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Tracing Landscape Evolution of the Sila Massif using 10Be

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Erosion distinctly shapes earth's surface and therefore influences landscape and, in particular, also soils. The evolution of landscapes and soils are known to evolve in discontinuous ways over thousands of years. Several studies have tried to compare erosion rates over different time periods, thereby trying to derive a chronology of process rates. These studies, however, often had a catchment-wide approach and, thus, basically lack in a distinction of soil erosion from erosion as a general landscape process. To decipher soil erosion rates over millennia time-scales, new approaches are therefore needed. Landscapes affected by intense erosion and denudation may be characterised by boulder fields or "tor" landforms, i.e. tower-like or dome-shaped, often castellated, residual rock boulders (resistant to erosion) "growing" from gentle landforms. Determining the speed of boulder exhumation, soil erosion rates over different time periods can be deduced. The Sila Massif upland plateau in Calabria (Italy) exhibits boulder fields that seemed to be exhumed over time. 10Be-dating along vertical profiles of such granitic boulders was now used as a new approach to unravel long-term erosional phases and to reconstruct the lowering of the surface. The results cover a time span of the last 140 ka and revealed several phases of their exhumation. The different trends could be connected to specific climate conditions, yet a major tectonic influence could be excluded, as the main uplift ended about 400 ka ago. This new approach provides a new insight into soil erosion and denudation rates during the Pleistocene and Holocene.