



Moisture sources and synoptic conditions of summer precipitation in the glacial zone of the East Sayan Range

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Glaciers as important components of mountain landscapes regulate the river flow regime, used for recreation and are associated with various natural hazards for human activities. Precipitation is an important part of the mass balance in high-mountain glacialized basins. It influences the formation of snow cover, accumulation and ablation (in the case of summer snowfalls). Precipitation in the mountains is characterized by a strong heterogeneity due to the complex interaction between atmospheric circulation and steep topography. However, extremely rare network of high-mountain stations hampers the adequate high resolution regional climate modeling. Therefore, obtaining new observation data directly on the glaciers is an important task.

The purpose of the research was the direct measuring of precipitation in the glacial basin of the East Sayan Range (south East Siberia, up to 3500 m a.s.l.) and the studying of the main atmospheric circulation patterns related to precipitation events. The measurements were conducted on the valley glacier No. 18 (Peak Topografov massif, East Sayan Range, 52.5°N, 98.8°E) during the three summer seasons of 2015-2017. Precipitation was continuously measured using an automatic weather station installed in the middle part of the glacier at the elevation of 2550 m a.s.l. We compared the data obtained on the glacier with that from the nearest low-elevation weather station as well as with reanalysis data (ECMWF and NCEP/NCAR products) and found a good correlation. The synoptic patterns of precipitation were analyzed using surface and baric topography maps at standard levels. To establish the sources of the atmospheric moisture we used the HYSPLIT trajectory model of NOAA. The summer precipitation (at least 70% of annual precipitation falls in June-August) is mainly associated with cyclones passing from west, north-west and south. We also investigated the statistical relationships between precipitation in the East Sayan mountains and the cyclone frequency and global/regional indices of atmospheric circulation.

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