Geophysical Research Abstracts
Vol. 18, EGU2016-5594, 2016
EGU General Assembly 2016

Mass balance and surface velocity reconstructions of two reference Caucasus glaciers

Oleg Rybak (1,2,3), Mariia Kaminskaia (4), Stanislav Kutuzov (5), Ivan Lavrentiev (5), Polina Morozova (5), Victor Popovnin (4), and Elena Rybak (2)

(1) Institute of Natural and Technical Systems, Sochi, Russia, (2) Scientific Research Center, Russian Academy of Sciences, Sochi, Russia, (3) Earth System Sciences & Departement Geografie, Vrije Universiteit Brussel, Brussels, Belgium, (4) Department of Geography, Lomonosov Moscow State University, Moscow, Russia, (5) Institute of Geography, Russian Academy of Sciences, Moscow, Russia

Total glacial volume of the Greater Caucasus exceeds 40 cubic km and its area exceeds 1 thousand square km. During the 20th century, mountain glaciers at the Greater Caucasus were continuously degrading. According to various estimates, their area reduced more than one-third and their volume almost by half. The process of degradation was accompanied by growing population and economical development on surrounding territories. In the 21st century under proceeding global warming, a tendency of shrinking of area and volume of glaciation is obviously expected to continue. Working out of strategy of sustainable economic development of the region is the main motivation for elaboration of predictions of glaciers' evolution in the changing environment. Growing demand of fresh water is the basic challenge for the local economy, and efficient planning of water resources is impossible without knowing future state of glaciation.

Therefore our research aims at obtaining accurate evaluation of probable future change of the most prominent mountain glaciers of the Greater Caucasus in forthcoming decades and at studying impacts of changing characteristics of glaciation on the run-off in the area. Initially, we focus on two so-called reference glaciers – Marukh (Western Caucasus) and Djankuat (Central Caucasus). Intensive field observations on both of them have been conducted during the last half of the century and essential amount of detailed relevant information has been collected on their geometry change and on mass balance. Besides, meteorological measurements were episodically carried out directly on the glaciers providing enough data for correlation of the local weather conditions with the data from the closest meteorological stations. That is why studying of response of Marukh and Djankuat on the environmental change can be accurately verified, which is crucial for understanding mechanisms driving evolution of large glaciated area in the Caucasus. As the instrument of research, we employ a 3D higher order ice flow model coupled with an energy balance model. Both models were calibrated and validated using observational data. Test on prediction of glaciers' change until the end of the 21st century is carried out using climate change simulated by a GCM coupled with a regional climate model and employing a procedure of statistical downscaling.