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Combined high resolution terrestrial LIDAR and time-lapse photography for rockfall monitoring and analysis

Kerry Leith (1), Andrea Pedrazzini (2), Reto Seifert (1), Jeffrey Moore (1), Andrew Kos (1), and Michel Jaboyedoff (2)

(1) ETH Zurich, Geological Institute, Engineering Geology, Switzerland (kerry.leith@erdw.ethz.ch), (2) University of Lausanne, IGAR-FGSE, Switzerland (andrea.pedrazzini@unil.ch)

Rockfall events typically occur in response to environmental phenomena, and as a result may be widely distributed in both space and time. A monitoring program, utilizing high resolution, repeat ground based LIDAR scans and fixed time lapse photography has been initiated in order to better understand the sensitivity of rockfall processes to external environmental forcings. Seven sites within the Matter and Saas valleys (Canton Valais, Switzerland) have been selected in order to investigate sensitivity under various structural and geomorphological slope conditions. Identification and quantification of rockfall events will be undertaken through difference analysis of subsequent DEMs, and timing will be determined from the photographic record. Structural and geomorphic characterization of each site based on the high resolution DEMs will provide data on specific failure modes and associated erosional processes.

The selected sites vary in elevation from 1100 m to 2900 m, and occupy various geomorphic environments ranging from sub-alpine to periglacial. This variability has lead to a number of challenges in designing both the monitoring program and fixed systems for the expected two year project duration. Repeat scans will be undertaken approximately every four months, with significant winter and early spring snowfall defining re-scans during this period. Canon EOS 1000D SLR cameras were selected based on their possibility for remote operation, manual zoom and focus, and low standby power consumption. Sealed housings were designed for simple maintenance, and to minimize internal humidity and temperature variation. Small solar systems with lead-acid batteries provide constant power to each installation. First results and system specifications will be described.