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Erosion rates on subalpine paleosurfaces in the western Mediterranean by in-situ ^{10}Be concentrations in granites: implications for surface processes and long-term landscape evolution in Corsica (France)

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A study of erosion rates by in-situ ^{10}Be concentrations in granites of Miocene high-elevation paleosurfaces in Corsica indicates maximum erosion rates between 8 mm/kyr and 24 mm/kyr. The regional distribution of measured erosion rates indicates that petrographic composition of granites, the degree of brittle deformation and the local climatic setting govern erosion rates. These factors cause a variation of up to factor one. It remains unclear if this dependency is a general rule, since former studies show a fairly wide scatter of data particularly in mid latitudes and do not provide enough background data on precipitation, deformation, and petrography. These studies indicate that ongoing tectonic activity strongly increases erosion rates, possibly by an order of magnitude. Thus, less important factors such as climate, degree of deformation, and petrography can only be detected in tectonically inactive regions.

In Corsica, chemical erosion dominates even at elevations around 2000 m in presently subalpine climate conditions. A steady mode of erosion by dissolution or disintegration to grains (grusification) is indicated by field evidence. Dissolution or grusification justify an interpretation of cosmogenic nuclude concentrations in terms of average erosion rates.

The erosion rates are relatively high with respect to the preservation of inferred Early

to Middle Miocene landscapes. We assume temporal burial in the Middle Miocene and significantly lower erosion rates in the Neogene until $\sim$3 Ma to explain the preservation of paleosurfaces, in line with fission track data. Valley incision rates a magnitude higher than erosion rates on summit surfaces result in long-term relief enhancement and surface uplift with respect to the geoid. On the other hand, widening and deepening of valleys by cyclic glaciation progressively destroys the summit surface relics.