Geophysical Research Abstracts
Vol. 19, EGU2017-18803, 2017
EGU General Assembly 2017

Millennial scale variability of denudation rates for the last 15 kyrs inferred from the detrital 10Be record of lake Stappitz in the Hohe Tauern massif, Austrian Alps

Reto Grischott (1), Florian Kober (2), Maarten Lupker (3), Jürgen M. Reitner (4), Ruth Drescher-Schneider (5), Irka Hajdas (1), and Marcus Christl (1)

(1) Laboratory for Ion Beam Physics, ETH Zurich, Zurich, Switzerland, (2) Nagra, Wettingen, Switzerland, (3) Geological Institute, ETH Zurich, Zurich, Switzerland, (4) Geological Survey of Austria, Vienna, Austria, (5) Graz, Austria

Reconstructing paleo-denudation rates over Holocene time-scales in an Alpine catchment provides an excellent opportunity to isolate and test the climatic forcing of denudation, disentangling its effects from tectonics or anthropogenic effects. We measured cosmogenic 10Be on two sediment cores from Lake Stappitz (Austrian Alps) to derive a 15-kyr long record of the upstream Seebach Valley. Our study provides quantitative estimates of catchment denudation for the Holocene in an unprecedented temporal resolution. Due to the existence of the lake over the Holocene, the upstream Seebach Valley was isolated from baselevel (tectonic) changes and the high elevation minimizes anthropogenic impacts. The 10Be record indicates significant, but temporally decreasing, mixing with low-dosed paraglacial sediments from 15 to 7 kyr cal BP. In the absence of perturbing glacial sediments after 7 kyr cal BP, the 10Be concentrations can be converted to denudation rates. Denudation rates significantly fluctuated over this time period and are related to the hillslope response of climate forcing. Lower hillslope erosion rates of ca. 0.4 mm/yr found between 5 to 7 kyr cal BP correlate with a stable climate, infrequent flood events and higher temperatures that favoured the widespread growth of stabilizing soils and vegetation. Higher hillslope erosion rates of ca. 0.8 mm/yr for the last ∼4 kyr correlate with a variable, cooler climate where frequent flood events increase denudation of the less protected hillslopes. Overall our results suggest a tight coupling of climate and hillslope erosion in alpine landscapes as it has been observed in other parts of the Alps.