

Fluvial bedrock gorges as markers for Late-Quaternary tectonic and climatic forcing in the French Southwestern Alps

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Fluvial incision is the consequence of landscape readjustment to combined tectonic and climatic processes. In the Southwestern Alps, deep gorges incised by rivers attest of efficient erosional processes at the front of the Alpine mountain range. We measured in situ-produced ³⁶Cl concentrations along the fluvially-polished bedrock walls of the Pérouré and Bévéra river gorges, which are located in the external SW French Alps. Both catchments lie beyond the previously glaciated domain during the last glacial periods, which makes them suitable to quantify fluvial incision dynamics in a non-glacial environment. Our cosmic-ray exposure (CRE) dating results provide a mean incision rate of 0.6-0.7 mm/yr over the last 20 ka. Compared to CRE dating data obtained from previous studies in neighboring catchments, we highlight three different incision dynamics for bedrock gorges in SW Alps: (i) Group A with slow and steady incision rates (0.5 mm/yr over the last ca. 30 ka), comparable to long-term denudation and rock-uplift rates in the area, suggesting tectonic forcing for incision in non-glaciated zones; (ii) Group B showing high incision rates (≈ 2 mm/yr) during the paraglacial period after the Last Glacial Maximum (LGM, ca. 20 ka), possibly related to an increase in sediment yield and water runoff following glacier retreat; (iii) Group C with high (≈ 5 mm/yr) and recent (post-10 ka) incision rates that reflect fluvial rejuvenation of glaciated catchments.

Mots-Clés : Southwestern Alps, mountain gorges, fluvial incision, ³⁶Cl CRE dating