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Low Frequency Wind Generated Acoustic Noise

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The objective of this study is to improve modeling underwater ambient noise below 100 Hz from local and distant wind. Historically, shipping is assumed to dominate ambient noise at this frequency band, however, the CTBTO hydroacoustic array off Crozet Island provides unique wind noise observations with minimal shipping interference. First, ambient noise is correlated to overhead windspeed through a simple frequency dependent power relation, and second, the distant wind contributions are modeled through a source density and propagation model. Wind-related noise is modeled as a layer of monopole sources located at a quarter wavelength below the surface. The ambient noise and source level (SL) are related to wind speed (U) through a power relation such that, SL=A(f)+10n(f)log(U) and AN=B(f)+10n(f)log(U) where A, B, and n are frequency dependent coefficients estimated from the acoustic data. An important observation is that the n parameter increases as frequency decreases and reaches a value above 7 at 10 Hz, which is much larger than the 3.5 often measured at 300 Hz. The source layer model accurately predicts the ambient noise within a standard deviation of 2.5 dB and is necessary with low overhead wind speeds.

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Promotional text

Wind generated low frequency noise is difficult to observe but the array north of Crozet Island provides unique data that allows for insight and original findings. The conclusions will improve environmental noise characterization and will be used towards a PhD dissertation.

Oral preference format

in-person

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