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An automatic time lapse camera setup for multi-vision 3D-reconstruction of morphological changes

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In the cause of a five year monitoring campaign on an Alpine slope in the Lainbach catchment, Southern Germany, high erosion rates were documented by terrestrial laser scanners (TLS) and unmanned airborne vehicles (UAV). As a result of different denudation processes erosion rates differ between summer and winter periods. The latter became evident after comparing both TLS-measured time spans. However, process differentiation and their contribution to the overall denudation remained challenging due to the discontinuous data collection every few weeks.

In order to record these erosion processes an array of four automatically triggered cameras was installed capturing frames in ten minutes time steps as long as there is daylight. This work in progress aims to produce long term time series of morphodynamic changes in an active catchment by applying multi-vision structure from motion algorithms from a set of four cameras. Geomorphic processes caused by special weather phenomena can thus be interpreted in combination with climatic data acquired right next to the slope. Preliminary model calculations from the chosen perspectives produced adequate results with point counts of around 5.5 Mio for the 120m^2 slope. The point density proved to be dependent on the weather conditions, thus foggy and dull images will be excluded. A validation of the approach will be achieved by comparison of the time lapse point clouds with the TLS scans and UAV surveys as the monitoring will continue.