



The Pizzo Cengalo and Val Bondasca events: From early warnings to immediate alarms

Richard Steinacher, Christian Kuster, Chasper Buchli, and Lorenz Meier
Geopraevent AG, Technoparkstrasse 1, 8005 Zurich, Switzerland (www.geopraevent.ch)

After a rock fall at Pizzo Cengalo in December 2011, the Val Bondasca valley in the Bregaglia region (Switzerland) carried mudslides to the village of Bondo. In 2017, even larger rock falls at Pizzo Cengalo caused a series of large debris flows. As a result the catch basin overflowed and the main traffic route of the valley was buried. Our alarm system closed the roads and gave alarm in real-time. After the first rock fall we installed an early-warning system with a ground-based interferometric radar. We predicted a second rock fall event with the accuracy of a few hours the day before the event. To secure the valley from future but imminent debris flows we extended the existing alarm system. A range of sensors including level radars, seismic sensors, and cameras is used to trigger alarms. Our sensors and the tailored communication infrastructure over the whole valley offer a reliable basis for detecting upcoming debris flow events. Finally, we will show future directions in early-warning and alarm systems by presenting high-resolution webcams and a wide-angle debris flow radar with spatial resolution.