



Inter-seasonal surface deformations of an active rock glacier imaged with radar and lidar remote sensing; Turtmann valley, Switzerland

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Inter-seasonal changes in surface deformation were imaged using a portable radar interferometer and terrestrial laser scanner during a series of three campaigns that took place in autumn 2011, summer 2012 and autumn 2012 on a rock glacier located in the Turtmann valley, Switzerland.

Satellite radar interferometry (ERS 1 & 2, CosmoSkymed) indicate that accelerated downslope movement of the rock glacier commenced during the 1990s. Due to signal decorrelation associated with the satellite repeat pass time interval, continuous ground-based radar interferometry measurements were undertaken. Results show that the rock glacier accelerated significantly in Summer ($V_{max} = 6.0\text{cm}/25\text{hrs}$), probably in response to the condition of the subsurface hydrology (e.g. post-peak spring snow melt and/or infiltration of rainfall). In autumn, the displacement velocity was reduced ($V_{max} = 2.0\text{cm}/25\text{hrs}$). A one year surface difference of the glacier topography, derived from terrestrial laser scanning, provided insight into the rock glacier kinematics. Ongoing research is aimed at integrating surface displacement results with an extensive borehole monitoring system consisting of inclinometers and temperature sensors.