

Distributed detection framework and three-dimensional propagation model for acoustic detection of baleen whales.

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The HA08 hydrophone triads to the north and south of Diego Garcia constantly record low frequency whale calls. This work builds detectors for different types of blue whales; the Antarctic, Sri Lankan, Madagascan, and an unidentified type. There are significant challenges for constructing detectors. The calls are complicated, and show variations in intensity across frequency bands, and the three hydrophones within a triad. There is hence a variability to the Signal to Noise Ratio (SNR) available for detection. A major cause for the variability is the scattering due to the island bathymetry. This work builds a robust framework to overcome these issues in two stages. The first uses subspace approaches to detect calls across respective frequency bands. The second compensates for the SNR variability to improve the detection rates. In this stage, a distributed approach fuses detections across call frequencies, and the hydrophone triads. The other focus of this work is building a three dimensional propagation model to predict sound scattering, which helps suggest improvements to the detector. Finally, the work uses a subset of calls (recorded over a year) to estimate the probability of detection. The new method has higher detection rates than results previously published in the literature.

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