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Monitoring landslide kinematics by multi-temporal radar interferometry - the Corvara landslide case study

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Corvara landslide in the Italian Dolomites is slow-moving landslide on which extensive research activities have been carried out since the 1990ies, including sub-surface techniques (e.g. drillings, piezometers and inclinometers), surface methods (e.g. geomorphological mapping and GPS measurements), and remote sensing techniques (e.g. multi-temporal radar interferometry (MTI), and recently amplitude-based offset-tracking and UAV-based photogrammetry). The currently active volume of Corvara landslide has been estimated to be approximately 25 million m^3 with shear surfaces at depths of 40 m. Displacement velocities greatly vary spatially and temporally, with only a few cm per year in the accumulation zone, and more than 20 m per year in the highly active source zone. Autumn rainfall and spring snow melt, as well as accumulation of snow during winter have been identified as the major displacement triggering and accelerating events. The ongoing landslide movements pose a threat to the municipality of Corvara, the national road 244, extensive ski resort infrastructure and a golf course.

Over the last years, the focus for monitoring the Corvara landslide was put on MTI using 16 artificial corner reflectors and on permanent and periodic differential GPS measurements. This aimed for (1) assessing the ongoing displacements of an active and complex landslide, and (2) analysing the benefits and limitations of MTI for landslide monitoring from the perspective of geomorphologists but also for administrative end-user such as civil protection and Geological surveys. Here, we present the latest results of these analyses, and report on the potential of MTI and related investigations, as well as future fields of research.