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Changes of Glaciation and Their Probable Impact on Water Resources in Central Asia

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In the Central Asia the main limiting factor of sustainable development is increasing water shortage. Even now the overwhelming part of territory of Kazakhstan and the adjacent countries of Central Asia are characterized by a condition of the strongest water stress. Fresh water deficiency is, to this or that extent, observed practically on all the territory of Central Asia and transboundary character of the main rivers is one of the main risk factors for sustainable development of national economy of the countries in this region.
For the last 20 years a great number of scientific publications appeared in which their authors express an increasingly serious fears about significant reduction of water resources in the arid regions of the world as a reaction to global warming. One of the arguments substantiating such forecasts is the indisputable fact of a continuous intensive degradation of glaciers.
Predominating opinion about the inevitability of glaciers disappearance in Central Asia Mountains cannot be accepted as an axiom. Taking into account stability in the sum of precipitation and especially in the snow resources, one can suppose that glaciers in this region will not disappear during this century.
Despite the reduction of glaciers, annual runoff volumes and runoff distribution within a year remained unchanged during the last decades. During the same period, norms of atmospheric precipitation and maximum snow-water storage in the zone of runoff formation remained stable. All these suggest the existence of a certain compensation mechanism. Research, based on data analysis of repeated photogrammetric surveys of a group of glaciers and temperature regime of permafrost in Zailiyskiy Alatau range (Northern Tien Shan), suggests that such mechanism can be more and more significant (with climate warming) participation of melting waters of underground ice (buried glaciers, rock glaciers, permafrost) in runoff formation.
During last decade the Global Climate system developed in direction of cooling, not warming. It's very clear reflects in change in state of the mountain's glaciation. This rate calculated on the basis of comparative analyses of the data of unified glaciers inventories composed for years 1955, 1979, 1990, 2000, and 2008. The maximum rate of glaciers area reduction in Northern Tien Shan is observed during 1970s and after that during period from middle 1980s to 2008 it significant decreased. In our days this rate is lesser than in middle 1950s. Changes in state of climate was clear reflects in state of perennial permafrost. The ground temperature in perennial permafrost layer in Northern Tien Shan (on the depth of 15m on elevation 3400 a.s.l.) during period from 1974 to 1995 was increased by 0.5-0.6. But after that this process of ground warming was stopped and temperature of above perennial permafrost layer during last 12 years was remain stable about minus 0.2°C.
According to the results of research, dispute on continue reduction of glaciation is no reasons to expect significant shortage of regional water resources in Central Asia at least up to coming decades.