A GIS Approach for Reconstructing the Litorina Sea Lagoon in Tolkuse-Rannametsa Area, Eastern Gulf of Riga.

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The eastern coast of the Gulf of Riga in the NE Baltic Sea is characterized by slow post-glacial isostatic uplift (about 1mm/yr) and slowly undulating low topography. Therefore even small increases in sea-level can easily lead to the flooding of considerable areas. The complex deglaciation history of the Baltic Sea area left, at times, south western Estonia submerged, while at other times, it emerged as terrestrial land. Different transgressive and regressive development stages of the Baltic Sea did not only shape the landscape, but also influenced the locations of the Stone Age settlements which were closely bound to the coastal areas which also include estuaries and lagoonal systems. The coastal region of the Gulf of Riga is abundant in Meso- and Neolithic settlement sites.

The present study combines LiDAR, ground-penetrating radar (GPR) and geological data to reconstruct development of the Litorina Sea lagoon in Tolkuse-Rannametsa area and to create prognostic palaeogeographic maps in order to search for Meso- and Neolithic coastal settlement sites. Over 47 km of GPR profiling was done; sediments were described and dated in 37 cores two riverbank outcrops. Diatoms were analysed in the master core.

A semi-automatic method for the removal of modern anthropogenic features from LiDAR derived digital elevation model (DEM) was developed, tested and used. In modelling process the impact of sedimentary processes subsequent to the time being modelled was taken into account by employing a backstripping methodology. The differential glacio-isostatic uplift within the study area was taken into account by using interpolated water-level surfaces.

Palaeogeographic reconstructions shed new light into region's post-glacial coastal evolution and enabled us to suggest the possible locations of the Stone Age settlements with some of the proposed areas buried under up to 3 m thick peat layer. The results of the current study provide new chronological and shore displacement data, contributing to earlier knowledge of the water-level change and palaeoenvironmental history of the Baltic Sea.