

Evaluation of multifrequency backscatter data for benthic habitat mapping

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Abstract

Acoustic remote sensing is widely used for mapping in the marine environment, with early applications in the disciplines of hydrography, geology, and offshore renewable energies. Despite its increasing use, the ecological validity of acoustic remote sensing methods remains largely uncertain due to the lack of: ground-truth data at comparable scales, robust time-lapse surveys and true independence between ground truth and acoustic data. Although single frequency multibeam echosounder (MBES) systems have dominated acoustic mapping efforts, new ideas are emerging in the acquisition and processing of MBES multifrequency backscatter data for benthic habitat characterization and classifications, inspired by multispectral mapping as used in the terrestrial environment for decades.

This study evaluates the performance of multifrequency backscatter data optimized for benthic habitat mapping in high priority areas of conservation of the Malin Sea, the Sea of the Hebrides and the North Channel. Preliminary results demonstrate that variation in sedimentary and ecological features can be explained by the combined acoustic response at a range of operating frequencies. Acoustic data is ground validated using underwater imagery and physical grab samples to provide detailed information of sediment particle size and better resolve the types of epifaunal assemblages present in the study area. This study provides supportive evidence for the use of multifrequency backscatter data as a tool in the rapid evolving field of benthic habitat mapping to support efforts in planning, conservation and management of Marine Protected Areas.

Key words: acoustic remote sensing, multifrequency, backscatter, habitat mapping