Geophysical Research Abstracts, Vol. 7, 00373, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00373

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-elevated paleosurfaces in Corsica, situated between 1400 m and 2350 m a.s.l., indicates maximum erosion rates between 8 mm kyr-1 and 25 m kyr-1. These rates are in the range of what is known from other environments except for arid and very cold settings. 10Be concentrations in a granite core of 30 cm depth indicate that during the last glacial erosion rates on a tor were significantly lower than in the Holocene. The regional distribution of measured erosion rates indicates that petrographic composition of granites, the degree of shearing, and the local climatic setting govern erosion rates. Field evidence suggests that chemical erosion dominates even in elevations around 2000 m in presently subalpine climate conditions. In subalkaline granite sampling sites, chemical weathering seems to respond to wetness. Glacial erosion rates of the tors under permafrost conditions and dominance of physical weathering appear to have been lower. Erodibility of alkaline granite is lower than of subalkaline granite both on short and long time scales, and thus rugged mountains build of alkaline granite rise above the smoother surrounding landscape. These erosion rates are relatively high with respect to a preservation of inferred Early Miocene landscapes. Valley incision rates, being a magnitude higher than erosion on summit surfaces, result in relief enhancement which yet has not fully destroyed the paleosurfaces. Accelerated erosion in the last 2.7 million years due to cyclic rapid climate changes and efficiency

of glacial erosion is reflected by a rugged relief contrasting to the gentle relief of the paleosurfaces. We assume significantly lower erosion rates in the Miocene to explain the preservation of paleosurfaces.