

Automatic benthic mapping using artificial intelligence and transfer learning

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The need to classify and characterize benthic habitats is a core necessity in many scientific fields such as ecology and geology, with applications branching out to a variety of industries, from fisheries to oil and gas, including but not being restricted to seaway management, dredging operations, and many more. As such, we present a machine learning method using geomorphological features applied on 3D point clouds to achieve a finely-grained classification of the substrate of the benthic zone and automatically generate habitat maps.

The methodology presented rests on a supervised classification of each sounding with regards to geomorphometric features computed on multibeam echosounder data and trained using ground-truthing data from Fisheries and Oceans Canada (DFO). We achieve an accuracy of up to 91% to predict benthic substrates. We then generalize the model through transfer learning to aerial lidar data in order to classify ultracoastal zones that are traditionally inaccessible to ships multibeam echosounders, opening the door for more cost-effective and faster surveying methods for problematic areas.

