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Geoacoustic uncertainties in matched-field inversions of ship-noise data

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This paper applies geoacoustic inversion to ship-noise data recorded on a horizontal array deployed on the seafloor in an experiment conducted by FFI in the Barents Sea. A Bayesian matched-field inversion method is employed which quantifies geoacoustic uncertainties and allows for quantitative comparisons of results from different data sets. Estimates of sediment parameters and their uncertainties were obtained by inversions of low-frequency narrowband data from a quiet research ship at source-array ranges of 1-6 km and different orientations with respect to the array, as well as from a merchant ship at ranges of 6-8 km. Multiple, independent data segments are included in the inversion and shown to significantly reduce geoacoustic parameter uncertainties. The effect of the state of prior information on the ship track (e.g., well known or unknown) on geoacoustic information content is also examined. Estimates of the sound-speed profile and density of sediment are compared with results from inversion of data from a towed controlled-source, and with reference values from other geophysical data collected in the area.