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Wide-area geoacoustic inversion using distant ship noise

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Broadband (50-500 Hz) noise data from fast-traveling surface ships in the vicinity of a VLA and a bottomed HLA are used to estimate the geoacoustic properties on the New Jersey Shelf. Matched-field inversion of geometric and geoacoustic parameters are presented by using twenty days of ship noise data, collected during the RAGS03 winter experiment. Noise data from different ships at different ranges provided robust geoacoustic inversions for both VLA and bottomed HLA data. Acoustic propagation tracks are determined from the HLA beamforming results and a 3-D geoacoustic parameter map is constructed. The constructed geoacoustic parameter map shows good agreement with the results from chirp sonar inversion and acoustic probe measurements, indicating silty seafloor sediments on the outer-shelf area and sandy sediments on the inner-shelf area. Efficiency of the 3-D geoacoustic inversion and extension to range-dependent inversions at longer ranges are also discussed. [Work supported by ONR.]