



Recent development of glacier complex Adygine and resulting risks

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Glacier complex Adygine (3,400-4,200 m asl) is situated on the northern flank of the Kyrgyz Range, Tien Shan, Kyrgyzstan. The valley downstream is part of National Park Ala Archa, which is popular with tourists, and is heading towards the country's capital – Bishkek.

At the study site there is a glacier which is observed since 1960's. The glacier has been monitored by satellite imagery and in last 10 years by on-site geodetic measurement as well. Due to glacier shrinkage several glacial lakes of different genetic types (moraine-dammed, moraine- and rock-dammed, termokarst) have appeared at the site. Nowadays, the lakes are situated on three levels in front of the glacier's terminus and form a cascade, they are also hydrologically connected. The lakes were subjected to detailed bathymetric measurement and some parts of the dams were surveyed by geophysical methods. Especially the newest lakes in proximity of the terminus has been undergoing dynamic changes and may pose a threat in the near future.

The risks arising together with changing climatic conditions and retreat of the glacier are associated with mainly three of the lakes. The largest one with area of 3.2 ha is dammed by a rock step overlaid by a moraine. Geophysical research of the dam revealed buried ice and seepage channels in its western part. It is the capacity of these subsurface channels, which are draining the lake throughout the year that represents a weak point in terms of dam stability. The second lake, a termokarst one, is a similar case but drained solely by subsurface channels. Very steep slopes of the lake basin are covered with loose material which could slide down and block the drainage channels. The lake would then fill all the basin (approx. 50,000 m³) very quickly as it is supplied with water from the large upper lake. The third lake is in contact with glacier terminus and has been enlarging substantially in last years. In case of outburst, this lake would drain to the mentioned termokarst lake.

The valley beneath this complex was mapped by geodetic station and this data should serve as a base for flood modelling which is being prepared. Large amount of loose material (older part of moraine) is available on the valley floor and would be entrained by the flow. Therefore there is a possibility that the flood could be transformed into a debris flow.