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The principle task for the Russian Antarctic Expedition (RAE) as well as for all logistic organizations, which work in Antarctica, is related to the safety of personal, vehicles and aviation. The most important point is connected with applied investigations near the stations, field bases and along the glacier routes, including ice and snow-strip. RAE pays special attention to the safety issues. For this reason, since 2012 multidisciplinary investigations, including GPR, have been performed in the area of Russian stations Progress and Mirny (East Antarctica). These works were focused on to study crevasses, especially their revealing, studying and future evaluation. For solution of this complicated practical and scientific problem GPR technique is believed to be the most reliable geophysical method. Some works based on this methodology were accomplished in the area of stations Progress and Mirny and, in addition, in Banger Hills oasis in the period of 63 and 64 RAE (2017-2019). The research was focused on safety arrangements for using the snow-strip, which was built nearby the Mirny Station in the area of crevasses. Moreover, it was related to finding the reliable place for the new snow-strip. In Progress Station our investigations were connected with searching of a new way on Dålk Glacier around the dip that was formed due to the outburst of the intraglacial lake. This depression destroyed the route between the station, the aerodrome and start point of the logistic traverse of the Vostok Station. Geophysical works in the Banger Hills were carried out in 2019 in order to find the reliable place for new airfield.

The role of avalanches in the restoration of the Kolka glacier

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The object of study - the Kolka Glacier - is located on the side ridge of the Central Caucasus. The glacier is known for its catastrophic events — large-scale moves and glacial landslides. This glaciological object can also be considered unique due to the fact that despite the general degradation of the Caucasus glaciation, the Kolka glacier is rapidly gaining mass. Due to the rapid recovery of the glacier, the repetition of previous catastrophic events is possible, and that is why it is necessary to constantly monitor its condition. It's safe to assume that such rapid rates of recovery occur due to the significant share of avalanche feeding that the glacier receives from the steep rock framing of the town of Dzhimaray-Khokh.

Currently, there are techniques to assess the role of avalanche nutrition, one of them being a two-dimensional RAMMS model, created on the basis of the one-dimensional hydraulic Velmi-Salm model. This model allows us to simulate the movement of the avalanche flow in a three-dimensional relief.

This work's purpose consists in evaluation of the role of avalanche feeding on the Kolka glacier. The tasks that were performed in the course of the work were to isolate avalanche foci on the rocky frame of the glacier, identify zones with different friction coefficients, and simulate avalanche flows via RAMMS model in three-dimensional relief conditions. The result of this work is the avalanche deposits distribution pattern on the Kolka glacier and the boundary comparison of the sediments with their previous distribution estimate.

Glacial lakes inventory in Central Caucasus (2017-2018)

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At present, the rapid retreat of glaciers in the Central Caucasus plays an important role in the formation of glacial lakes and glacier lake outburst flood (GLOF). It is important to make a periodical inventory high-altitude reservoirs, but due to the inaccessibility of mountain regions, it is not always possible to conduct route studies. Remote monitoring based on satellite imagery data can help solve such problems.

The inventory of the glacier lakes of the Central Caucasus was carried out on the basis of Sentinel-2A/2B satellite images for the period from August to October 2018 and SPOT-6 for August and September 2017. The data on the altitude of the water levels in the lakes are obtained on the basis of two digital elevation models (DEM): ASTER GDEM and DEM, based on the stereo pair of SPOT-6 images.

Based on the results of automated and visual interpretation, the contour of 105 lakes was identified. Reservoirs are located at absolute altitudes from 1320 to 3890 m. The total area of the lakes is estimated at approximately 1 km^2. The average area of one lake is about 10 thousand m^2. The lake, whose water surface area does not exceed 1 thousand m^2, can be considered safe even in case of a breakthrough. However, if such a lake is located in a cascade of other water bodies, in the event of a breakthrough it is possible to sum up the water components and increase the volume of the resulting flood.

According to the methodology, the total volume of all high-mountainous reservoirs in the region is estimated to be 6000 thousand m^3. The average value of the volume of water is estimated at about 60 thousand m^3. According to the