

High-Frequency Acoustic Inversion using a Military Mine-Hunting Sonar

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Abstract: Because the AQS-20's Volume Search Sonar (VSS) contains multiple beams at a number of grazing angles, the NRL Sediment Mapping System can be used to invert the backscattered acoustic signal for seafloor sediment parameters. Backscattering strength is computed for each beam and averaged over several pings. A physical backscatter model that predicts backscattering strength as a function of grazing angle is used with a simulated annealing inversion to find the model parameters. This paper discusses the inversion results using VSS data from a test off the coast of Panama City, Florida. The analysis results include sediment-water density ratio, bottom relief spectral strength (roughness parameter), and a volume interaction parameter. From these model parameters, we estimate mean grain size and root-mean square interface roughness. The sediment-water density ratios from the inversion are compared with the solutions from another NRL bottom classification system using a normal incidence impedance-based inversion technique.