

# MULTIBEAM BACKSCATTER STRENGTH AS A TOOL FOR SEA FLOOR CLASSIFICATION

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Swath bathymetry is widely used by industry and the scientific community for analysing and mapping the sea floor. However, modern multibeam systems also provide signal amplitude information for each beam in addition to the sound travel time.

For this study, the acquired amplitudes were corrected for the transmitted source level, acoustic beam patterns and the transmission loss in the water column. Taking into account the ensonified area and the slope of the sea floor, angular backscatter strength was calculated for each beam. The backscatter strength is affected by the physical properties of the sea floor (for example roughness and density) and therefore links the backscatter strength to sea floor properties. It provides areal coverage compared to analyses based on a few surface samples. Using the spatial distribution of the backscatter strength, changes of the physical properties of the sea floor can be determined. In particular, the spatial validity of surface samples can be evaluated. In contrast, locations for surface sampling can be determined based on a backscatter map.

During the cruise ANTXVII/4 undertaken by the German RV “Polarstern”, a high precision swath bathymetry survey was performed along the European continental margin in the Porcupine Seabight southwest of Ireland. A number of mound structures have been discovered there during earlier studies. These mounds are build up of corals and are known as carbonate mounds. The structure and the genesis of the mounds are analysed within the frame work of the EU project GEOMOUND. This study and subsequent analyses focus on the Belgica mound province.

In this study the backscatter strength has been used to analyse the sea floor in the vicinity of the carbonate mounds and the adjacent channel area. Regions showing equal backscatter characteristics have been combined in order to find the link to the local morphology. Functions showing the dependency between the incidence angle and the backscatter strength help interpreting different backscatter characteristics of the sea floor.

The backscatter map of the mound area indicates clear spatial changes of the backscatter strength. Shallow channels in that area for example show lower backscatter compared to the surroundings. This indicates smooth top sediments within the channel compared to the surroundings. The accumulation of fine sediments can result from active currents in this area. Besides these, high backscatter strength is observed on top of a number of mounds. The appearance of low backscatter on the top of some mounds are observed along with higher backscatter on their slopes. From other investigations it is known that some mounds are populated by corals. The existence of corals on the mounds can be reflected in the backscatter signal of the mounds. These corals could cause lower backscatter strength. Based on this interpretation, the mounds have been classified. An initiation to classify these mounds based on quantitative analyses is the main objective of the ongoing project.