

Recent glacier area changes in the East Sayan Range, interior of Siberia, derived from Landsat TM/ETM+ based inventories

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Mountain glaciers are considered to be reliable indicators of climate and multi-temporal monitoring allows to quantify the relationships between glaciation and climate. However, changes of small glaciers (with area < 1 km²) were studied in a less degree. We studied glaciers of the East Sayan, a mountain range (with altitudes up to 3491 m) stretching over 1000 km from north-west to south-east (in Russia and partially in Mongolia). The studied glaciers are in peculiar continental climate environments which could affect the recent glacial evolution. The last East Sayan glacier inventory (as a part of the Catalogue of Glaciers of the USSR) was mainly based on aerial photographs of the 1950s. Using Landsat TM/ETM+ scenes we obtained GIS-based multi-temporal glacier inventory covering the time interval from 1980s to 2000s. The 2000 glacier inventory included about 80 glaciers with a total area of 11.69 km². The East Sayan is dominated by extremely small glaciers, with exposed areas ranged from 0.001 to 1.392 km². About 40 glaciers have an area < 0.1 km² and the only glacier is > 1.0 km². In addition, we reconstructed the maximal glacier limits during the Little Ice Age (LIA, ~ 1850) using numerous end moraines located in front of modern glaciers. The total ice area has decreased from 24.8 km² in 1850 to 10.9 km² in 2000, thus, by 13.9 km² or 56%. We found that the mean value of relative ice changes and their scatter increase towards smaller glaciers. This study was supported by the Russian Foundation for Basic Research (project No. 15-05-04525).