

ROCKFALL MONITORING PREONZO



GEORADAR



CLIFF MEASUREMENT



DATA PORTAL

Detailed monitoring and analysis of rock movements by interferometric radar before large rockfall in Preonzo.





Title Page: Rock above Preonzo.

Figure 1: On 15 May, approx. 220,000 m³ of rock debris fell down into the valley.

CHALLENGE

The area around the Roscera Alp above Preonzo (TI) in southern Switzerland has been known to geologists as unstable since decades. The canton Ticino had crack meters placed at cracks visible on the alp and laser distance measurements had been carried out from the valley below. Geoprevent has also had the chance previously to measure the deformations with the interferometric radar on three occasions in 2011. In April 2012, an increase in rock mass movement was detected - an indication of an imminent rockfall event?

SOLUTION

An interferometric radar was installed at the valley floor at a distance of approx. 2 km, providing detailed and weather-independent monitoring of the moving rock mass. This radar allows for high-resolution scans of the rock wall with millimeter precision at a safe distance. On May 1, the station was fully operational and transmitting live data to the internet with less than 15 minutes delay. Local authorities could thus constantly integrate the latest data into their decisions. Initially, the rock mass moved at 1mm/h but the speed increased threefold after heavy precipitation on May 6/7.

The widespread movement continued throughout the next week, constantly creeping with 4 mm/h until May 13, when accelerations increased dramatically. Analyses predicted the rockfall event to occur late night May 14 to May 15 during the day. These analyses were also automated and provided as live data to local authorities. They evacuated the run-out zone and closed off the cantonal road.

In the early hours of May 15, approx. 220,000 m³ of rock plunged down the valley for several hours and fortunately did not cause any damage. However, half of the potentially unstable material had remained at the top. Were further events to be expected? How extensive were movements after the first part of the landslide? Since most of the originally mounted monitoring equipment had been destroyed during the event, the interferometric radar had to deliver the answers. We could give an all-clear few hours after the main fall. Some parts of the rupture zone were still moving, but were coming to a halt fast. Secondary rockfall was not to be expected, our work was completed.

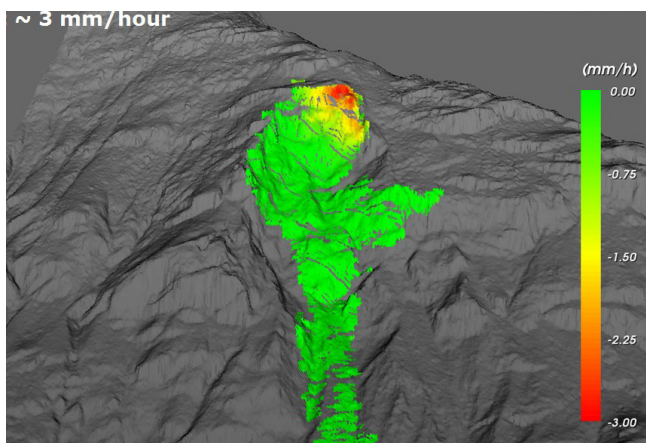


Figure 2: Georadar view: The moving rock mass contains an area of 100 x 200 m.



Figure 3: The interferometric radar is located at a distance of approximately 2 km.