

LENA DELTA WATER BODY MAPPING BASED ON RAPIDEYE SATELLITE IMAGE SERIES FOR DETERMINATION OF LAKE LEVEL HEIGHTS AND DELTA CHANNEL INCLINATION USING ALTIMETRY AND DEM DATA

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Past and present climate changes lead to a significant impact on dynamics of periglacial landscapes in Eastern Siberia. Thermokarst and polygonal lakes, ponds, watercourses and swamps are the inherent part of landscapes and primarily are subject to thermokarst and thermal erosion processes. The main objectives of master thesis are mapping of lakes and watercourses in the Lena Delta and adjacent Bykovsky Peninsula with subsequent determination of the height of the water's edge of these objects.

This region of interest is a notable as it is the largest arctic delta with its complicated geomorphological structure represented with three different in origin, structure and age main terraces. Such structure distinguishes the Lena Delta from other subarctic rivers deltas.

The study based on complex combination of Remote Sensing methods, GIS handling and statistical calculations. As initial data for the mapping of water bodies were used sets of high-resolution images acquired by two satellite surveying systems RapidEye and SENTINEL-2. To determine the height values of lakes was used TanDEM-X (TDX) digital elevation model. Received results were checked and compared with collected by GLAS laser altimetry data that was aboard ICESat satellite observing mission.

Statistical and visual analysis based on obtained map of lakes, watercourses of Lena Delta with area more than 100 m² and Bykovsky Peninsula and the height of the water's edge of these objects allows differentiating terraces by limnicity and reflects differences in plane and altitude characteristics of lakes in different terraces. On the other hand, some generic features of the region were highlighted. Distribution of lakes and its areas by terraces demonstrated similarity with the results obtained in previous studies. However using of high-resolution satellite imagery in this work allowed to take into account the influence of small lakes and consequently increased the detail of the map. Comparing the lake heights based on digital elevation model with averaged data of laser altimetry showed a correlation close to unity.