



Sediment processes in torrents with non-cohesive carbonate debris

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Torrents are characterized by severe bed load transport processes triggered by flash floods and massive erosion, that leads to debris flows with destructive effects of settlements and infrastructure.

The most abundant and active sources of debris within torrent catchment areas underlain by carbonate rock occur in the region of recent and sub-recent colluvial sediments and loose rock formations exposed to weathering. The extent of debris formation is substantially controlled by lithologic and tectonic factors: Primarily among these factors are the facies of the (marine) sedimentary environment, the early diagenetic processes, the allocation into the system of major tectonic units, the influence of metamorphism due to temperature and pressure, the position of the rock formation in relation to a fault zone and the resulting tectonic stress of the rock (mylonite). In general it is known that dolomite is more often subject to intensive debris formation according to the characteristic texture of fractures, but a fairly accurate quantitative assessment of debris potential of a catchment area for the purpose of hazard mapping or planning of mitigation measures has to be based on a detailed investigation which focuses on the individual geologic formation. Of major importance for the modelling of torrential bed load transport processes are the texture (grain size distribution) of the float debris and rubble (debris deposited after down slope gravity transport) exposed to fluvial erosion, particularly the sandy fraction in connection with the rheological regime of the transport processes, as well as the non-cohesive properties of carbonate debris (bed load).

Till now only little scientific research was done in this field, although carbonate debris plays an important role concerning torrent control in the Alps. The paper gives a comprehensive overview of the state of knowledge of the formation and shifting processes of carbonate debris and its influence upon bedload transport in torrential streams and summarizes the results of investigations, which were recently carried out in several Austrian torrent catchment areas (Großer Dürrenbach, Seebach, Holzäpfeltal).