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Paleo-denudation rates and possible links with climate variations in the Alps

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Modern estimates of denudation rates using cosmogenic nuclides and correlations with various
Modern estimates of denudation rates using cosmogenic nuclides and correlations with various geomorphic parameters have been established for several regions of the Alps. Cosmogenic denudation rates and mean denudation based on valley and lake fillings integrated since the Last Glacial Maximum suggest an 12 to 14-fold higher denudation rate compared to modern estimates. However, the influence of late Pleistocene to Holocene climate changes over time on denudation rates remains unclear due to the lack of empirical paleodenudation rates. In an attempt to overcome this missing link, an alpine sediment archive was selected where significant changes in vegetation cover, glacier fluctuations, periglacial activity have been reported. In the Eastern Swiss Alps one cold phase and two warm phases were reported for the Late Holocene based on stratigraphical and palynological analyses. We aim to quantify the variation of climate on erosion and sediment flux in the Fedoz river that drains a small high alpine valley (10% glaciated) to Lake Sils, Eastern Switzerland. The major part of fluvial sediments are archived in parts of the Isola delta (an subaerial alluvial fan at the entrance into Lake Sils). Palynological and radiocarbon- dated sediment cores provide the opportunity to determine 10Be-catchment wide denudation rates for distinct timeinervals back in time and to estimate the influence of climate on denudation and sediment transport.

Sediment cores on the fan were retrieved which range back to 2320 years. Sand layers in the sediment core between dated peat layers were sampled and measured. The same sediment interval was tested in different cores to test the homogeneity of the signal. Additionally, estimates of present-day nuclide concentrations were performed in modern stream samples. The data provide denudation rates in the time range from 2320 to approx. 1500 years BP (from 1500 y BP to present soil formation). The preliminary calculated denudation rates suggest that supplied sediment derived as a mixture of a modern typical alpine hillslope erosion signal with a potential addition of remobilized glacial deposits.