Monitoring Pays Off

by Konrad Saal

During the night of 14 May this year, 300,000 m³ (392,000 yd³) of rock broke off the Valegion mountain and crashed down 1,000 m (3,281 ft) to the valley floor in the Swiss canton of Ticino, near the village of Preonzo. Thanks in part to Leica Geosystems' Deformation Monitoring solution GeoMoS local authorities were able to evacuate the valley's industrial zone and to close the A2 highway and several cantonal roads at an early stage.

The community Preonzo between Biasca and Bellinzona in the canton Ticino/Switzerland has lived with rock falls for several years. Ten years ago, a huge rock mass slid into the valley. The Cantonal Forestry Office has been watching the danger zone since 1998, and has been relying on automatic monitoring systems from Leica Geosystems AG for the past two years. Cantonal geologist Giorgio Valenti says: "We have regularly experienced small movements over the years, especially in spring time. Since the end of April of this year, the movements measured have increased to several millimeters per hour, which made the safety measures necessary."

Smallest Movements Determined from Precise 3D Data

The automatic monitoring system has provided continuous information about every movement in the affected zone. Two years ago a Leica TM30 Monitoring Sensor was installed on a stable pillar below the slide area and connected to the Leica GeoMoS monitoring system. Since then the sensor has monitored 15 observation points located inside and outside the danger zone every hour, 24/7. The results are automatically forwarded to an FTP server in the Forestry Department and then analyzed by experts.

Michael Rutschmann, Product Manager at Leica Geosystems and technical consultant for this project, also has access to the data: "For years we have been able to track three-dimensional data with millimeter-accuracy in real-time, knowing when movements took place and in which direction. The responsible experts were able to analyze developments and trends, and combined this data with additional information. The complete measurement history is very valuable to the geologists' further analysis."

The experts were kept informed by SMS about the movements. As their speed continued to increase, it became clear that the rock would soon break off.

Leica TM30 monitoring the area.

This is where 300,000 m³ of rock crashed down 1,000 m to the valley floor.

Geodetic Monitoring Systems Help Save Human Lives

Based on the analysis of Leica GeoMoS and extensometer data, the necessary safety measures could be initiated early. The industrial area at the foot of the mountain, which is important for the local economy in this region, could be evacuated in time. The police also closed cantonal roads and the highway. It could not be predicted if the mass would reach and damage the industrial zone when the one million ton load crashed down to the valley.

Future Measures

The 70 employees of the six companies in the industrial zone have resumed their work. But even after this event in Preonzo the Leica Geosystems monitoring system will continue to monitor the slope accurately to protect the people. "Some of the observation points were destroyed during the rock fall. More observation points will be installed in an extended parameter around the fracture area and will be continuously monitored for their stability," said Michael Rutschmann.

Two years ago the community of Preonzo and the Forestry Office of the Canton Ticino (Sezione Forestale, Cantone Ticino) decided in favor of funding and commissioning an additional Leica Geosystems monitoring system to observe the area. ■

Find a video about the rock fall on youtube:
www.youtube.com/watch?v=Q6JCR1HZpeE

About the author:
Konrad Saal is a Surveying Engineer and Manager Marketing Communications at Leica Geosystems AG in Heerbrugg, Switzerland.
konrad.saal@leica-geosystems.com