

ROCKFALL GURTNELLEN



GEORADAR



CLEFT MEASUREMENTS



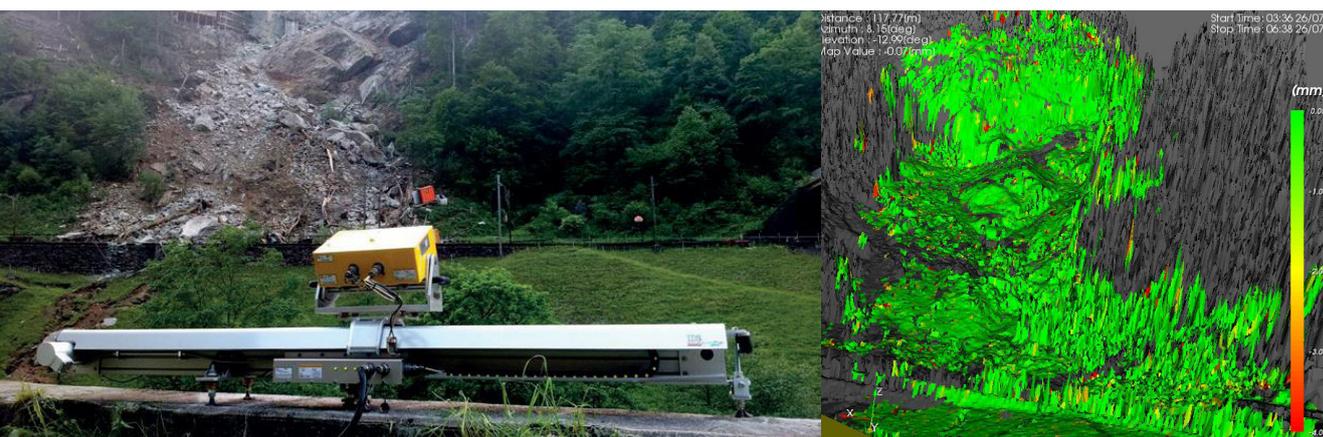
ALERTING

Rock monitoring system with georadar and various cleft measurement devices after large rockfall event affecting the main North-South route of the Swiss Federal Railway near Gurtellen.



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After the rockfall, the georadar was installed to monitor the rock face. On the right is the view of the georadar: Rock deformations in the millimetre range can be detected for the whole wall.

CHALLENGE

The rock fall that buried parts of the Gotthard Railway Line of the Swiss Federal Railways took everyone by surprise, even though some smaller falls had been registered from a nearby site three months before. The 3000 cubic meters of rock that broke loose on the morning of June 5, 2012, caused severe damage to the railway lines and resulted in a one-month closure period of Switzerland's most important north-south link.

SOLUTION

Together with geologists of the Swiss Federal Railways and GEOTEST AG, Geopraevent reached the rock fall site around noon on June 5, 2012. The interferometric georadar was immediately transferred to the Gurtellen site. Thanks to its simple installation and the independent power supply, it was ready to conduct the first measurements around 8pm that same day – and provide a first assessment of the remaining danger of secondary falls. During the three following days of recovery works Geopraevent was constantly present, analysing the radar data first-hand so that works in the danger-zone could have been stopped at the first sign of shifts in the wall.



The Gotthard Railway Line was buried under piles of debris after a security blasting.

Once the pressing recovery works had been concluded, the installation of the protective measures could be initiated. After all of the potentially unstable rock had been blasted away, the remaining rock face and talus had to be secured. During this construction period, several independent surveillance systems were installed:

- Six trifold extensometers at depths of up to 40m.
- More than ten telejointmeters monitored movements of single blocks and clefts.
- Trigger lines woven into the temporary safety nets which automatic trigger alarms.
- Over 50 geodetic reference points (operated by our partners, data available on the online data portal)
- Permanent operation of our interferometric radar.

Surpassing of predefined thresholds automatically triggered the sirens at the construction site in order to evacuate workers. At the same time, geologists at GEOTEST were informed via SMS and the live data on our online data portal served decision makers in planning further steps. On July 2, 2012, the Gotthard Railway Line could be reopened to traffic, but the surveillance system remained in place.



Permanently installed telejointmeters determine the width of cracks in the rock with high accuracy to enables the detection of movements.