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From Late-Glacial aggradation to Holocene incision of talus: Examples from the Northern Calcareous Alps (Austria).

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Near Innsbruck city (Austria, Eastern Alps), subsequent to the Last Glacial Maximum (LGM), an alluvial fan-to-talus slope succession was supplied from a carbonate-rock cliff more than 1000 meters in height. 234U/230Th ages of 9.5 to 9.37 isotope kyrs of diagenetic cements in the alluvial-fan succession suggest that the fan/talus ensemble accumulated mainly during Late-Glacial to, perhaps, early Holocene time. Subsequent to, both, glacial retreat and rapid aggradation, the geomorphic regime on the alluvial fan and talus changed to net erosion; this is recorded by fanhead trenching, cutting of fluvial terraces, abandonment and vegetation, and excavation of talus flatirons. In the Northern Calcareous Alps, dissected and abandoned talus slopes and fans are common but, because they are abandoned and vegetated, tend to be overlooked. We assume that the changeover from, first, rapid accumulation of fans and/or talus to, second, abandonment and dissection took place during terminal Late-Glacial to perhaps early Holocene time; the net erosional regime persists until present.
A record of rapid Late-Glacial to early Holocene accumulation of alluvial fans and/or talus slopes followed by: (i) abandonment and vegetation, combined with (ii) cutting of intra-formational unconformities of laterally limited extent, is typical for Alpine 'deglacial' to interglacial mountain-flank deposystems situated in comparatively low altitudes (lower than about 1500-1800 m a.s.l.). This record comprises (a) an autocyclic component, that is, progressive lowering of sediment input due to onlap and burial of freshly-deglaciated mountain flanks supplying alluvial fans and talus slopes, and (b) an allocyclic component, that is, deglacial climatic warming and upward rise of an altitudinal range with a maximum number of freeze-thaw cycles ('talus window'), leading to progressive vegetation-induced hillslope stabilization and lowering of scree production. Along the intra-formational unconformities much of total sediment volume is remobilized and transported off site during a single deglacial to interglacial cycle, introducing stratigraphic complexity to low-altitude fan- and talus successions.