Predicting the Distribution of Coastal Benthic Communities in Placentia Bay, Newfoundland and Labrador

Shreya Nemani[1]*, Evan Edinger[2], David Cote[3], and Katleen Robert[4]

1. Marine Institute - Memorial University, St. John's, NL, Canada, Shreya.Nemani@mi.mun.ca
2. Memorial University, St. John's, NL, Canada
3. Fisheries and Oceans Canada, St. John's, NL, Canada
4. Marine Institute - Memorial University, St. John's, NL, Canada

Marine ecosystems rely on effective management to conserve biodiversity and ensure the sustainable use of resources during a period of global change. Mapping seafloor habitats is fundamental to management as they delineate distinct regions of the seabed based on their bio-physical properties. Due to limitations in sampling the seabed continuously, the implicit assumption is that the distribution of identified species assemblages can be predicted based on their relationship to physical features of the seabed, which indirectly represent a preference for certain environmental conditions. This study examines the spatial distribution of benthic communities for two coastal sites in Placentia Bay, Newfoundland, identified as a ecologically and biologically significant area (EBSA). Spatially-continuous variables describing the physical characteristics of the seabed are composed of acoustic data (bathymetry and backscatter) at 10m resolution and their derived geomorphological attributes including slope, aspect, bathymetric position index, curvature, and backscatter textural features describing measures of seabed roughness. Using a multiple scales approach, these layers range from 10m-210m to recognize the scale-dependent patterns at which organisms select habitats. Ground truthing samples using a drop camera were used to extract information on species occurrence and identify the dominant species assemblages from underwater videos which resulted in five distinct habitat classes. Random forest classification was used to model the response of each class against the terrain variables to produce full-coverage habitat maps. Depth, slope, and textural features at broader scales of 70-90m were the most influential factors affecting the distribution of habitats, and higher diversity was observed in habitats with coarser substrates likely due to substrate heterogeneity. The use of geomorphological attributes and textural indices for the classification of seafloor habitat is important to improve our baseline understanding on the spatial distribution of coastal-benthic communities which are expected to undergo variations due to global change.

Conference themes: My project addresses ecosystem health and monitoring, and ocean mapping initiatives in marine geomatics.

- Author's biographical information (no more than 150 words):

Shreya Nemani is a MSc student in the geography department at Memorial University, involved in a baseline study to characterize benthic habitats for select coastal sites in Placentia Bay, NL, Canada. This project is in collaboration between the 4D Oceans lab at the Marine Institute, Memorial University and Fisheries and Oceans Canada.