

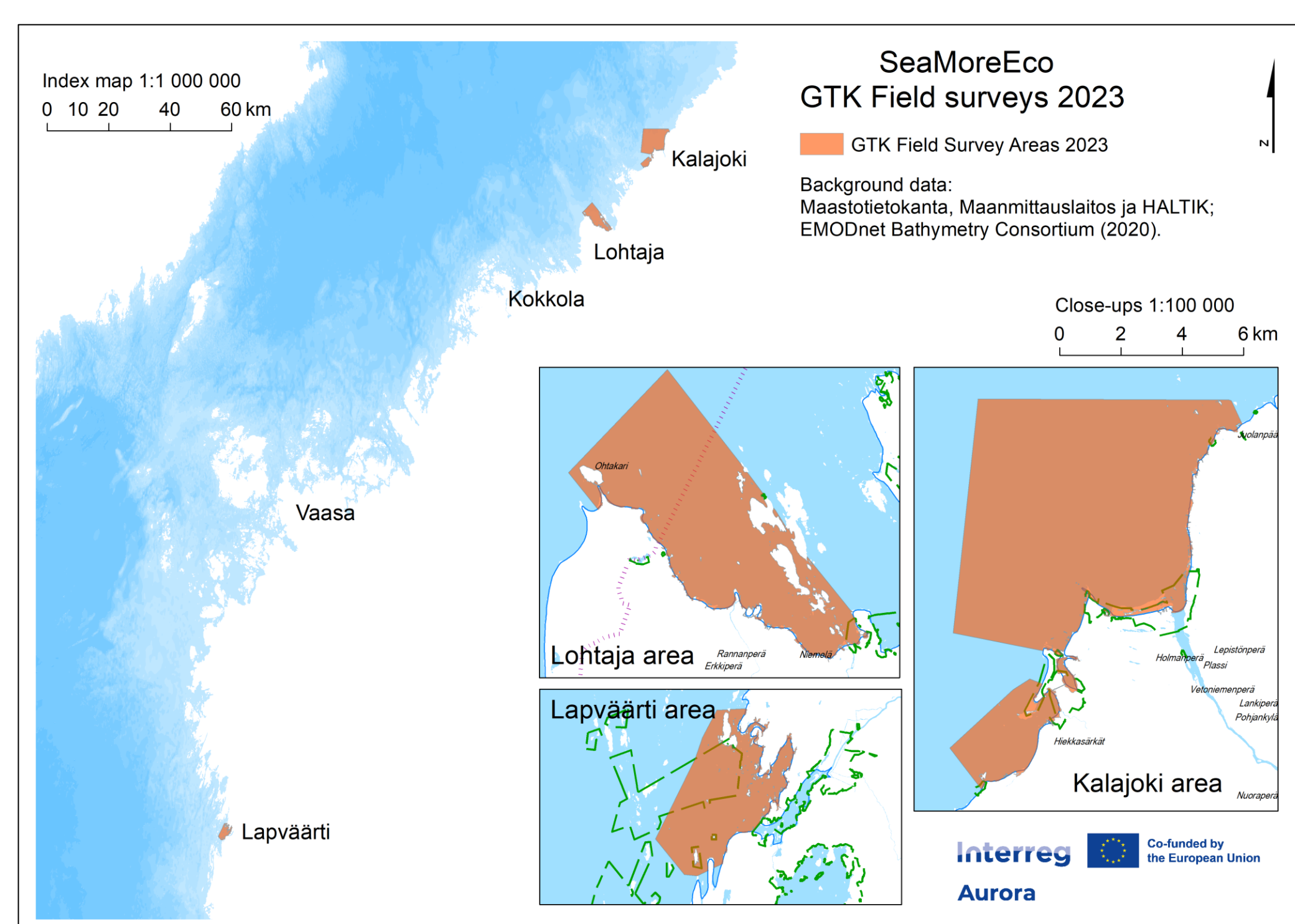
Survey of seabed geoenvironments in shallow coastal area in the Gulf of Bothnia



Introduction

Less than 30% of Finnish marine areas have been formally mapped geologically and knowledge gaps are substantial, especially in the shallow water settings. Coastal infrastructure construction and other human activities are causing pressure on sensitive coastal environments. Mapping these areas is thus essential for coastal zone management and for mitigating the impact of anthropogenic activities. Geological knowledge provides a firm basis for protecting ecosystems and ensuring sustainable construction.

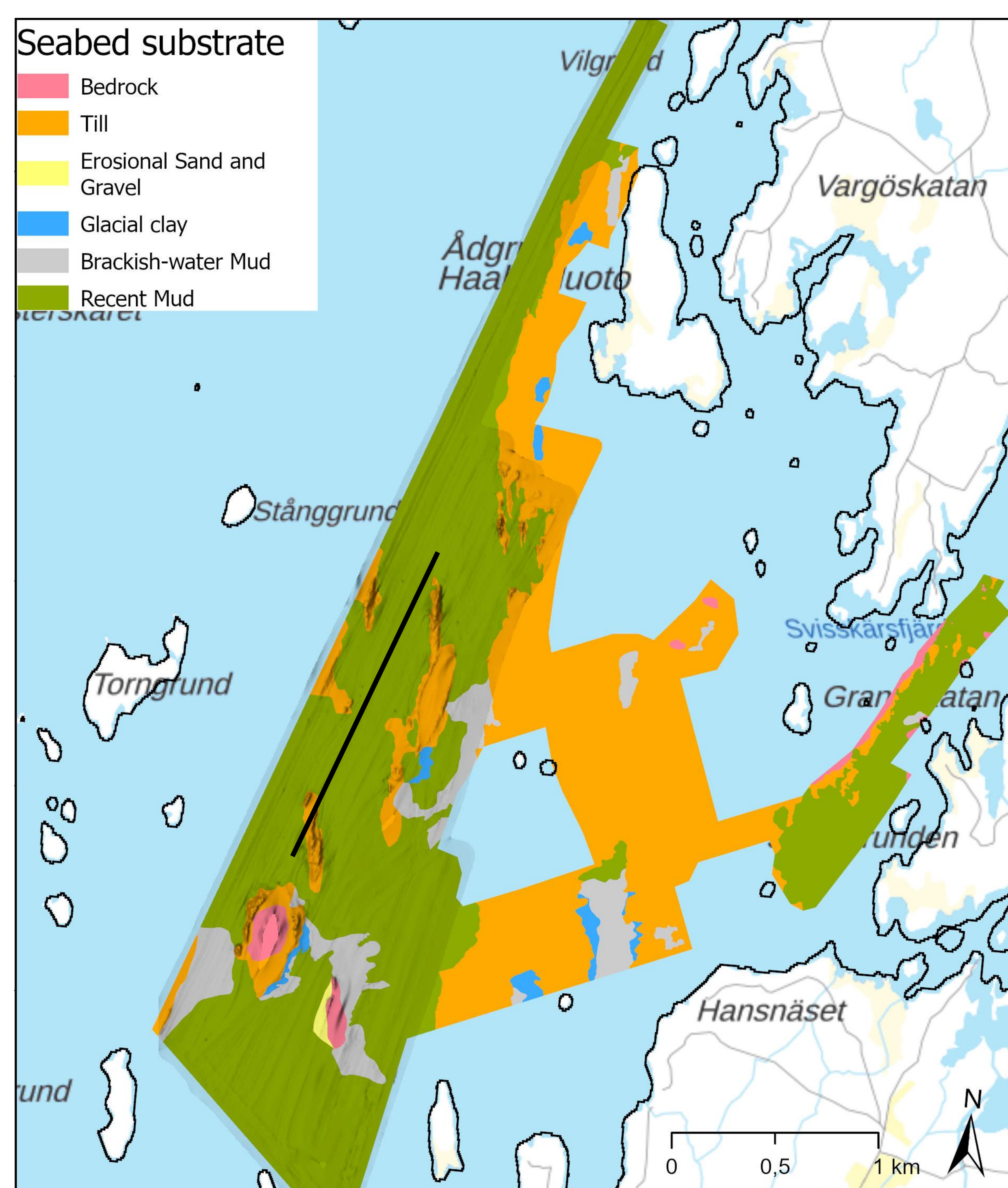
This study investigates the seabed geoenvironments in shallow coastal regions adjacent to river estuaries along the eastern coast of the Gulf of Bothnia. Investigations are conducted from shore up to 15-meter water depth. The aim is to interpret the seabed structure and explore erosional environments and to identify the key factors affecting them. Data on seafloor characteristics and bathymetry are gathered employing acoustic-seismic derived shipborne methods. Additionally, sediment samples were collected and ^{137}Cs activity was used to estimate sedimentation rates in the estuaries.



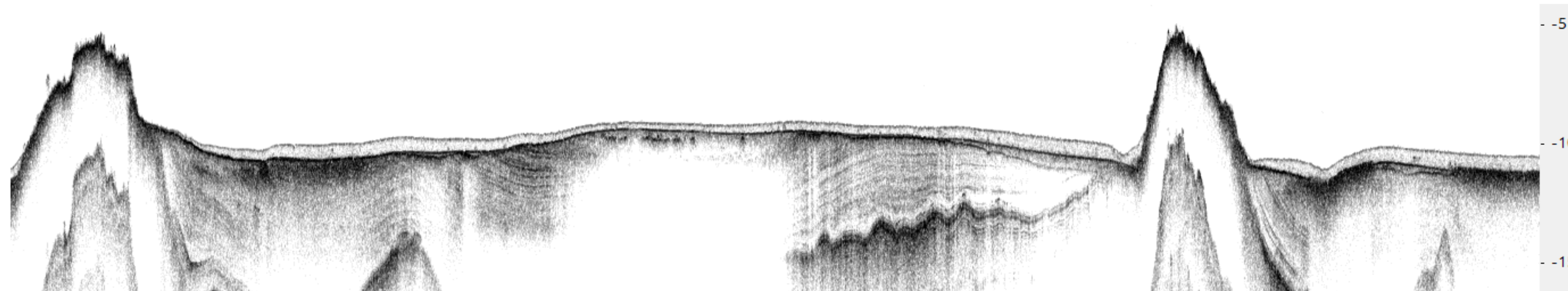
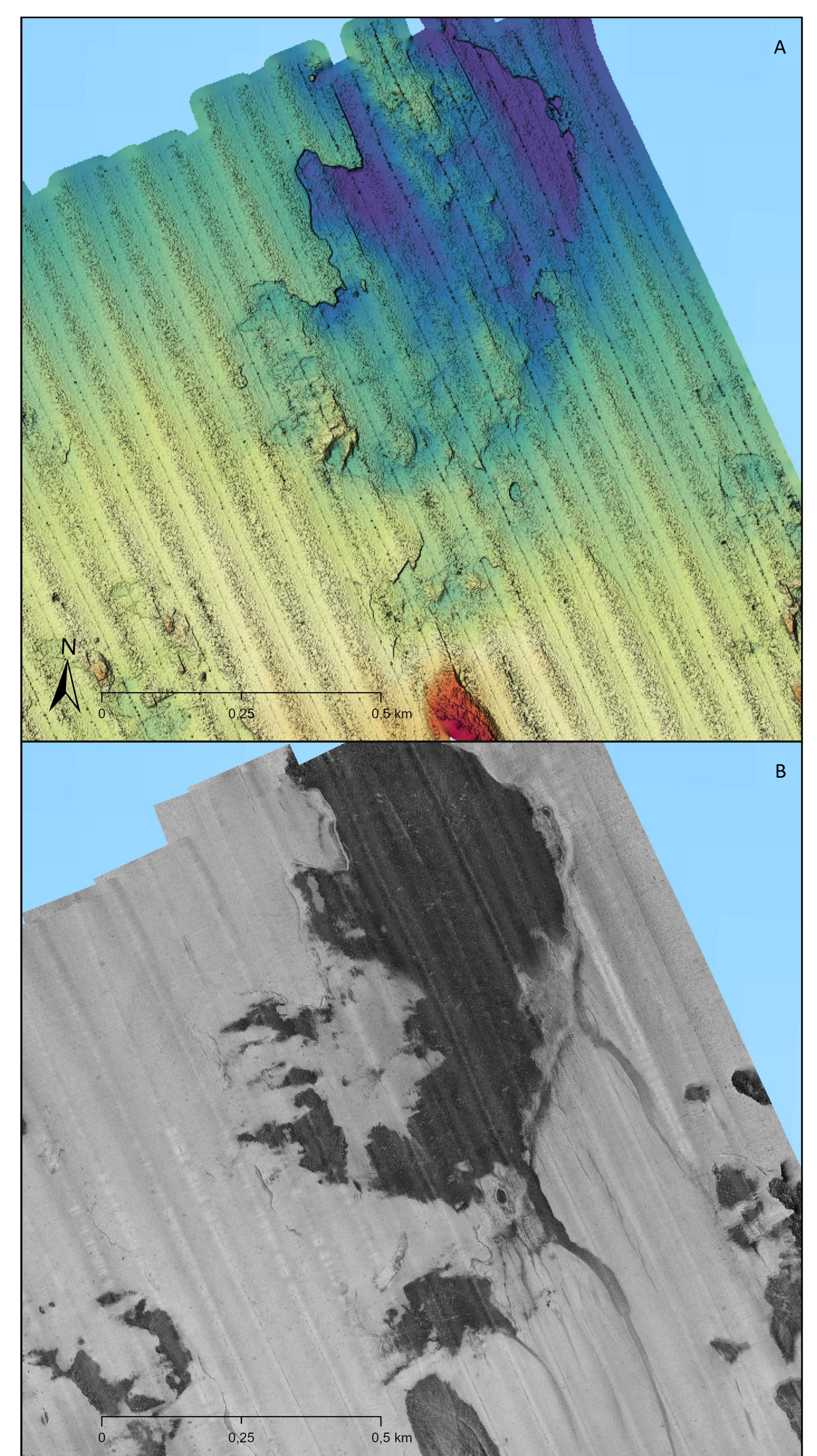
Results

Preliminary findings reveal variations among the study areas. In the northernmost region the data confirms that the geomorphological features, such as eskers, seen on land extend on to the seabed. However, the features are strongly eroded, and the uppermost seabed substrate predominantly consists of erosional secondary sand. Erosional features suggest dynamic environmental conditions, likely influenced by wave action and sea ice. In contrast, more sheltered areas exhibit softer sediments, including thick mud layers indicative of active sediment accumulation. These soft sediments, coupled with shallow depths and sheltered conditions, emerge as potential habitats for dense vegetation.

The Seabed substrate map was created using ArcGIS Pro software, utilizing acoustic-seismic sounding profiles with different frequencies. The Lapväärti area is a sheltered estuary where the sedimentation rate averages 0.54 cm/year. In the Chirp profile, the uppermost transparent layer represents mud recently deposited under calm conditions. The seabed substrate map also shows that mud (in green) is the predominant surface substrate type in the area. The profile below is marked in black on the map.



The erosional features in Lohtaja area can be seen in the multibeam data (A) and also in the sidescan mosaics (B).



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