
James G. Bellingham
Director, Center for Marine Robotics
Woods Hole Oceanographic Institution

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Education:

Massachusetts Institute of Technology	Ph.D., Physics	Sept 1988
Massachusetts Institute of Technology	S.M., Physics	Sept 1984
Massachusetts Institute of Technology	S.B., Physics	Sept 1984

Experience:

Director, Center for Marine Robotics
Woods Hole Oceanographic Institute *November 2014-present*

Chief Technologist *2006–November 2014*
Director of Engineering *1999–2006*
Monterey Bay Aquarium Research Institute

Board of Directors, Co-Founder *1997-2005*
President *1997-1999*
Bluefin Robotics Corporation

Lecturer, Department of Ocean Engineering *1996 - 2001*
Massachusetts Institute of Technology

Founder, Laboratory Manager, *Jan 1989 – Apr 2000*
AUV Lab, Sea Grant College Program
Research Engineer '89-'94, Principle Research Engineer '94-'00
Massachusetts Institute of Technology

Cruises and Field Operations with AUVs:

<i>NATHANIEL B. PALMER</i> , Bellingshausen Sea,	<i>Dec 1992 - Jan 1993</i>
Under-ice tests, Lake Winnepesaukee,	<i>Feb - Mar 1994</i>
Sea Ice Mechanics Initiative (SIMI), Beaufort Sea,	<i>Apr 1994</i>
<i>DISCOVERER</i> , Juan de Fuca Ridge,	<i>Jul 1994</i>
Joint operations with FAU, Florida,	<i>Jan 1995</i>
<i>WEATHERBIRD</i> , Bermuda, (co-Chief Scientist)	<i>May 1995</i>
<i>DISCOVERER</i> , Juan de Fuca Ridge,	<i>Jun 1995</i>
<i>FERREL</i> , Stellwagen Bank, (Co-Chief Scientist)	<i>Oct 1995</i>
<i>DIANE G</i> , Buzzards Bay, (Chief Scientist)	<i>Mar - Apr 1996</i>
<i>ROSS BAY</i> , Haro Strait, (Chief Scientist, AUV Ops)	<i>Jun - Jul 1996</i>
<i>DIANE G</i> , Cape Cod Bay, (Chief Scientist)	<i>Nov 1996</i>
<i>TANEKAHA</i> , Kaikoura Canyon, (Chief Scientist, AUV Ops)	<i>Feb 1997</i>
<i>CAPE HATTERAS</i> , Cape Cod Bay, (Chief Scientist)	<i>May 1997</i>
<i>OCEANUS</i> , Sargasso Sea, (Chief Scientist)	<i>Oct 1997</i>
<i>KNORR</i> , Labrador Sea, (Chief Scientist, Expedition Leader)	<i>Jan – Feb 1998</i>
<i>ALLIANCE</i> , Mediterranean Sea, GOATS '98	<i>May-June 1998</i>
<i>OCEANUS</i> , Massachusetts Bay, (Chief Scientist)	<i>Sept 1998</i>
SITE 99 Experiment in Monterey Bay (Experiment Lead)	<i>Aug 1999</i>
<i>McARTHUR</i> , Monterey Bay (Chief Scientist)	<i>Jan 2000</i>
<i>POINT SUR</i> , MUSE 2000, Monterey Bay (Chief Scientist)	<i>Sept 2000</i>
<i>USCGC Healey</i> , Arctic Ocean (Chief Scientist)	<i>Oct- Nov 2001</i>
<i>AOSN 2003 Field Program in Monterey Bay</i> (Project Lead)	<i>July-Sept. 2003</i>

MB2006 Field Program in Monterey Bay
BIOSPACE Program, Monterey Bay
CANON Field Program, Monterey Bay

July-Sept. 2006
October 2010
Twice a year 2011-2014

Professional Activities and Service:

Science Advisory Board, MARUM - Center for Marine Environmental Science, University of Bremen, Germany	<i>2011-present</i>
Advisory Committee, Signature Discovery Initiative, Pacific Northwest National Laboratory	<i>2011- present</i>
Scientific Advisory Board, Center for Environmental Sensing and Modeling (CENSAM), Singapore MIT Alliance for Research & Technology	<i>2009-present</i>
Chair, Naval Research Advisory Committee (NRAC) Chair since 2012, Member since 2008	<i>2008-2013</i>
Member Strategic Advisory Group, Battelle National Security Global Business	<i>2006-present</i>
Chair, External Review of Harbor Branch Oceanographic Institution (FAU)	<i>2010</i>
Member, NRC/NAS Panel, Ocean Infrastructure	<i>2009-2011</i>
Advisory Committee, Ocean X PRIZE	<i>2008-2011</i>
Advisory Committee, Marina Technology Cluster	<i>2008-2010</i>
Member, Naval Studies Board Panel, Distributed Remote Sensing for Naval Undersea Warfare	<i>2005-2007</i>
Member, NRC/NAS Panel, Arctic Observing Network	<i>2005-2006</i>
Steering Committee for NSF Sensors Workshop	<i>2004</i>
Steering Committee for Ocean Research Interactive Observatory Network Meeting	<i>2004</i>
Steering Committee for Regional Cabled Observatory Network (RECON) Meeting	<i>2004</i>
Co-Organizer, NSF Sponsored Arctic Instrumentation Workshop	<i>2002</i>
Steering Committee for SCOTS (Scientific Cabled Observatory for Time Series) Workshop	<i>2002</i>
Organizing Committee - LINK 2002 Meeting (NOAA, NASA joint meeting)	<i>2002</i>
Panel Member, NRC/NAS Panel on Sea Floor Observatories	<i>1999 to 2000</i>
Steering Committee, DESCEND Workshop	<i>1999</i>
Member, Deep Submergence Science Committee (DeSSC) for ALVIN/JASON	<i>1993 to 1999</i>
Panel Member, MBARI AUV Review	<i>1994</i>
Co-Organizer NSF Workshop: Application of UUVs to Marine Environmental Characterization and Remediation, Brighton, England	<i>1993</i>
Co-Organizer: Scientific and Environmental Data Collection with Autonomous Underwater Vehicles, MIT Sea Grant and C. S. Draper Laboratories, Cambridge, Massachusetts	<i>1992</i>

Current Organization Membership:

American Association for the Advancement of Science, American Geophysical Union, IEEE

Patents:

- U.S. Patent 4,881,037*: Bellingham, J. G., and MacVicar, M. L. A.,
“Variable Load Analysis of Electrochemical Cells.”
- U.S. Patent 5,687,137*: Schmidt, H., and Bellingham, J. G.,
“Methods and Apparatus for Adaptive Oceanographic Sampling.”
- U.S. Patent 5,894,450*: Schmidt, H., Bellingham, J.G., and Bales, J.W.,
“Mobile Underwater Arrays.”

Honors and Recognitions:

- Chief of Naval Operations, Invited Dinner*, July 2010
- Exploration Panelist for MIT 150th Anniversary*, April, 2010.
- Recognition for support of Battelle Executive Leadership Lab*, 2010.
- K. D. Woods Colloquium, Aerospace Engineering Sciences, University of Colorado*, November 2006.
- Lockheed Martin Award for Ocean Science and Engineering*, November 2004.
- Steinbach Visiting Scholar, Woods Hole Oceanographic Institution*, August 2004.
- MIT, Fourteenth Robert Bruce Wallace Lecture*, November 7, 1996.
- Antarctica Service Medal of the United States of America, NSF*, August 1993.
- Antarctica Service Medal, Navy*, August 24, 1993.
- R&D 100 Award*, Awarded to MIT for commercialization effort of Ph.D. thesis, 1992.

Example Media Coverage:

- Carl Posey, “Robots of the Deep Blue Yonder,” *Popular Science*, February, 2003,
http://www.mbari.org/news/media_coverage/pop_sci_2-03_reprint.pdf
- Robert Kunzig, “A thousand diving robots,” *Discover*, April, 1996, <http://www.discover.com/issues/apr-96/features/athousanddivingr734/>
- JR Fricke, “Down to the Sea in Robots,” *Technology Review*, MIT, October 1994.

Journal Publications:

- Bellingham, J. G., and Rossano, G. S., "Long Period Variations in R CrA, S CrA, T CrA, and R Mon," *Astronomical Journal*, Vol. 85, 555, 1980.
- Bellingham, J.G., “Magnetic Detection and Characterization of Electrochemical Reactions,” Ph.D. thesis, *MIT*, 1984.
- Bellingham, J. G., MacVicar, M. L. A., Nisenoff, M., and Searson, P. C., "Detection of Magnetic Fields Generated by Electrochemical Corrosion," *Journal of the Electrochemical Society*, Vol. 133, pp 1753-1754, 1986.
- Bellingham, J. G., MacVicar, M. L. A., and Nisenoff, M., "SQUID Technology Applied to the Study of Electrochemical Corrosion," *IEEE Transactions on Magnetics*, Mag-23, pp 477-479, 1987.
- Curtin T., Bellingham, J. G., Catipovic, J., and Webb, D., “Autonomous Ocean Sampling Networks,” *Oceanography*, Vol. 6, No. 3, pp 86-94, 1993.
- Tuohy, S. T., Leonard, J. J., Bellingham, J. G., Patrikalakis, N. M., and Chrysostomidis, C. “Map Based Navigation for Autonomous Underwater Vehicles,” *International Journal of Offshore and Polar Engineering*, 6(1), March 1996.
- Bellingham, J.G., “New Oceanographic Uses of Autonomous Underwater Vehicles,” *Marine Technology Society Journal*, Vol.31, No. 3, pp. 34-47, Fall 1997.

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- Vaganay, J., Bellingham, J.G., Leonard, J.J., "Comparison of fix Computation and Filtering for Autonomous Acoustic Navigation," *International Journal of Systems Science*, Vol. 29, No. 10, pp. 1111-1122, 1998.
- Bellingham, J. G., Streitlien, K., Overland, J., Rajan, S., Stein, P., Stannard, J., Kirkwood, W., and Yoerger, D., "An Arctic Basin Observational Capability using AUVs," *Oceanography*, Vol 13, No. 2, pp 64-70, 2000a.
- Singh, H., Bellingham, J. G., Hover, F., Lerner, S., Moran, B., von Der Heydt, K., and Yoerger, D., "Docking for and Autonomous Ocean Sampling Network," *IEEE Journal of Oceanic Engineering*, Vol. 26, No. 4, pp 498-514, 2001.
- Feezor, M. D., Sorrell, F. Y., Blankinship, P. R., and Bellingham, J. G., "Autonomous Underwater Vehicle Homing/Docking via Electromagnetic Guidance," *IEEE Journal of Oceanic Engineering*, Vol. 26, No. 4, pp 515-521, 2001.
- Willcox, J. S., Bellingham, J. G., Zhang, Y., and Baggeroer, A. B., "Performance Metrics of Oceanographic Surveys with Autonomous Underwater Vehicles," *IEEE Journal of Oceanic Engineering*, Vol. 26, No. 4, pp 711-725, 2001.
- Zhang, Y., Baggeroer, A. B., and Bellingham, J. G., "Spectral Feature Classification of Oceanographic Processes Using an Autonomous Underwater Vehicle," *IEEE Journal of Oceanic Engineering*, Vol. 26, No. 4, pp 726-741, 2001.
- Zhang, Y., Streitlien, K., Bellingham, J. G., and Baggeroer, A. B., "Acoustic Doppler Velocimeter Flow Measurement from an Autonomous Underwater Vehicle with Application to Deep Ocean Convection," *Journal of Atmospheric Science and Oceanic Technology*, 18(12), pp 2038-2051 (2001)
- Yu, X., Dickey, T., Bellingham, J., Manov, D., and Streitlien, K., "The Application of Autonomous Underwater Vehicles for Interdisciplinary Measurements in Massachusetts and Cape Cod Bays", *Continental Shelf Research*, 22, pp 2225-2245, 2002.
- Ryan, J. P., Chavez, F. P., and Bellingham, J. G., "Physical-biological coupling in Monterey Bay, California: topographic influences on phytoplankton ecology," *Marine Ecology Progress Series*, Vol. 287: pp 23-32, 2005.
- Zhang, Y., Baggeroer, A.B., and Bellingham, J.G., "The total variance of a periodogram-based spectral estimate of a stochastic process with spectral uncertainty and its application to classifier design," *IEEE Transactions on Signal Processing*, vol.53, no.12pp. 4556- 4567, Dec. 2005.
- Bellingham, J. G., "New Challenges for Ocean Technology," *Marine Technology Society Journal*, 40(2), pp 139-140, 2006.
- Bellingham, J. G., and Rajan, K., "Robotics in Hostile Environments," *Science*, Vol. 318. no. 5853, pp. 1098 – 1102, 2007.
- McEwen, R. S., Hobson, B. W., and Bellingham, J. G., "Docking Control System for a 54-cm-Diameter (21-in) AUV," *IEEE J. Ocean. Eng.*, 33(4) 550-562, 2008. (expanded version of UUST paper)
- Cokelet, E. D., N. Tervalon, and Bellingham, J. G., Hydrography of the West Spitsbergen Current, Svalbard Branch: Autumn 2001, *J. Geophys. Res.*, 113, C01006, 2008. doi:10.1029/2007JC004150.
- Bellingham J. G. and Godin, M., "Exploring Ocean Data," *ACM Sigmod, Jim Gray Tribute Issue*, 37(2) 78-82, 2008.

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- Zhang, Y., and Bellingham, J. G., "An efficient method of selecting ocean observing locations for capturing the leading modes and reconstructing the full field," *JGR(Oceans)*, Vol. 113, C04005, doi:10.1029/2007JC004327, 2008.
- Curtin, T. B, and Bellingham, J. G., "Progress toward autonomous ocean sampling networks," *Deep Sea Research II*, : 56, pp 62-67, 2009.
- Chao, Y., Li, Z., Farrara, J., McWilliams, J., Bellingham, J., Capet, X, Chavez,F., Choi, J., Davis, R., Doyle, J., Fratantoni, D. Li, P., Marchesiello, P., Moline, M., Paduan, J., Ramp, S., "Development, implementation and evaluation of a data-assimilative ocean forecasting system off the central California coast," *Deep Sea Research Part II*, 56, pp 100-126, 2009.
- Haley P., Lermusiaux, P., Robinson, A., Leslie, W., Logoutov, O., Cossarini, G., Liang, X., Moreno, P. Ramp, S., Doyle, J., Bellingham, J., Chavez, F., Johnston, S., "Forecasting and reanalysis in the Monterey Bay/California Current region for the Autonomous Ocean Sampling Network-II experiment," *Deep Sea Research Part II*, 56, pp 127-148, 2009.
- Zhang, Y., Bellingham, J. G., and Chao, Y., "Error Analysis and Sampling Strategy Design for Using Fixed or Mobile Platforms to Estimate Ocean Flux," *Journal of Atmospheric and Oceanic Technology*, Volume 27(3), pp. 481-506, 2010a.
- Zhang, Y., McEwen, R. S., Ryan, J. P., Bellingham, J. G., "Design and Tests of an Adaptive Triggering Method for Capturing Peak Samples in a Thin Phytoplankton Layer by an Autonomous Underwater Vehicle," *IEEE Journal of Oceanic Engineering*, Vol. 35, No. 4, pp. 785-796, October 2010b, DOI: 10.1109/JOE.2010.2081031.
- Zhang, Y., McEwen, R. S., Ryan, J. P., Bellingham, J. G., Thomas, H., Thompson, C. H., and Rienecker, E., "A Peak-Capture Algorithm Used on an Autonomous Underwater Vehicle in the 2010 Gulf of Mexico Oil Spill Response Scientific Survey," *Journal of Field Robotics*, Volume 28, Issue 4, pages 484–496, July/August 2011a.
- Cazenave, F., Zhang, Y., McPhee-Shaw, E., Bellingham, J. G., Stanton, T. P., "High-resolution surveys of internal tidal waves in Monterey Bay, California, using an autonomous underwater vehicle," *Limnol. Oceanogr.: Methods* 9, 2011, 571–581
- Frolov, S., Paduan, J., Cook, M., and Bellingham, J. G., "Improved statistical prediction of surface currents based on historic HF-radar observations," *Ocean Dynamics*, Vol. 62, No. 7, pp. 1111-1122, July 2012.
- Zhang, Z., Godin, M. A., Bellingham, J. G., and Ryan, J. P., "Using an Autonomous Underwater Vehicle to Track a Coastal Upwelling Front," *IEEE Journal of Oceanic Engineering*, Vol. 37, No. 3, pp. 338-347, July 2012a, DOI: 10.1109/JOE.2012.2197272.
- Zhang, Y., Bellingham, J. G., Godin, M. A., and Ryan, J. P., "Using an Autonomous Underwater Vehicle to Track the Thermocline Based on Peak-Gradient Detection," *IEEE Journal of Oceanic Engineering*, Vol. 37, No. 3, pp. 544-553, July 2012b, DOI: 10.1109/JOE.2012.2192340.
- Zhang, Y., Ryan, J. P., Bellingham, J. G., Harvey, J. B., & McEwen, R. S. "Autonomous detection and sampling of water types and fronts in a coastal upwelling system by an autonomous underwater vehicle." *Limnol. Oceanogr.: Methods*, 10, pp. 934-951, 2012.
- Frolov, S., Kudela, R., and Bellingham, J., "Monitoring of harmful algal blooms in the era of diminishing resources: A case study of the U.S. west coast". *Harmful Algae*, Vol 21-22, pp. 1–12, January 2013, <http://dx.doi.org/10.1016/j.hal.2012.11.001>.
- Ryan, J. P., McManus, M. A., Kudela, R. M., Lara Artigas, M., Bellingham, J. G., Chavez, F. P., Doucette G., Foley, D., Godin, M., Harvey, J. B. J., Marin III, R., Messie, M., Mikulski, C., Pennington, T., Py, F.,

Rajan, K., Shulman, I., Wang, Z., and Zhang, Y., "Boundary influences on HAB phytoplankton ecology in a stratification-enhanced upwelling shadow." *Deep Sea Research II. Special Issue: Harmful Algal Blooms in Stratified Systems*, 101, pp. 63–79, 2014.

Cheriton, O. M., McPhee-Shaw, E. E., Shaw, W. J., Stanton, T. P., Bellingham, J. G., and Storlazzi, C. D., "Suspended particulate layers and internal waves over the southern Monterey Bay continental shelf: An important control on shelf mud belts?" *J. Geophys. Res. Oceans*, 119 2014.

Frolov, S., Garau, B., and Bellingham, J. "Can we do better than the grid survey: Optimal synoptic surveys in presence of variable uncertainty and decorrelation scales," *J. Geophys. Res. Oceans*, 119(8), 5071-5090, 2014.

Book Chapters, Invited Papers, Conference Papers:

Loch, J., Wallar, E., Bellingham, J. G., Beaton, R., and Triantafyllou, M., "Software Development for the Autonomous Submersible Program at MIT Sea Grant and Draper Laboratory," *Proceedings 6th International Symposium on Unmanned, Untethered Submersible Technology*, pp 25-32, 1989.

Bellingham, J. G., Beaton, R., Triantafyllou, M., and Shupe, L., "An Autonomous Submersible Designed for Software Development," *Proceedings Oceans '89 MTS/IEEE*, pp 799-803, 1989.

Bellingham, J. G., Consi, T., Beaton, R., and Hall, W., "Keeping Layered Control Simple," *Proceedings AUV '90*, pp 3-8, 1990

Bellingham, J. G. and Humphrey, D., "Using Layered Control for Supervisory Control of Underwater Vehicles," *Proceedings ROV '90*, pp 175-181, 1990

Bellingham, J. G. and Consi, T., "State Configured Layered Control," *Mobile Robots for SubSea Environments, International Advanced Robotics Programme*, Monterey CA, pp 75-80, 1990

Perrier, M. and Bellingham, J. G., "Control Software for an Autonomous Survey Vehicle," *Proceedings Workshop on Underwater Robotics, International Advanced Robotics Programme*, Genova, Italy, 1992.

Bellingham, J. G., Consi, T. R., Tedrow, U., and Di Massa, D., "Hyperbolic Acoustic Navigation for Underwater Vehicles: Implementation and Demonstration," *Proceedings IEEE AUV '92*, pp 304-309, 1992a.

Bellingham, J. G., Goudey, C. A., Consi, T. R., and Chryssostomidis, C., "A Small, Long-Range Vehicle for Deep Ocean Exploration," *Proceedings Second International Offshore and Polar Engineering Conference*, San Francisco, Volume 2, pp 461-467, 1992b.

Bellingham, J. G., and Chryssostomidis, C., "Economic Ocean Survey Capability with AUVs," *Sea Technology*, April, pp 12-18, 1993.

Leonard, J. J., and Bellingham, J. G., "Directed Sensing Strategies for Feature-Relative Navigation," *SPIE Volume 2059 Sensor Fusion VI*, pp 120-129, 1993.

Bellingham, J. G., Bales J. W., Atwood, D. K., Chryssostomidis, C., Consi, T. R., Goudey, C. A., "Demonstration of High-Performance, Low-Cost Autonomous Underwater Vehicle," *Proceedings Association for Unmanned Vehicle Systems, AUV '93*, pp 1017-1031, 1993.

Tuohy, S. T., Patrikalakis, N. M., Leonard, J. J., Bellingham, J. G., and Chryssostomidis, C., "AUV Navigation Using Geophysical Maps with Uncertainty," *Proceedings 8th International Symposium on Unmanned, Untethered Submersible Technology*, pp 265-276, 1993.

Bellingham, J. G., Bales, J. W., Atwood, D. K., Perrier, M., Goudey, C. A., Consi, T. R., and Chryssostomidis, C., "Performance Characteristics of the Odyssey AUV," *Proceedings 8th International Symposium on Unmanned, Untethered Submersible Technology*, pp 37-49, 1993.

Bellingham, J. G., Deffenbaugh, M., Leonard, J. J., Catipovic, J., and Schmidt, H., "Arctic Under-Ice Survey Operations," *Proceedings 8th International Symposium on Unmanned, Untethered Submersible Technology*, pp 50-59, 1993.

Deffenbaugh, M., Schmidt, H., and Bellingham J. G., "Acoustic Navigation for Arctic Under-Ice AUV Missions," *Proceedings of Oceans '93 MTS/IEEE*, 1993.

Bellingham, J. G., Goudey, C. A., Consi, T. R., Bales, J. W., Atwood, D. K., Leonard, J. J., and Chryssostomidis, C., "A Second Generation Survey AUV," *Proceedings AUV '94*, Boston MA, pp 148-155, 1994a.

Bellingham, J. G. and Leonard, J. J., "Task Configuration with Layered Control," *Mobile Robots for SubSea Environments, International Advanced Robotics Programme*, Monterey CA, pp 193-202, 1994b.

Patrikalakis, N. M., Chryssostomidis, C., Tuohy, S. T., Bellingham, J. G., Leonard, J. J., Bales, J. W., Moran, B. A., and Yoon, J. W., "Virtual Environments for Ocean Exploration and Visualization," *Proceedings of Computer Graphics Technology for the Exploration of the Sea*, "CES '95, Rostock, May 4-5, 1995.

Atwood, D. K., Leonard, J. J., Bellingham, J. G. and Moran, B. A., "An Acoustic Navigation System for Multiple Vehicles," *Proceedings International Symposium on Unmanned Untethered Submersible Technology*, pp 202-208, New Hampshire, September 1995.

Bennett, A. B., Leonard, J. J., and Bellingham, J. G., "Bottom Following for Survey Class Autonomous Underwater Vehicles," *Proceedings International Symposium on Unmanned Untethered Submersible Technology*, pp 327-336, New Hampshire, September 1995.

Leonard, J. J., Tuohy, S. T., Bellingham, J. G., Moran, B. A., Kim, J. H., Schmidt, H., Patrikalakis N. M., and Chryssostomidis C., "Virtual Environments for AUV Development and Ocean Exploration," *Proceedings International Symposium on Unmanned, Untethered Submersible Technology*, pp 436-443, New Hampshire, September 1995.

Vaganay, J., Leonard, J. J., and Bellingham, J. G. "Outlier Rejection for Autonomous Acoustic Navigation," *Proceedings IEEE International Conference on Robotics and Automation*, Minneapolis, Minnesota, April 1996.

Vaganay, J., Bellingham, J. G., and Leonard, J. J., "Comparison of Fix Computation and Filtering for Autonomous Acoustic Navigation," *International Advanced Robotics Programme*, Toulon, France, 1996.

Bellingham, J. G., Willcox, J. S., "Optimizing AUV Oceanographic Surveys," *Proceedings AUV '96*, pp 391-398, 1996.

Schmidt, H., Bellingham, J. G., Johnson, M., Herold, D., Farmer, D. M., and Pawlowicz, R., "Real-Time Frontal Mapping with AUVs in a Coastal Environment," *Oceans 96 MTS/IEEE*, Ft. Lauderdale, Florida, 1996.

Willcox, J. S., Zhang, Y., Bellingham, J. G., and Marshall, J., "AUV Survey Design Applied to Oceanic Deep Convection," *Oceans 96 MTS/IEEE*, Ft. Lauderdale, Florida, 1996.

Deffenbaugh, M., Schmidt, H., and Bellingham, J. G., "Acoustic Positioning in a Fading Multipath Environment," *Oceans 96 MTS/IEEE*, Ft. Lauderdale, Florida, 1996.

Deffenbaugh, M., Bellingham, J. G., and Schmidt, H., "The Relationship between Spherical and Hyperbolic Positioning," *Oceans 96 MTS/IEEE*, Ft. Lauderdale, Florida, 1996.

Kim, J. H., Moran, B. A., Leonard, J. J., Bellingham, J. G., and Tuohy, S. T., "Experiments in Remote Monitoring and Control of Autonomous Underwater Vehicles," *Oceans 96 MTS/IEEE*, Ft. Lauderdale, Florida, 1996.

Schmidt, H., J. G. Bellingham, and P. Elisseef, "Acoustically focused oceanographic sampling in coastal environments," in *Rapid Environmental Assessment*, ser. SAACLANTCEN Conference Proc. Series CP-44, E. Pouliquen, A. D. Kirwan, and R. T. Pearson, Eds., pp. 145-151, 1997.

Curcio, J.A., Bellingham, J.G., Hover, F.S., "CETUS: Design of a production AUV," *Sea Technology*, Vol. 39, No. 12, December, 1998

Zhang, Y., Bellingham, J.G., Baggeroer, A., "Spectral Feature Classification of Oceanographic Processes Using an AUV," *Proceedings 11th International Symposium of Unmanned, Untethered Submersible Technology*, pp. 172-181, 1999.

Patrikalakis, N.M, Abrams, S. L., Bellingham, J. G., Cho, W., Mihanetzis, K. P., Robinson, A. R., Schmidt H., and Wariyapola, P. C. H., "The Digital Ocean," Invited paper in Proceedings of Computer Graphics International, GCI 2000. pp. 45-53. Geneva, Switzerland, June 2000. IEEE Computer Society Press. Los Alamitos, CA: IEEE, 2000.

Bellingham, J. G., "Autonomous Ocean Sampling Networks – a mobile, adaptive observatory concept," Autonomous Underwater Vehicle and Ocean Modeling Networks, GOATS 2000 Conference Proceedings," SAACLANTCEN Conference Proceedings CP-46, pp 19-48, 2000b.

Bellingham, J. G., "Autonomous Underwater Vehicles," in Steele, John H., Steve A. Thorpe, and Karl K. Turekian. *Encyclopedia of Ocean Sciences*. Academic Press, 2001.

Bellingham, J. G. and Zhang, Y., "Observing Processes that Vary in Time and Space with Heterogeneous Mobile Networks," *Proc. International Workshop on Underwater Robotics for Sustainable Management of Marine Ecosystems and Environmental Monitoring*, Genoa, Italy, pp 9-16, 2005.

Bellingham, J. G., McEwen, R. S., and Hobson, B. W., "The Development of a Docking Station for a Regional Cabled Observatory," *Proceedings of Scientific Submarine Cable 2006*, Dublin Ireland, Feb 8-10, 2006.

Zhang, Y. and Bellingham, J. G., "Synoptic Chemical Sampling with Distributed Mobile Systems: a Possibility?" *Arctic/Subarctic Ocean Fluxes Newsletter*, No. 5, pp. 11&18, April 2006.

Bellingham, J. G., and Hobson, B. W., "Future Developments and Applications of Marine Robotics," Proceedings of the 7th IFAC Conference on Manoeuvring and Control of a Marine Craft, Lisbon, Portugal 2006.

Godin, M. A., Bellingham, J. G., Rajan, K., Chao, Y., and Leonard, N., "A Collaborative Portal for Ocean Observatory Control," *Proceedings Oceans 2006*, Boston, MA., 2006.

Hobson, B. W., McEwen, R. S., Erickson, J., Hoover, T., McBride, L., Shane, F., and Bellingham, J. G., "The Development and Ocean Testing of an AUV Docking Station for a 21" AUV," *Oceans*, Vancouver, B.C., October 2007.

Godin, M. A. and Bellingham, J. G., "Data Exploration for Multidisciplinary Research," *Oceans*, Vancouver, B.C., October 2007.

McEwen, R. S., Hobson, B. W., and Bellingham, J. G., "Docking Control System for a 21" Diameter AUV," *Unmanned Untethered Systems Technology*, New Hampshire, 2007.

Bellingham, J. G., Cokelet, E., and Kirkwood, W. J., "Observation of Warm Water Transport and Mixing in the Arctic Basin with the ALTEX AUV," *IEEE AUV 2008*, Woods Hole, MA October 13-14, 2008.

Bellingham, J. G., "Platforms: Autonomous Underwater Vehicles," in Steele, John H., Steve A. Thorpe, and Karl K. Turekian. *Measurement Techniques, Platforms & Sensors: A Derivative of the Encyclopedia of Ocean Sciences*. Academic Press, 2009a.

Bellingham, J. G., "The Changing Relationship Between Humans and the Ocean," in *Oceanography in 2025: Proceedings of a Workshop*, editor Deborah Glickson, National Academies Press, Washington D.C., 2009b.

Zhang, Y., McEwen, R. S., Ryan, J. P., and Bellingham, J. G., "An Adaptive Triggering Method for Capturing Peak Samples in a Thin Phytoplankton Layer by an Autonomous Underwater Vehicle," *Proc. MTS/IEEE Oceans'09*, pp. 1-5, Biloxi, Mississippi, U.S.A., October 2009.

Bellingham, J. G., Zhang, Y., Kerwin, J. E., Erikson, J., Hobson, B., Kieft, B., Godin, M., McEwen, R., Hoover, T., Paul, J., Hamilton, A., Franklin, J., and Banka A., "Efficient Propulsion for the Tethys Long-Range Autonomous Underwater Vehicle," *IEEE AUV*, pp 1-6, Monterey, CA, Sept 1-3, 2010.

Zhang, Y., Bellingham, J. G., Godin, M., Ryan, J. P., McEwen, R. S., Kieft, B., Hobson, B., and Hoover, T., "Thermocline Tracking Based on Peak-Gradient Detection by an Autonomous Underwater Vehicle," *Proc. MTS/IEEE Oceans'10*, pp. 1-4, Seattle, WA, U.S.A., September 2010c.

Godin, M.A., Bellingham, J.G., Kieft, B., McEwen, R., "Scripting language for state configured layered control of the Tethys long range autonomous underwater vehicle," *OCEANS 2010* , pp.1-7, 20-23 Sept. 2010. doi: 10.1109/OCEANS.2010.5664515

M. Godin, Y. Zhang, J. P. Ryan, T. Hoover, and J. G. Bellingham, "Phytoplankton Bloom Patch Center Localization by the Tethys Autonomous Underwater Vehicle," *Proc. MTS/IEEE Oceans'11*, pp. 1-6, Kona, HI, U.S.A., September 2011.

Y. Zhang, M. Godin, J. G. Bellingham, and J. P. Ryan, "Ocean Front Detection and Tracking by an Autonomous Underwater Vehicle," *Proc. MTS/IEEE Oceans'11*, pp. 1-4, Kona, HI, U.S.A., September 2011b.

J. Das, T. Maughan, M. McCann, M. Godin, T. O'Reilly, M. Messié, F. Bahr, K. Gomes, F. Py, J. G. Bellingham, G. S. Sukhatme, and K. Rajan, "Towards Mixed-initiative, Multi-robot Field Experiments: Design, Deployment, and Lessons Learned," *Proc. International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, September 2011.

S. Frolov, J. Bellingham, W. Anderson, G. Hine, "Wave Glider--a platform for persistent monitoring of algal blooms", *Proc. MTS/IEEE Oceans'11*, Kona, HI, U.S.A., September 2011.

B. Hobson, J. G. Bellingham, B. Kieft, R. McEwen, M. Godin, and Y. Zhang, "Tethys-Class Long Range AUVs - Extending the Endurance of Propeller-Driven Cruising AUVs from Days to Weeks," *Proc. IEEE AUV'2012*, pp. 1-8, Southampton, U.K., September 2012.

Y. Zhang, J. G. Bellingham, J. P. Ryan, B. Kieft, and M. J. Stanway, "Two-Dimensional Mapping and Tracking of a Coastal Upwelling Front by an Autonomous Underwater Vehicle," *Proc. MTS/IEEE Oceans'13*, pp. 1-9, San Diego, CA, U.S.A., September 2013

Invited Lectures Since 2006

Invited Presentation, "Future Directions for AUVs," *WHOI AUV User Meeting*, June 6, 2006.

MIT Technology Breakfast Speaker, "Laying the Foundation for Bluefin...the AUVs from MIT," *Massachusetts Institute of Technology*, June 8, 2006.

K. D. Woods Colloquium, "Robotics and the Ocean Observing Revolution", *University of Colorado*, Boulder, November 17, 2006.

Invited Presentation, "Quantitative Design Tools for Coastal Observing Systems," *Workshop on Coastal Observatories*, Liverpool, U.K., October 2006.

Plenary Talk, "Future Developments and Applications of Marine Robotics," *7th IFAC Conference on Manoeuvring and Control of a Marine Craft*, September 21, 2006.

Invited Presentation, "Autonomous Ocean Sampling Networks," *University of Washington-Microsoft Summer Institute*, August 5, 2006.

Seminar, "Advanced Technologies for Observing a Changing Ocean," *CITRIS Research Exchange*, UC Berkeley, February 12, 2007.

Invited Lecture, "Return to the Ocean: Dawn of a New Age of Discovery," *Launch of School of Earth and Space Exploration Seminar*, Arizona State University, April 10, 2007.

Banquet Speaker, "Ocean Exploration in the Age of Robotics," *2007 Spring Banquet, IEEE Twin Cities Section*, April 21, 2007.

Luncheon Speaker, "Technology and Discovery on the Ocean Frontier," *SemiTherm 24*, San Jose, CA, March 19, 2008.

Invited Lecture, "The Age of the Industrial Ocean", *Battelle Duxbury*, Duxbury, May 7, 2008.

Invited Lecture, "Trends for AUVs and AUV Markets," *Battelle*, Columbus OH, October 28, 2008.

Keynote Presentation, "The Future of AUVs," *CENSAM Workshop*, NTU, Singapore, January 20, 2009

Invited Lecture, "An Introduction to Ocean Observing Technology," *Tropical Marine Science Institute, National University of Singapore*, Singapore, February 16, 2009

Keynote Speaker, "Robots and the Age of the Industrial Ocean," *Florida Conference on Recent Advances in Robotics*, May 21, 2009.

Invited Lecture, "Networking the Ocean," *Symantec Lecture Series*, July 22, 2009.

Invited Presentation, "Energy Transport by Vehicles," *DARPA Vent Power Meeting*, SIO, August 18, 2009.

NRAC Report, "Future Naval Use of COTS Networking Infrastructure," *Chief of Naval Research*, Washington DC, September 22, 2009

Opening Keynote Presentation, "To Infinity and Beyond: AUVs in 2030," *IEEE AUV Monterey*, CA Sept. 1, 2010

Invited Presentation, "Adaptive Observatories for Observing Moving Marine Organisms," *American Geophysical Union Meeting*, San Francisco, December 15, 2010.

Invited Seminar, "Engineering for Ocean Science and Society," *Green Talk, San Jose State University*, San Jose, CA, February 9, 2011.

Invited Lecture, “AUV Power Requirements,” *Invited Lecture Naval Postgraduate School*, Monterey, CA, Feb 24, 2011.

Invited Presentation, “AUVs and Technology Trends,” *FUNS Wargame, Naval Postgraduate School*, Monterey, CA, March 22, 2011

Menneken Lecture, “Robots on Watch: Towards A Persistent Presence at Sea” *Naval Postgraduate School*, Monterey, CA, April 7, 2011

Invited Presentation, “From Robots to Plankton,” *Sanctuary Symposium*, Monterey, April 8, 2011.

Invited Presentation and Panelist, “Ocean Exploration, Robots & Our Future,” *Earth, Air, Ocean and Space: The Future of Exploration, MIT150 Symposium*, Cambridge, MA, April, 27, 2011.

Invited Presentation, "Robots, Microbes, and Observatories", Moss Landing, CA, U.S.A., September 15, 2011.

Invited Presentation, "Interactions between Platforms, Sensors, and Models", *Global Earth Observing System of Systems (GEOSS) XLII*, Kona, HI, U.S.A., September 18, 2011.

Invited Presentation, URI 2011 Honors Colloquium, University of Rhode Island, October 25, 2011.

Invited Presentation, “Robots, Microbes, and the Ocean,” Tongji University Nov. 3; Zhejiang University, Nov. 7; Chinese Academy of Sciences, Beijing, Nov. 8; Shanghai Jiao Tong University, Nov. 9.

Invited Presentation, "Microbes, Robots, and Next Generation Ocean Observatories", University of Bremen, Germany, 16 Nov. 2011.

Invited Presentation, “Ocean Science in a Crowded World,” Ocean Sciences 2012, Salt Lake City, Utah, February 21, 2012

Invited Presentation, “Power below,” Catch the Next Wave, Oceanology International 2012, London, UK, March 12, 2012.

Invited Presentation, “Robots at Sea - Autonomous Underwater Electric Vehicles,” Invited talk, Electric Vehicles Land, Sea & Air 2012, San Jose, CA, March 28, 2012.

Invited Presentation, “Robots, Climate, and the Life and Death of Marine Microbes,” Center for Information Technology Research in the Interest of Society (CITRIS) Lecture, UC Berkeley, April 4, 2012.

Plenary Speaker, “Industrial Ocean,” 10th Mine Warfare Association (MINWARA) Symposium, Monterey, CA, May 9, 2012.

Invited Presentation, “The New Ocean Economy,” Capitol Hill Ocean Week, Washington DC, June 6, 2012

Invited Presentation, “Robots of the Ocean, Unite!” AUVSI Annual Meeting, Las Vegas, August 8, 2012.

Keynote Presentation, “The New Ocean Economy,” Bluefin Robotics 15th Birthday, Quincy, MA, September 24, 2012.

Keynote Presentation, “Our Ocean Future,” WUWNet, Los Angeles, CA, November 5, 2012.

Defense Energy Lecture, Naval Postgraduate School, February 1, 2013.

Dinner Speaker, Neustar Technology Summit, Air and Space Museum, Chantilly, VA, May 21, 2013.

Dinner Speaker, “Up for Grabs: Technology and the Race to Control the Ocean,” Schmidt Ocean Institute Symposium, Honolulu, Hawaii, November 1, 2013.

Invited Speaker, USGS Innovation Center for Earth Workshop, Palo Alto, California, December 7, 2013.

Invited Speaker, “20 Years of Building AUVs: Progress and Opportunities,” GEOMAR, Kiel, Germany, March 13, 2014.

Invited Speaker, “Technology for Observing the Biological Ocean,” MTS TechSurge: Ocean Sensors Meeting, New Jersey, April 1, 2014.

Invited Speaker, “The New Ocean Economy...and its Robotic Enablers,” Branding the Monterey Bay Region, Marina, CA, April 25, 2014.

Distinguished Lecture together with Chris Scholin: “The development and application of autonomous ocean observation systems,” Library of University Town of Shenzhen, May 8, 2014.

Distinguished Lecture together with Chris Scholin: “The development and application of autonomous ocean observation systems,” State Key Laboratory of Marine Pollution, City University of Hong Kong, May 9, 2014.