

Postglacial development of the eastern Gulf of Finland: from Pleistocene glacial lake basins to Holocene lagoon systems

Daria Ryabchuk (1,2), Alexander Sergeev (1), Aarno Kotilainen (3), Outi Hyttinen (4), Andrey Grigoriev (1), Dmitry Gerasimov (5), Mikhail Anisimov (1), Tatiana Gusentsova (6), Vladimir Zhamoida (1), Aleksey Amantov (1), and Leonid Budanov (1)

(1) A.P.Karpinsky Russian Geological Research Institute, Marine and Environmental Geology, St.Petersburg, Russian Federation (Daria_Ryabchuk@mail.ru), (2) St.Petersburg State University, Russia, (3) Geological Survey of Finland (GTK), Espoo, Finland, (4) University of Helsinki, Department of Geosciences and Geography, Finland, (5) Institute of Anthropology and Ethnography RAS, St. Petersburg, Russia, (6) North-West Institute of Natural and Cultural Heritage, Russia, St.Petersburg

Despite significant amount of data, there are still lots of debatable questions and unsolved problems concerning postglacial geological history of the Eastern Gulf of Finland, the Baltic Sea. Among these problems are: 1) locations of the end moraine and glacio-fluvial deposits; 2) time and genesis of the large accretion forms (spits, bars, dunes); 3) basinwide correlations of transgression/regression culminations with the other parts of the Baltic Sea basin; 4) study of salinity, timing, frequency and intensity of Holocene saline water inflows and their links of sedimentation processes associated with climate change. Aiming to receive new data about regional postglacial development, the GIS analyses of bottom relief and available geological and geophysical data was undertaken, the maps of preQuaternary relief, moraine and Late Pleistocene surfaces, glacial moraine and Holocene sediments thicknesses were compiled. High-resolution sediment proxy study of several cores, taken from eastern Gulf of Finland bottom, allows to study grain-size distribution and geochemical features of glacial lake and Holocene sediments, to reveal sedimentation rates and paleoenvironment features of postglacial basins. Interdisciplinary geoarcheological approaches offer new opportunities for studying the region's geological history and paleogeography. Based on proxy marine geological and coastal geoarcheological studies (e.g. off-shore acoustic survey, side-scan profiling and sediment sampling, on-shore ground-penetrating radar (GPR SIR 2000), leveling, drilling, grain-size analyses and radiocarbon dating and archeological research) detailed paleogeographical reconstruction for three micro-regions – Sestroretsky and Lahta Lowlands, Narva-Luga Klint Bay and Southern Ladoga – were compiled. As a result, new high resolution models of Holocene geological development of the Eastern Gulf of Finland were received. Model calibration and verification used results from proxy geoarcheological research of the reported project. Results of archeological studies helped to reconstruct paleoenvironment of the Holocene coastal zone and to date the “barren” geological formations, e.g. coastal accretion bodies. On the other hand, based on predictive geological and geomorphological models of the coastal systems formation, during archeological expeditions several new sites of Neolithic – Early Metal Epoch were found (Sosnovaya Gora-1, Kuzemkino 2-6). Research was supported by RFBR projects 13-06-00548, 14-05-91763, 15-05-08169, and 15-06-05548, and Academy of Finland CISU project.