# Chronology, patterns and rates of erosion and deposition processes, western Peruvian Andes

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Fluvial sediments from geologically young mountain belts like the Andes are important archives recording past Earth surface processes. The establishment of the timing of alluvial sediment deposition allows to correlate accumulation and erosional periods with particular climate or tectonic events. In this context, depth profile and isochron burial dating based on cosmogenic nuclides 10Be and 26Al on quartz have proven to be reliable methods to establish the chronology of sediment deposition. Alluvial terraces located on the lowermost reaches of the western Peruvian Andes, are dated using these two techniques. In addition, cosmogenic nuclide concentrations in the dated sedimentary deposits are interpreted in terms of a basin averaged denudation rate at the time of deposition. Finally, the provenance of both the dated terrace deposits and the modern stream sediments, accomplished through matching detrital zircon U-Pb ages with crystallization ages of source rocks, are used to infer changes in the erosion and sediment dynamics between the past and the present period.

Dating results show a high degree of fluvial dynamics with multiple phases of sediment aggradation and incision, leading to a complex pattern of cut-and-fill terraces. Provenance tracing through detrital zircon ages show major changes in the sediment provenance through time. Nowadays, sediment source areas are mainly located along the steep middle reaches of the rivers whereas during the Pleistocene, sediment source areas were located in the steep reaches and also in the flat headwater areas.

The information about the terrace ages, paleo erosion rates and shifts in the loci of erosion reflect changes in the rainfall patterns. In the past, periods of stronger precipitation allowed the entrainment of material within the flat headwaters and the steep middle reaches, resulting in high erosion rates, large sediment fluxes and the accumulation of the terraces. In contrast, weak modern rainfall results in nearly zero erosion in the flat headwaters, and the site of material entrainment has shifted to the steep middle reaches. As a result of the reduced sediment fluxes, the terraces have been eroded.