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Long-term accumulation rates of subaerial scree slopes: implications of numerical ages and field observations.

Diethard Sanders (1) and Gernot Patzelt ()

(1) Institute of Geology and Palaeontology/University of Innsbruck, Faculty of Geo- and Atmospheric Sciences, Innsbruck, Austria (Diethard.G.Sanders@uibk.ac.at), (2) former Institute of Alpine Research, University of Innsbruck, Austria

Subaerial scree slopes are considered, either, as faithful, or, by other investigators, as unreliable recorders of palaeoclimatic change, respectively; this apparent contradiction is mainly related to differences of methods and perspective. Any palaeoclimatic assessment of talus successions, however, must hinge on sediment accumulation rate as this is the key variable for preservation of record. Up to now, data on 'medium-term' (tens to hundreds of years) to 'long-term' (hundreds to thousands of years) accumulation rates of scree slopes are scarce. Post-depositional diagenetic cements in subaerial talus can be dated by the 234U/230Th disequilibrium method (Sanders et al., 2010); these U/Th ages, however, can only yield crude estimates of minimum long-term accumulation rate. Radiocarbon dating of intercalated organic remnants remains the best approach to age-date talus successions, or portions thereof (Blikra and Selvik, 1998). Unfortunately, in particular carbonate-lithic talus typically is devoid of organic remnants.
A compilation of ages from literature data plus our own data indicates that medium- to long-term rates (as defined) of talus accumulation range over at least four orders of magnitude. This variability is related to: (a) differences in geomorphic maturity of scree slopes, (b) different climatic regimes, (c) different substrate lithologies, and (d) differences in structural disintegration of the rock substrate. In particular, the potential influence of items (c) and (d) on style and rate of talus development to date is practically undocumented. In the Eastern Alps, geomorphically mature scree slopes deposited in detachment scars of age-dated rockslides indicate mean long-term accumulation rates of up to a few tens of meters per ka. Scree slopes in detachment scars of historical rockslides, however, suggest that the initial rate of accumulation is still much higher. Talus accumulation, thus, is strongly non-linear in time; this is further supported by observations in 'low-altitude' (less than about 1700-1500 m a.s.l.), abandoned, post-glacial scree slopes. In the Alps, present rates of cliff retreat of 0.01–0.2 mm/a are about an order of magnitude lower than deduced average rates of late-glacial cliff retreat (summary in Matsuoka, 2008); this underscores non-linearity of talus accumulation. In addition, straightforward applicability of present rates of cliff retreat to the Past is impeded by marked differences in geomorphic settings and dynamics of the present versus late-glacial deposystems, respectively. Even with highly resolved age data, however, individual talus successions are poor recorders of palaeoclimatic change.

Blikra, LH, Selvik, SF, 1998. The Holocene, 8, 631-658.
Matsuoka, N, 2008. Geomorphology, 99, 353-368.
Sanders, D, Ostermann, M, Kramers, J, 2010. FACIES, 56, 27-46.