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Subj: ONR Grant# N00014-19-1-2252 "Analysis and Publication of Long-Range Low Frequency Acoustic Results from the Pacific Ocean"

Encl: (1) Final Technical Report for Subject Grant
(2) SF298 for Enclosure

Enclosure (1) is the Final Technical Report for the subject grant. Enclosure (2) is the SF 298 form. These documents constitute the Final Technical Report and deliverable for ONR Grant# N00014-19-1-2252.

cc: Grant & Contract Administrator, APL-UW
Office of Sponsor Programs, UW
ONR Seattle
Naval Research Laboratory
Defense Technical Information Center

**Analysis and Publication of Long-Range Low-Frequency Acoustic Results
from the Pacific Ocean**

Final Report

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Award Number N00014-19-1-2252

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This multi-year grant overlapped with ONR Grant N00014-16-1-2483. Project goals for both efforts were nearly identical and the accomplishments were intermingled.

Project Goals

The primary goal of this project was to analyze and publish results of long-range low-frequency acoustic experiments conducted in the Pacific Ocean. These experiments addressed the ultimate limitations to the performance of long-range sonar systems due to ocean sound speed perturbations and the characteristics of the ambient acoustic noise field. Scattering and diffraction resulting from internal waves and other ocean processes limit the temporal and spatial coherence of the received signal, while the ambient noise field is in direct competition with the received signal. Research conducted in the North Pacific Acoustic Laboratory (NPAL) and Deep Water Acoustic programs at the Applied Physics Laboratory (APL-UW) were directed toward a complete understanding of the basic physics of low-frequency, long-range, deep water, broadband acoustic propagation, the effects of ocean variability on signal coherence, and the fundamental limits to signal processing that are imposed by ocean processes.

Dr. Mercer is a member of the ASA Technical Committee on Acoustical Oceanography (remote participation since the Covid pandemic), and has reviewed manuscripts submitted to JASA and to other journals. He has also continued to mentor his former Post-Doc Andrew White.

Publications

Dr. Mercer co-authored the following manuscripts:

Deep water acoustic range estimation based on an ocean general circulation model: Application to PhilSea data (JASA, Mengyu Wu, et al.)

Observations of low-frequency, long-range acoustic propagation in the Philippine Sea and comparison to mode transport theory (JASA, Tarun K. Chandrayadula, et al.)

Temperature-driven seasonal and longer term changes in spatially averaged deep ocean ambient sound at frequencies 50 Hz to 125 Hz (Michael A. Ainslie, et al.)

Dr. Mercer provided technical reviews of the following manuscripts:

Manuscript Number JASA-EL-00929 for the Journal of the Acoustical Society of America.

Manuscript Number JOL-2021-Aug-0265 for the Journal of Oceanography and Limnology.

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