

Underwater Acoustics: Field Work, Laboratory Measurements, and Computational Models

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This talk presents the use of sound as a tool to remotely sense the underwater environment. Both geoacoustic inference as well as direct measurements of acoustic properties of the water column and seabed are applied to understand geological processes and biological systems. Field experiments on Chukchi Shelf, the New England Mud Patch, and the Gulf of Mexico are described. Each of these works represents a collaborative effort on the use of sound to make a contribution to diverse fields including physical oceanography, biology, and ecology. Complimentary laboratory measurements are used to benchmark results, extend the frequency range of field measurements, calibrate sensors, and devise new measurement techniques. Computational models are applied to provide insight into the effects of environmental inhomogeneities on the propagation of measured signals. This talk will highlight key results including the use of sound to (1) monitor the stability of the Beaufort Lens, a sub-surface acoustic sound channel that supports long-range acoustic propagation, (2) examine of the effects of infauna on particle interactions in fine-grained sediments, and (3) infer the void fraction of gas bubbles in the water column as a proxy for photosynthetic activity in a seagrass meadow.



Megan Ballard is a Research Scientist at the Applied Research Laboratories, University of Texas at Austin. She received a BS in ocean engineering from Florida Atlantic University and a PhD in acoustics from Pennsylvania State University. Her research focuses on a variety of topics in underwater acoustics including measurement and modeling of ocean acoustic propagation, as well as direct measurement and inference of sediment geoacoustic properties. She has

conducted field experiments in several sites off the coast of North America, spanning from the warm waters of the Gulf of Mexico to the frigid environment of the Canadian Beaufort. Dr. Ballard received the R. Bruce Lindsay Award from the Acoustical Society of America, the Postdoctoral Special Research Award from the Office of Naval Research, the National Defense Science and Engineering Graduate Fellowship Award, and the National Defense Industrial Association Undersea Systems Division Fellowship Award. She currently serves as the chair of the Technical Committee on Underwater Acoustics.