

Notice and Invitation

Oral Defense of Doctoral Dissertation
The Volgenau School of Engineering, George Mason University

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Deep Ocean Ambient Noise Analysis and Modeling for SPICEX

Wednesday, March 15, 2017, 2:00 pm
Room 1605 Engineering Building
All are invited to attend.

Committee

Dr. Kathleen E. Wage, Chair
Dr. Jill K. Nelson
Dr. Siddhartha Sikdar
Dr. Brian J. Sperry

Abstract

A variety of underwater acoustic applications require knowledge of the ambient noise characteristics. The SPICEX experiment provided a unique opportunity to observe the ambient noise in 20-500 Hz in the North Pacific in 2004-2005. The major sources of ambient noise in this frequency band are distant shipping and local wind noise.

Analysis of SPICEX shows that the noise levels in 2004-05 at 50 Hz had not increased relative to levels measured during CHURCH ANCHOR experiment at a nearby North Pacific site three decades earlier, but rather were comparable to those levels. At 50 Hz the noise below the conjugate depth decreases at a rate of -9.9 dB/km, which is much less than that observed during CHURCH OPAL experiment in September 1975. Also, the ambient noise in SPICEX shows a seasonal pattern over its year-long time series of the measurements.

Inspired by the results of SPICEX noise analysis, this research shows that the internal wave scattering can be an effective mechanism to transfer the near-surface generated noise into the SOund Fixing And Ranging (SOFAR) channel. Due to large number of sources in open ocean, the effect of internal wave scattering in coupling the near-surface generated noise into SOFAR channel is comparable with shallowing the SOFAR channel in high latitudes. Using shipping lane maps and numerical modeling, this work simulates the noise and compares it with SPICEX measurements. The comparison shows that the seasonal variation of noise during SPICEX in 40-50 Hz band is most likely caused by distant wind rather than the distant shipping.