

Using wireless technology for rock face monitoring of hiking trails

Country

Switzerland

Project type:Geophysical
monitoring**Sector:**Environmental
hazards**Main product:**

Monitoring Solution

Challenge

Zermatt, Switzerland, is famed as a mountaineering and ski resort throughout the Alps. The area is also known for frequent rock falls which can lead to temporary closures of local ski resorts. In 2011, a minor rockfall on the Wiis Flüe rock face buried a popular hiking trail just 5 km west of Zermatt, opposite the north face of the Matterhorn. Geological investigations performed in the area by Worldsensing partner Rovina & Partner showed that a larger rockfall could endanger a second hiking trail. Consequently, a wider area was identified as a danger zone and temporarily closed to the public.

Until 2017, the rock face was subject to yearly tachymetric surveys. Although the monitoring results suggested that a large rockfall could occur, tachymetric surveillance on its own was insufficient for monitoring rock deformations and predicting future events. Thus, there was no way to determine if it was safe to reopen the affected hiking trails.

Advantages

- Remote monitoring allows rock fall instability to be tracked in near real-time, reducing the hazards to people and property.
- Monitoring costs are minimal, making the remote solution more attractive than cable-based alternatives.
- The reliability, ease of installation and low maintenance of the solution help save time and money.



Worldsensing's Gateway installation

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“The Worldsensing solution is robust and functions reliably in a challenging high Alpine environment. Thanks to its simple installation and low maintenance, it reduces the exposure of workers to risk in rockfall danger zones.”

Eric Pointner

Managing Director
Rovina & Partner AG

Solution

To address the lack of data, Rovina recommended deploying an automatic surveillance system using Worldsensing technology. The system comprised a gateway, a wireless tiltmeter and five wireless vibrating wire devices connected to five Geokon vibrating wire crack meters measuring the width of fissures across the rockface.

On an hourly basis, the gateway transmits device readings to Worldsensing's local, on-premises Connectivity Management Tool, CMT Edge, which in turn is integrated into Rovina's data visualization software through File Transfer Protocol. Rovina uses in-house software called Zeitreihen for storing, processing and visualizing data. Combined with a second in-house system, RPAAlarm, the remotely obtained monitoring data is analyzed continuously. Once a predefined threshold is breached, alerts are triggered via email and text messages.

On May 7, 2020, a large rockfall occurred, leading to the complete collapse of the rockface. Only a few days before the incident, the measurements began showing an increase in the deformation rate of the rock face.

Rovina recognized from this increasing deformation rate that a major event was about to happen and notified the customer in good time. Worldsensing's remote monitoring solution was key to the success of this surveillance project.

Benefits

The remote solution was deployed in an exposed vertical rock face at acute risk of rockfalls. Thanks to the easy and quick installation of the Worldsensing equipment and minimal cable lengths required, the time spent by the geologists and rockfall specialists in the danger zone was minimized.

Furthermore, the small cable distance between the wireless data logger and crack meter eliminated the need for maintenance work during the surveillance operation. The gateway was safely deployed in the valley floor, 800 m from the deployed devices.

About Rovina & Partner AG

Since the 1990s, the Swiss consultancy Rovina & Partner AG has provided geological and geotechnical services, spring- and groundwater investigations, natural hazard assessments, contaminated site remediation advice and geothermal energy consultation in the alpine Valais region. The company's natural hazards expertise includes risk assessments, remote geological and geotechnical instrumentation and monitoring, advising municipal crisis management teams and emergency response in cases of natural hazard events.

2.3 Felsinstabilität

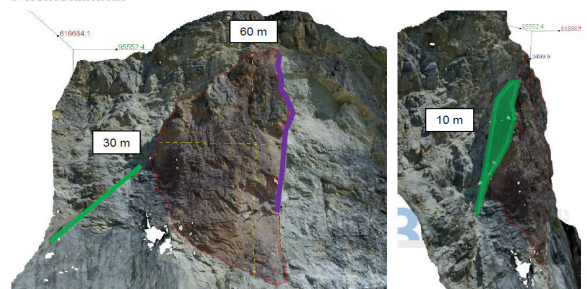


Abbildung 4: 3D-Modell des Felssturzgebietes (links: Frontalansicht / rechts: Blick von Westen) grün: tektonische Bruchfläche / magenta: Abbruchlinie Felssturz 2006

The rockface where Worldsensing's Monitoring Solution was deployed