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Recycling of Pleistocene valley fills dominates 125 ka of sediment flux, upper Indus River

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Rivers draining the semiarid Transhimalayan Ranges along the western Tibetan Plateau margin underwent alternating phases of massive valley infill and incision in Pleistocene times. The imprints of these cut-and-fill cycles on long-term sediment fluxes have remained largely elusive. We investigate the timing and geomorphic consequences of headward incision of the Zanskar River, which taps the vast More Plains valley fill that currently impedes drainage of the endorheic high-altitude basins of Tso Kar and Tso Moriri. In situ ^{10}Be exposure dating and topographic analyses indicate that a phase of valley infill gave way to net dissection of the >250-m thick sedimentary stacks ~125 ka ago, i.e. during the last interglacial (MIS 5e). Rivers eroded >14.7 km^3 of sediment from the Zanskar headwaters since then, fashioning specific sediment yields that surpass ^{10}Be-derived denudation rates from neighbouring catchments by factors of two to ten. We conclude that recycling of Pleistocene valley fills has provided Transhimalayan headwater rivers with more sediment than bedrock denudation, at least since the beginning of the last glacial cycle. This protracted liberation of sediment stored in thick valley fills could bias rate estimates of current sediment loads and long-term bedrock denudation.