



CLEAN beamforming for an enhanced separation of infrasound sources in array data

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The separation and classification of signals of interest in the presence of coherent noise is central in the analysis of infrasound array data. The ambient noise field is particularly coherent around 0.2 Hz, and consists of microbarom signals. These signals are generated by ocean-wave interaction. The locations are dependent on the sea state and the bathymetry and are dynamical features that move in time. Multiple source regions may exist at any moment in time.

From the perspective of an infrasound array, these coherent noise sources may appear as interfering signals. Classical beamform methods, such as f/k , may not correctly resolve such signals. This limits the ability of an infrasound array to dissect the wavefield into its individual components. In order to resolve this, higher-resolution methods can be applied to detect subdominant sources. In this research, we apply CLEAN beamforming. This algorithm iteratively selects the maximum of the f/k spectrum, removes a percentage of this maximum together with its sidelobes and stores the maximum in a new spectrum until reaching a stopping criterion. Fisher statistics are used to determine the stopping criterion and to estimate signal amplitudes.

The method allows for the identification of various source regions in the North Atlantic, as shown in a case study. A good agreement is found with source regions that are simulated using ocean-wave model data.