



The mobility of debris flows – An empirical approach based on the average fan- and channel slope of the catchment

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A semi-empirical approach to describe the runout behaviour of volcanic mudflows (lahars) has found applicable to debris flows. The method was tested on alpine debris flow events from Austria, South Tyrol (Italy) and Switzerland. It is shown that the used empirical relation also describes the flow behaviour of different process types and its characteristic deposition. We assume that an increase of the rheological characterisations of debris flows are directly related to the runout and therefore to their mobility. We can observe, and it is well known, that the shape of the deposition fan of granular debris flow events differs significantly from the shape of the deposition fan of viscous respectively muddy debris flows.

Results imply that granular flow behaviour will lead to a higher roughness during deposition activity, which further results in steeper fan slopes on average and less mobility. A more viscous respectively muddy flow behaviour, on the other hand, shows higher mobility and result in smoother fans. We further observed a higher mobility (larger runout) in catchments of lower average channel slopes.

Proposing that in general the local runout of an event can be correlated to the dominant fan-forming process and the driving energy within the catchment, we estimate the local mobility coefficient based on the fan- and channel slope.