



Mass balance assessment of Austre Grønfjordbreen glacier using a complex of glaciological, physico-mathematical and remote methods

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The glaciers of the Arctic archipelago Svalbard undergo an increase in average summer temperature and duration of melt period along with the impact of early summer and late autumn rainfalls. Due to the recent warming Svalbard glaciers significantly contribute to sea level rise outside of Greenland and Antarctica.

Recent efforts by the Institute of Geography RAS have been aimed at establishing mass balance observation at Austre Grønfjordbreen (7,6 km²) located 16 km south of Barentsburg.

We analyze the mass balance on Austre Grønfjordbreen glacier over the 1985–2017 period. Annual glacier mass balances were quantified on the basis of biannual glaciological measurements using the network of 21 ablation stakes. Overall, the glacier has been in a permanent state of negative mass balance (cumulative mass balance 2012-2016: -6574 mm w.e.). Remarkably a total absence of accumulation area has been registered in recent years.

We apply spatially distributed model A-MELT (Rets et al., 2012) using all available glaciological and meteorological measurements and energy balance determination according to spatial grid. The snow line level has been reconstructed using all available satellite images from 1985 to 2017.

The obtained mass balance gradients are compared with the results of temperature-index simulations and geodetic mass balance changes in 1990-2015 and recent Arctic DEM data.