



On the contemporary morphodynamics of an alpine talus cone and the granulometry and morphometry of its surface particles

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Talus cones are important sediment stores in high mountain basins. They act as both sediment sinks for rock fall debris and sources for debris flows and the fluvial system and are thus important components of alpine sediment cascades.

After a 50000 m³ rock fall event in 2007, the morphodynamics of the talus cone “Am Steingerümpel” (Reintal valley, Wetterstein Mountains, Bavarian Alps) were studied in great detail, based on the previous investigations of HECKMANN et al. (2012).

During a four-year period (2008-2011) the whole study site (rock fall scar and talus cone) was scanned three times with a terrestrial laserscanner (TLS). The TLS-based digital elevation models were used for change detection, calculating sediment input, reworking and output and to derive morphological attributes of the talus cone.

In 2011 the surface of the talus cone was mapped with differential GPS. On the basis of this mapping 3 different zones of contemporary geomorphological activity were identified:

- A) Inactive zone: The biggest part of the slope surface has been inactive since the rockfall event in 2007.
- B) Active zone, dominated by fluvial and debris flow processes: Debris shift mainly occurs at the sides and is driven by fluvial processes during snowmelt or rainstorms. Also small debris flows appear.
- C) Active zone, rockfall-dominated: Continuous material input from rockfall at the apex of the cone has been recognized.

Additionally particle size, shape and sorting of the surficial debris were measured in each zone along selected longitudinal transects. These parameters were related to morphological properties of the cone (e.g. slope, distance from the apex).

First results show that particles are very poorly sorted at every point on the surface. At one profile (zone A and B) the typical effects of downslope sorting and downslope increase of sphericity were observed.

The cone apex was dissected by fluvial erosion. The particles in one gully show other characteristics than particles on the inactive talus cone. There is no correlation between particle size and distance from the talus apex. Only the sphericity is related to the distance from the apex.

References

Heckmann, T., Bimböse, M., Krautblatter, M., Haas, F., Becht, M. and Morche, D. (2012): From geotechnical analysis to quantification and modeling using LiDAR data: a study on rockfall in the Reintal catchment, Bavarian Alps, Germany. *Earth Surface Processes and Landforms* 37, 119-133. DOI: 10.1002/esp.2250