, and J.M. Jech, "Measurements and modeling of midfrequency clutter from fish aggregations over Georges Bank in the Gulf of Maine," *J. Acoust. Soc. Am.*, **125**, 2642 (Spring).
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- 2010 Stanton, T.K., "Sonar remote sensing of marine organisms," Physics Department, Hunter College, New York City, New York (May).
- 2013 Stanton, T.K., "Fish school clutter in mid-frequency acoustic systems," Naval Undersea Warfare Center, Newport, RI (Nov).
- 2014 Stanton, T.K., "Broadband acoustic studies of marine organisms and the seafloor," National Taiwan University and National Taiwan Ocean University (via Skype), (Jan).
- 2014 Stanton, T.K., "Broadband acoustics: an emerging technology for studying fish and zooplankton," Tutorial presented at MTS/IEEE Oceans14 conference in Taipei, Taiwan (April).
- 2014 Stanton, T.K., "Broadband acoustic studies of marine organisms and the seafloor," Dept. Environmental Biology and Fisheries Science, National Taiwan Ocean University (April).

- 2014 Stanton, T.K., "Broadband acoustic studies of marine organisms and the seafloor," Ocean Technology Research Center, Dept. Engineering Science and Ocean Engineering, National Taiwan University (April).
- 2014 Stanton, T.K., "Broadband acoustic studies of marine organisms and the seafloor," Ship and Ocean Industry Center, (April).
- 2014 Stanton, T.K., "Broadband acoustic studies of marine organisms and the seafloor," Institute of Oceanography, National Taiwan University (April).
- 2014 Jones, B., T.K. Stanton, J.A. Colosi, R.C. Gauss, J.M. Fialkowski, and J.M. Jech, "Broadband classification and statistics of long-range, mid-frequency sonar measurements of aggregations of fish," *J. Acoust. Soc. Am.*, **135**, 2152 (Spring).
- 2014 Stanton, T.K., "Joint graduate education program: Massachusetts Institute of Technology and Woods Hole Oceanographic Institution," *J. Acoust. Soc. Am.* **136**, 2187 (Fall).
- 2014 Stanton, T.K., "Hot topics in fish acoustics (active)," *J. Acoust. Soc. Am.* **136**, 2222 (Fall).
- 2015 Badiey, M. and T.K. Stanton, "Clay and Medwin: An intuitive approach to math and physics," *J. Acoust. Soc. Am.* **137**, 2331 (Spring).

WORKSHOP PARTICIPANT/PRESENTATION

- 1983 Clay, C.S., T.K. Stanton, and K.C. Jezek, "Acoustic observations from the underside of sea ice," ONR Arctic Acoustic Workshop at ASA Conference (Fall).
- 1984 Clay, C.S., T.K. Stanton, R. Nash, and Y. Sun, "Inverse problems for a biological sonar," ONR Bioacoustics Workshop AGU Conference (Jan).
- 1984 Stanton, T.K., "Sonar estimates of seafloor microroughness," Acoustic-Geotechnical Correlation Workshop in Calgary, Ontario (April).
- 1985 Stanton, T.K., K.C. Jezek, and A.J. Gow, "Laboratory studies of acoustic scattering from the underside of sea ice," Arctic Oceanography and Acoustic Workshop, NORDA (June).
- 1986 Stanton, T.K., "Acoustical techniques for remotely detecting and classifying particles in the ocean," in ONR Workshop on Aggregate Dynamics in the Sea Asilomar Conference Center, Monterey, California (Sept).
- 1988 Stanton, T.K., "Sonar estimates of seafloor microroughness," in ONR Workshop on Terrains, MIT (April).
- 1988 Acoustic Reverberation – Sea Surface Component ONR Workshop, NORDA (Dec). Participant.
- 1989 Jezek, K.C., T.K. Stanton, and A.J. Gow, "Acoustic properties of laboratory grown saline ice," ONR Arctic Program Workshop, MIT (Feb).
- 1989 Stanton, T.K., K.C. Jezek, A.J. Gow, "Effects of environment and ice morphology on acoustic properties of sea ice," ONR Arctic Data Analysis Workshop, WHOI (June).
- 1989 Stanton, T.K., "Sonar classification of zooplankton," ONR Biophysical Coupling Workshop, Monterey, California (Aug).

- 1990-1992 Acoustic Reverberation – Seafloor Component, ONR Workshop various locations.
- 1992 Stanton, T.K., “Estimates of unresolved seafloor roughness using sonar echo statistics,” NRL Workshop on Sediment Classification, Austin, Texas (Feb).
- 1992 Advanced Standoff Sensors, NUWC workshop at Newport, Rhode Island (March).
- 1994 Stanton, T.K., “Acoustic classification of irregular bodies,” in ONR Workshop on Physics of Moderate to High Frequency Acoustics, Washington, D.C. (March).
- 1994 Stanton, T.K., “Acoustical scattering characterization of several zooplankton groups,” in ONR Workshop on Marine mammals and acoustic remote sensing, Cornell University, Ithaca, NY (Aug).
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- 2010 Stanton, T.K., "Sonar remote sensing of marine organisms: 2030," NRC Ocean Infrastructure Strategy Workshop, The National Academics, Washington, DC (Feb).
- 2010 Stanton, T.K., "Scattering, statistics, and signal processing associated with the presence of fish," AEMBERS advisory panel, Navy Research Laboratory, Washington, DC (May).
- 2010 Stanton, T.K., "Biophysics-based classification of echoes," AEMBERS advisory panel, Applied Research Laboratories, University of Texas, Austin, Texas (Aug).
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