Richard CAMILLI

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Professional Experience:

2009 - present	**Associate Scientist**. Woods Hole Oceanographic Institution, Department of Applied Ocean Physics and Engineering. Woods Hole, MA.
2005 - 2009	**Assistant Scientist**. Woods Hole Oceanographic Institution, Department of Applied Ocean Physics and Engineering.
2004 - 2005	**Postdoctoral Scholar**. Woods Hole Oceanographic Institution, Deep Ocean Exploration Institute.
2003 - 2004	**Visiting Investigator**. Woods Hole Oceanographic Institution, Department of Marine Chemistry and Geochemistry.
2001 - 2003	**Research Assistant**. Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, Cambridge, MA.
2001- 2002	**Instructor**. Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, 1.992: Special Studies in Civil and Environmental Engineering
1996 - 2000	**Graduate Research Fellow**. Massachusetts Institute of Technology, Department of Civil and Environmental Engineering.

Education:

2003	**Ph.D. Massachusetts Institute of Technology**, School of Engineering, Department of Civil and Environmental Engineering.
2000	**S.M. Massachusetts Institute of Technology**, School of Engineering, Department of Civil and Environmental Engineering.
1996	**B.A. Cheyney University**, Biology, minors: chemistry and sculpture. GPA 4.0/4.0

Honors and Awards:

2010	National Science Foundation CAREER Award
2004, 06, 07	Green Technology Innovation Award
2003	Society of Naval Architects and Marine Engineers Graduate Paper Award
2002	URISA Horwood Student Critique Paper Award (shared)
1996-98, 2000	National Science Foundation Graduate Research Fellowship
1998-99	Alfred P. Sloan Fellowship
1996	Carver Science Award
1996	Cheyney University Award for Achievement in Biology
1994-96	Cheyney University Scholarship

Research Interests:

In-situ sensor and instrumentation design, marine and cognitive robotics, chemical oceanography, pollution remediation, environmental informatics, intelligent control systems, remote sensing, multi-resolution and concurrent mapping, deep water archaeology.

Certifications:

NOAA National Undersea Research Program (NURP) Aquanaut, Master diver (nitrox, surface supply, and saturation), Sea survival, Helicopter underwater escape (HUET), PEC Safe Gulf, Rig Pass, Cardio pulmonary resuscitation (CPR), First aid, Diver Alert Network (DAN) O_2

Professional Affiliations:

American Academy of Underwater Sciences
American Association for the Advancement of Science
American Geophysical Union
American Society for Limnology and Oceanography
Institute of Electrical and Electronics Engineers
Marine Technology Society
Union of Concerned Scientists

Professional Activities:

- Faculty member MIT/WHOI Joint Program in Oceanography
- Scientist on over 30 (Chief Scientist of 11) major oceanographic expeditions and oil spill survey operations throughout the world
- Crew member on 15 human occupied submersible dive missions
- Nominee to the US Environmental Protection Agency (EPA) review panel for Oil Spill Research Strategy
- Panelist for the President's National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling
- Scientific advisor to the US Coast Guard and the National Incident Command during Deepwater Horizon spill containment and assessment operations
- Member of the Woods Hole Consortium delegation to the United Nations COP15 Climate Summit
- US National Oceanic and Atmospheric Administration (NOAA) Ocean Exploration Advisory Working Group
- Scientific contributor to US Department of Defense programs for unexploded ordnance and disposed military munitions detection
- WHOI Deep Ocean Exploration Institute advisory committee
- MTS/IEEE OCEANS conference technical chair
- Underwater Intervention conference technical chair
- NEPTUNE Canada cabled observatory design committee, Barkley Canyon node

Journal Publications:

1. **R. Camilli**, C.M. Reddy, D.R. Yoerger, B.A.S. VanMooy, M.V. Jakuba, J.C. Kinsey, C.P. McIntyre, S.P. Sylva, J.V. Maloney "Tracking Hydrocarbon Plume Transport and Biodegradation at *Deepwater Horizon*" *Science* 330(6001):201-204. 2010.
2. D.L. Valentine, C.M. Reddy, C. Farwell, T.M. Hill, O. Pizarro, D. Yoerger, **R. Camilli**, R.K. Nelson, E.E. Peacock, B.A. Clarke, C.N. Roman, and M. Soloway. "Asphalt Volcanoes as a Potential Source of Methane to Late Pleistocene Coastal Waters" *Nature Geosciences* 3(10):345-348. 2010.
3. B. Bingham, B. Foley, H. Singh, **R. Camilli**, K. Delaporta, R. Eustice, A. Mallios, D. Mindell, C. Roman, D. Sakellariou, "Robotic Tools for Deep Water Archaeology: Surveying an Ancient Shipwreck with an Autonomous Underwater Vehicle" *Journal of Field Robotics* 27(6):702-717. 2010.
4. H. Dulaiova, **R. Camilli**, P. Henderson, M. Charette "Large-scale assessment of radon, nitrate and methane as indicators of regions of groundwater discharge and non-point source pollution to coastal waters" *Journal of Environmental Radioactivity* 101(7):553-563. 2010.
5. **R. Camilli**, B. Bingham, M. Jakuba, A. Duryea, R. LeBouvier, M. Dock, "AUV Sensors for Real-Time Detection, Localization, Characterization, and Monitoring of Underwater Munitions" *Marine Technology Society Journal special issue The Legacy of Underwater Munitions Worldwide: Policy and the Science of Assessment, Impacts and Potential Responses* 43(4):76-84. 2009.

6. **R. Camilli**, B. Bingham, C.M. Reddy, R.K. Nelson, A.N. Duryea "Method for rapid localization of seafloor petroleum contamination using concurrent mass spectrometry and acoustic positioning" *Marine Pollution Bulletin* 58(10):1505-1513. 2009.
7. **R. Camilli**, and A.N. Duryea, "Characterizing spatial and temporal variability of dissolved gases in aquatic environments with in-situ mass spectrometry" *Environmental Science and Technology* 43(13):5014-5021. 2009.
8. B.P. Foley, K. DellaPorta, D. Sakellariou, B. Bingham, **R. Camilli**, R. Eustice, D. Evagelistis, V. Ferrini, K. Katsaros, D. Kourkoumelis, A. Mallios, P. Micha, D. Mindell, C. Roman, H. Singh, D. Switzer, T. Theodoulou. "The 2005 Chios Ancient Shipwreck Survey: New Methods for Underwater Archaeology" *Hesperia* 78(2):269-305. 2009.
9. C. Kunz , C. Murphy, H. Singh, C. Willis, R. Sohn, S. Singh, T. Sato, C. Roman, K. Nakamura, M. Jakuba, R. Eustice, **R. Camilli**, J. Bailey, "Toward Extraplanetary Under-Ice Exploration: Robotic Steps in the Arctic." *Journal of Field Robotics*. 26(4): 411-429. 2009.
10. K.R. Newman, M. Cormier, J.K. Weissel, N.W. Driscoll, M. Kastner, E.A. Solomon, G. Robinson, J.C. Hill, H. Singh, **R. Camilli**, R. Eustice "Active methane venting observed at giant seafloor pockmarks along the U.S. mid-Atlantic shelf break" *Earth and Planetary Science Letters*, Vol. 267, No. 1-2., March 2008, pp. 341-352.
11. S. Mau, D. Valentine, J. Clark, J. Reed, **R. Camilli**, L. Washburn. "Dissolved Methane Distributions and Air-Sea Flux in the Plume of a Massive Seep Field, Coal Oil Point, California", *Geophysical Research Letters*, 34(22) L22603, 2007.
12. **R. Camilli** and H.F. Hemond "NEREUS/Kemonaut, a mobile autonomous underwater mass spectrometer" *Trends in Analytical Chemistry* 23(4):307-313. 2004.
13. E.R. Vivoni, and **R. Camilli**, "Real-time Streaming of Environmental Field Data" *Computers & Geosciences*. 29(4): 457-468. 2003.
14. H.F. Hemond, and **R. Camilli**, "NEREUS: engineering concept for an underwater mass spectrometer" *Trends in Analytical Chemistry* 21(8):526-533. 2002.

Edited Volumes:

15. E.R. Vivoni, **R. Camilli**, M.A. Rodríguez, D.D. Sheehan, and D. Entekhabi, "Development of mobile computing applications for hydraulics and water quality field studies" in: *Hydraulic Information Management*. Blain, W.R. and Brebbia, C.A. (ed). 2002. WIT Press. Southampton. pp. 275-284.

Conference Papers and Other Publications:

1. **R. Camilli** "Eschew the Scientific Sound Bite: a Response to the Oil Plume Paradox" *Columbia Journalism Review.* September 10, 2010.
2. M.V. Jakuba, J.C. Kinsey, D.R. Yoerger, **R. Camilli**, C.A. Murphy, D. Steinberg, A. Bender. "Exploration of the Deepwater Horizon Oil Spill with the Sentry Autonomous Underwater Vehicle" Accepted to the *IEEE/RSJ International Conference on Intelligent Robots and Systems*
3. **R. Camilli**, A. Bowen, N. Farr, "Bright Blue: Advanced Technologies for Marine Environmental Monitoring and Offshore Energy" in *Proceedings of MTS/IEEE OCEANS 2010,* Sydney, Australia 2010.
4. **R. Camilli** and A. Duryea, "Real-time assessment of subsurface hydrocarbons for environmental remediation and resource development" in *Proceedings of Underwater Intervention*. New Orleans, LA. March 3-5, 2009.
5. **R. Camilli**, A. Mallios, D. Sakellariou, B. Bingham, R. Eustice, J. Goudreau. "Human occupied submersible utilized real-time in-situ chemical and localization sensors for studying hydrothermal vents off Milos and Santorini Islands" in *Proceedings of the 9th Hellenic Symposium of Oceanography and Fisheries.* Patra, Greece. May 13-16, 2009
6. C. Kunz, C. Murphy, **R. Camilli**, H. Singh, J. Bailey, R. Eustice, C. Roman, M. Jakuba, C. Willis, T. Sato, K. Nakamura, R. Sohn, "Deep Sea Underwater Robotic Exploration in the Ice-Covered Arctic Ocean with AUVs" in *Proceedings of the 2008 International Conference on Robotics and Systems*. Nice, France. September 22-26, 2008. doi:10.1109/IROS.2008.4651097

7. L. Camilli, O. Pizarro, **R. Camilli**, "Advancing Spatial-Temporal Continuity in Coral Reef Ecosystem Pattern Detection: The Morphology, Distribution and Chemical Environments of Coral Habitats Encompassing Coiba National Park, Panamá." in *Proceedings of the 11th International Coral Reef Symposium*, Ft. Lauderdale, Florida, 7-11 July 2008.
8. K.A. Hansen, J. Bello, S. Clauson, **R. Camilli**, B. Bingham, M.T. Eriksen, E. Maillard, J. Morris, P.J. Luey, "Preliminary Results for Oil on the Bottom Detection Technologies" in *Proceedings of the 31st Arctic and Marine Oil-Spill Program on Environmental Contamination and Response*. Calgary, Canada, 2-5 June 2008.
9. **R. Camilli** and A. Duryea, "Characterizing marine hydrocarbons with in-situ mass spectrometry" in *Proceedings of MTS/IEEE OCEANS 2007,* Vancouver, Canada 2007. doi:10.1109/OCEANS.2007.4449412
10. **R. Camilli**, O. Pizarro, L. Camilli. "Rapid Swath Mapping of Reef Ecology and Associated Water Column Chemistry in the Gulf of Chiriquí, Panamá" in *Proceedings of MTS/IEEE OCEANS 2007,* Vancouver, Canada 2007. doi:10.1109/OCEANS.2007.4449413
11. **R. Camilli**, D. Sakellariou, B. Foley, C. Anagnostou, A. Mallios, B. Bingham, R. Eustice, J. Goudreau, and K. Katsaros. "Investigation of Hydrothermal Vents in the Aegean Sea using an Integrated Mass Spectrometer and Acoustic Navigation System Onboard a Human Occupied Submersible." in *Rapp. Comm. Internationale pour l'Exploration Scientifique de la Mer Méditerranée (CIESM)* 38: 79, 2007
12. C. Roman and **R. Camilli**. "Design of a Gas Tight Water Sampler for AUV Operations." in *Proceedings of IEEE OCEANS Europe 2007.* Aberdeen, Scotland 2007. doi:10.1109/OCEANSE.2007.4302365
13. **R. Camilli**, A. Duryea, J. Buchner, and J.K. Whelan, "TETHYS: an In-situ Mass Spectrometer for Cabled Observatories" in *Proceedings of the Fourth International Workshop on Scientific Use of Submarine Cables and Related Technologies*. pp.238-243. Dublin, Ireland 2006.
14. S. White, **R. Camilli**, A. Michel, J.K. Whelan, "Spectroscopic Sensor Technology for In-Situ Seafloor Analysis" in *Proceedings of the Fourth International Workshop on Scientific Use of Submarine Cables and Related Technologies*. pp. 232-237. Dublin, Ireland 2006.
15. **R. Camilli**, A.N. Duryea, M. Wilson, "Underwater Vacuum Technology" *Vacuum Technology and Coatings.* December 2005, pp. 34-39.
16. R. Eustice. **R. Camilli**, H. Singh, "Bathymetry-Aided Doppler Re-Navigation for AUVs" in *Proceedings of MTS/IEEE OCEANS 2005*, Washington DC, USA 2005. doi:10.1109/OCEANS.2005.1639956
17. **R. Camilli**, B. Bingham, M. Jakuba, H. Singh, and J. Whelan, "Integrating in-situ chemical sampling with AUV control systems" in *Proceedings of MTS/IEEE OCEANS 2004*, Kobe, Japan 2004. doi:10.1109/OCEANS.2004.1402902
18. **R. Camilli**, "Kemonaut: An Odyssey Class AUV Platform for the NEREUS Underwater Mass Spectrometer" in *Proceedings of the Society of Naval Architects and Marine Engineers World Maritime Technology Conference*, San Francisco, CA 2003.

Conference Abstracts:

1. J.C. Kinsey, M.V. Jakuba, A.D. Bowen, D.R.Yoerger, L .Whitcomb, **R. Camilli**, C.R. German, D.L. Valentine, "Employing Autonomous Underwater Vehicles to Develop New Techniques for Astrobiological Exploration: Recent Field Results and Future Opportunities" AbSciCon2010 Astrobiology Science Conference, League City, TX. April 26-29, 2010
2. **R. Camilli**, D. Yoerger, M. Jakuba, O. Pizarro, S. Williams, M. Johnson-Roberson, J. Kinsey, T. Shank, "Advancing autonomy for exploration, discovery, and characterization of astrobiology in aqueous environments" AbSciCon2010 Astrobiology Science Conference, League City, TX. April 26-29, 2010.
3. **R. Camilli**, D. Yoerger, M. Jakuba, O. Pizarro, S. Williams, D. Valentine, "Extending autonomy for exploration, discovery, and characterization of deep sea extreme environments" ASLO/AGU Ocean Sciences Meeting, Portland, OR. February 22-26, 2010.
4. S. Sommer, D.F. McGinnis, P. Linke, **R. Camilli**, T. Mosch, O. Pfannkuche, "Life at the edge - oscillating lower boundary of the Peruvian oxygen minimum zone" ASLO/AGU Ocean Sciences Meeting, Portland, OR. February 22-26, 2010.

5. C. Martens, N. Lindquist, B. Popp, H. Mendlovitz, P. Gibson, **R. Camilli**, J. Hench, A.N. Duryea, "Underwater Membrane Inlet Mass Spectrometry Measurements of Sponge Dinitrogen Gas Production on Conch Reef, Florida Keys (USA)" ASLO/AGU Ocean Sciences Meeting, Portland, OR. February 22-26, 2010.
6. **R. Camilli**, L. Macelloni, V. Asper, M. Woolsey, J. Williams, A. Diercks, C. Lutken, K. Sleeper. "Discovery and Characterization of Cold Seep Vents Using a Mass Spectrometer Operating aboard an Autonomous Underwater Vehicle" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2009.
7. L. Camilli, O. Pizarro, **R. Camilli**, "Synoptic Analysis of Coral Habitats and Coastal Ocean Chemistry to Inform Reef Conservation in Pacific Panamá" ASLO/AGU Ocean Sciences Meeting, Orlando, FL. March 2-7, 2008.
8. C.S. Martens, N. Lindquist, J.L. Hench, H.P. Mendlovitz, **R. Camilli**, A.N. Duryea, P.J. Gibson, B.N. Pope. "In-situ Measurements of Diel Variations in Barrel Sponge Respiration from NOAA's Aquarius Underwater Observatory on Conch Reef, Florida Keys (USA)" ASLO/AGU Ocean Sciences Meeting, Orlando, FL. March 2-7, 2008.
9. O. Pizarro, L. Camilli, **R. Camilli** "Rapid Optical Swath Mapping of Reef Ecology in the Gulf of Chiriquí, Panamá" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2007.
10. **R. Camilli**, D. Sakellariou, C. Anagnostou, J. Goudreau, B. Bingham, R. Eustice, B. Foley, K. Katsaros, A. Malios, "Real-time characterization of submarine hydrothermal vents with an in-situ mass spectrometer operating aboard a human occupied submersible" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2006.
11. **R. Camilli**, C. Martens, J. Whelan, O. Pizarro, N. Farr, J. Goudreau, H. Mendlovitz, V. Ferrini, "Coordinated Mapping and Characterization of Ocean Floor Methane Sources with Manned Submersibles, AUVs and Modular Observatory Arrays" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2006.
12. O. Pizarro, N. Farr, **R. Camilli**, J. Whelan, C. Martens, J. Goudreau, H. Mendlovitz, L. Camilli, "In-situ Optical Characterization of Methane Seeps and Bubble Plumes" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2006.
13. **R. Camilli**, B. Bingham, M. Jakuba, H. Singh, and J. Whelan, "In-situ Chemical Exploration and Mapping using an Autonomous Underwater Vehicle" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2004.
14. O. Pizarro, **R. Camilli**, and J. Whelan, "Optical sensing for characterization of bubble plumes from methane seeps" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2004.
15. J. Hill, N. Driscoll, J.K. Weissel, M. Kastner, H. Singh, M. Cormier, **R. Camilli**, R. Eustice, R. Lipscomb, N. McPhee, K. Newman, G. Robertson, E. Solomon, K. Tomanka, "A Potential Link between Fluid Expulsion and Slope Stability: Geochemical Anomalies Measured in the Gas Blowouts along the U.S. Atlantic Margin Provide New Constraints on their Formation" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2004.
16. K. Newman, N. Driscoll, J. Weissel, M. Kastner, H. Singh, M. Cormier, **R. Camilli**, R. Eustice, R. Lipscomb, N. McPhee, J. Hill, G. Robertson, E. Solomon, and K. Tomanka, "A detailed near-bottom survey of large gas blowout structures along the US Atlantic shelf break using the autonomous underwater vehicle (AUV) SeaBED" in EOS: Trans. Amer. Geophysical Union Fall Meeting Supplement, 2004.
17. **R. Camilli** and H.F. Hemond, "Project NEREUS: The construction of a practical autonomous underwater gas analyzer" ASLO Aquatic Sciences Meeting, Albuquerque, NM. February 14, 2001.
18. **R. Camilli,** "NEREUS: A Deep Diving Autonomous Underwater Gas Analyzer Based on Mass Spectrometry" IEEE OCEANS, Providence, RI. Sept 11-14, 2000.

Invited Talks:

- Testimony to the President's National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling: "Flow Rate and Fate of Oil from the Deepwater Horizon Disaster" Washington, DC. 2010.

- Harvard Club Boston Science Briefing: "WHOI's Involvement in the Deepwater Horizon Oil Spill." Invited speaker. Boston, MA. 2010
- AAAS/NSF/WHOI press conference: "Tracking Hydrocarbon Plume Transport and Biodegradation at Deepwater Horizon." National Press Club, Washington, DC 2010.
- Public Forum: "WHOI in the Gulf of Mexico." Invited Panelist. Woods Hole, MA. 2010
- Marine Technology Society TechSurge Workshop: "Ocean Observing: Thinking Outside the Basin." Invited speaker. Norfolk, VA. 2010.
- Testimony to the US Congressional Subcommittee on Energy and Environment (Committee on Energy and Commerce): "Acoustic Technology for Determining Oil Spill Size." United States House of Representatives, Washington, DC. 2010.
- WHOI Trustee Science Panel meeting: "Subsurface observation and environmental assessment with in-situ tools." Invited speaker. Woods Hole, MA. 2009.
- University of Sydney, Australian Centre for Field Robotics. "Toward Imaging of Environmental Chemical Features." Invited speaker. Sydney, Australia. 2009.
- Second International Dialogue on Underwater Munitions: "AUV-based Underwater Localization, Characterization, and Monitoring of Non-conventional Disposed Military Munitions Sites." Invited speaker. Honolulu HI. 2009.
- Harvard Club breakfast: "A Submarine Mass Spectrometer." Invited speaker. Boston, MA. 2007.
- SERDP/ESTCP Underwater Unexploded Ordnance Workshop: "Navigation Technology for Underwater Surveys." Invited speaker. San Diego, CA. 2007.
- Exxon-Mobil Research and Engineering Headquarters: "Long-Term Unattended Observation of Low-Molecular Weight Chemicals in the Water Column." Invited speaker. Annandale, NJ. 2007.
- American Schools of Oriental Research Annual Meeting: "In-situ chemical sensors for underwater archaeology." Invited speaker. Philadelphia, PA. 2005.
- The 4th International Workshop on Methane Hydrate Research and Development: "Characterization of Deep Ocean Methane Seeps and Hydrate Fields." Invited speaker. Victoria, Canada. 2005.
- University of Southern California, Department of Biological Sciences, Marine Environmental Biology: "Subsurface exploration and mapping with autonomous systems." Invited speaker. Los Angeles, CA. 2005.
- Discovery Center of Idaho: "Secrets from the Deep: Science, History and Technology." Invited speaker. Boise, ID. 2005.
- Satellites and Education Conference XVII, California State University: "Exploring the Deep Ocean: generating high-resolution maps with the aid of satellite technologies." Keynote speaker. Los Angeles CA. 2004.