Angular Independent Backscattered Amplitude Imagery of Multi-Beam Echo Sounder for Sediment Boundary Extraction

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Abstracts:

Since 1996, National Oceanographic Research Institute of KOREA have been surveying the territorial sea-bottom around the country using a multi-beam echo sounder (L3 SeaBeam 2112). The purpose of the survey is to collect the bathymetric data of the national territorial sea for the EEZ identification and marine developments.

It has been proven that the the underwater survey using multi-beam echo sounders provides a very new and precise way of describing the morphology and the sediment types of the underwater seabed. Multi-beam echo sounder systems employ sound waves propagating at angles which vary from vertical to nearly horizontal. The width of survey swath of each ping is as several times wide as the water depth. Recent multi-beam echo sounders even provide both a beam by beam depth and backscatter amplitudes of the sea-bottom. However, the usage of the backscattered amplitude data has been limited because they are in general didn't use for identification of bottom properties because backscatter amplitude effects by the many environmental variables of underwater and seabed.

In this paper, we investigate the utilization of geo-referenced backscatter amplitude and analyze the relationship between the backscattered amplitude and the sidescan sonar imagery from SeaBeam 2112. Since the backscattered amplitude imagery mainly represents the properties of sediment, we compute the beam geometry, the time-varying amplifier gain, and the incidence angle to the topography using the bathymetric model at each ping. Finally, the angular independent imagery based on the swath topographic model is described.

Keywords:

Multi-Beam Echo Sounder, Backscattered Amplitude, Sediment Classification