



From source (Alps) to sink (Mediterranean): An estimate of late Quaternary denudation rates from cosmogenic nuclide dating and surface process models.

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The impact of Quaternary glaciations on the morphology, hydrologic and sedimentary mass budget and isostatic adjustment of the Alps has been extensively studied over the last decades. Several studies pointed out particularly large incision and denudation rates throughout the Plio-Quaternary in the Alpine belt. These are probably related to global climate cooling and the shift to predominant glacial processes. However, shorter-term interglacials are also characterized by large incision rates in river valleys, and therefore by an increasing supply of clastic sediments to the offshore domain. This suggests that the release of glacier meltwaters coupled with increasing rainfall during warmer period causes intense river bedrock erosion and glacial sediments wash-out.

We present a compilation of river incision rates obtained from Cosmic Ray Exposure (CRE) dating of river polished surfaces in the Southern French Alps. These data systematically highlight an age of $\sim 15-20$ ka (i.e. posterior to the LGM) for the onset of rapid incision (>1 mm.yr⁻¹) and carving of deep gorges in most river systems of the study area. In addition to constraints provided by published geochemical and sedimentological analyses of off-shore sediments, numerical models of surface processes are then used to determine climatic parameters (i.e. water runoff, rock erodibility) that best explain incision rate fluctuations.