

DEBRIS FLOW ALARM SYSTEM KAZBEGI, GEORGIA



WEBCAM



LEVEL MEASUREMENT



NOTIFICATION

The comprehensive system monitors the Devdoraki glacier on Mt Kazbek in the Russian-Georgian border region. In the event of an incident, the border police is automatically informed and closes the busy road between Russia and Georgia.





Title Page: The large debris deposits from the last debris flows are still visible near the road and the power plant.

Figure 1: The results of the measuring sensors of the upper and lower station are sent by radio to the border police and by SMS to other authorities. This ensures that the road is closed off early in case of debris flow danger.

CHALLENGE

On May 17th, 2014 an ice avalanche coming off the Devdoraki Glacier on Mt Kazbek (5033m) triggered an enormous debris flow with a volume of several million cubic meters. The debris covered the road that serves as an important connection between Russia and Georgia, killing several people and damaging a power plant and the border control station. In the same year, two rainfall triggered debris flows did more damage to the same area.

On behalf of Georgia’s National Environmental Agency and in cooperation with experts at our partner company Geotest, we developed and installed an early warning system for the Kazbek debris flow.

SOLUTION

The overall system acts as alarm system for debris flows with automatic road closure in the valley as well as monitoring system for the hanging glacier at Mt Kazbek. The system design includes two measurement stations: the glacier monitoring site further up the mountain and the debris flow detection station at the channel.

The lower station consists of two gauge radars and two trigger lines. The radars are used as primary sensors to detect a debris flow and the trigger lines serve as redundant units. Whereas the radars detect a debris flow by an abrupt rise of the river level, the trigger lines pull out during the

passage of a sufficiently large debris flow. Both technologies automatically alert the border police via radio to close the road. In addition, SMS are sent to the local authorities.

The upper station serves the monitoring of the Devdoraki glacier and the initiation area of the 2014 ice avalanche. The autonomous camera station provides regularly updated pictures directly to the Geoprevent online data portal. These images allow glaciologists and natural hazard experts to track glacier changes daily and identify changes on the mountain early.

All measured values and image files are regularly uploaded to the password-protected data portal, where authorised users can access the data at any time and gain an overview of the situation on site. This automatic debris flow alarm system enables the border police to close the busy road between Russia and Georgia with sufficient advance warning and ensure overall road safety at all times.

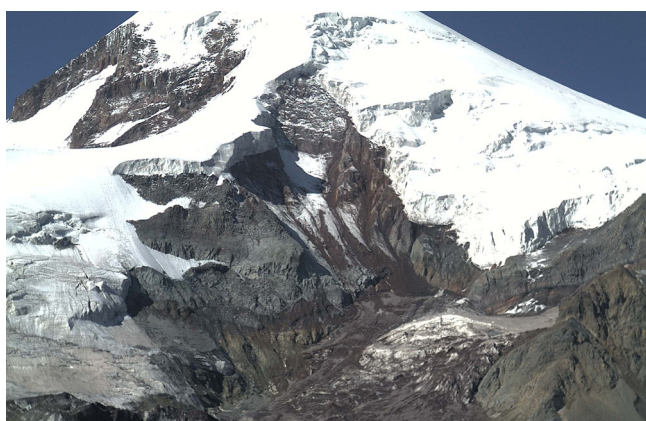


Figure 2: The Devdoraki Glacier at Mt Kazbek is monitored by webcams.

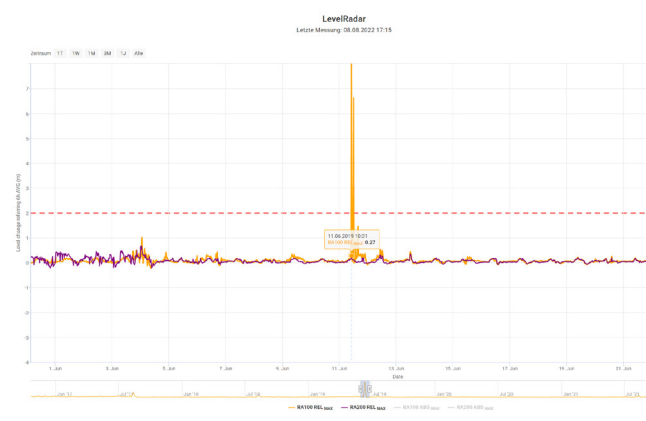


Figure 3: All measurement series of the sensors are clearly displayed in the online data portal.