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### **Three dimensional geoacoustic inversion on the New Jersey shelf**

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Perturbative inversion, based on a linearized relationship between sound speed in the sediment and modal eigenvalues, is applied to data from the Shallow Water Experiment 2006. Data were collected by towing a low-frequency sound source out and back along radials, spanning a 90 degree angular sector, from a common receiver location. Range-dependent estimates of horizontal wave numbers are obtained along each of the radials using high-resolution signal processing techniques capable of detecting and localizing changes in sub-bottom properties, and that are particularly sensitive to changes in layer structure. Wave number estimates at each range are used in a linearized inversion algorithm to estimate local sediment properties. Locations of the R-reflector and other layering information are used as a priori information in the inversion algorithm. The additional information both constrains the solution of an otherwise ill-posed problem and emphasizes the layered structure of the sediment. These methods have been shown to yield accurate estimates of the sound speed profile deep into the sediment using very few perturbations to the forward model. Combining the local inversion results, a three-dimensional map of sediment sound speed structure is obtained for a 25 km<sup>2</sup> region of the seafloor. [Supported by NDSEG and ONR]