

Ship Noise Characteristics using a Viscous Grain Shearing Model of the Sediment

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Acoustic noise from transiting cargo ships and tankers affords an opportunity to find estimates of seabed properties. Spectrograms from these ships of opportunity (SOO) are utilized in a Bayesian maximum entropy (BME) approach to find posterior probability distributions for both source characteristics and seabed properties. The seabed is parameterized with the viscous grain shearing model. Specifically, the BME approach is utilized to obtain probability density functions (PDFs) for porosity and thickness of the sediment layers as well as ship speed, closest point of approach, and the source strength for the Wales-Heitmeyer empirical source spectrum. Data collected from several transiting ships on a vertical line array during the 2017 Seabed Characterization Experiment are used in the BME application. Statistical properties of the PDFs are compared to expected values, and modeled spectrograms are compared to measured spectrograms. This research shows that the SOO spectrograms contain sufficient information about porosity and source strength to make meaningful comparisons to ground truth measurements. [Work supported by the Office of Naval Research]

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