Geophysical Research Abstracts
Vol. 16, EGU2014-2647, 2014
EGU General Assembly 2014

Temporal and latitudinal cosmogenic nuclide-derived denudation rates from European river terraces

Mirjam Schaller and Todd A. Ehlers
Department of Geosciences, University of Tuebingen, 72074 Tuebingen, Germany

Denudation of the Earth surface is sensitive to changes in tectonics, climate, and biotic activity. The determination of these denudation rates over space and time has proven difficult. Cosmogenic nuclide concentrations in active river sediment and river terrace deposits contain information about catchment-wide denudation rates and paleo-denudation rates, respectively.
In this study, temporal and spatial variations in denudation across Europe are investigated as a function of Quaternary climate change. We test the hypothesis that Quaternary climate change impacted catchment denudation rates between glacial and interglacial cycles and during late Cenozoic global cooling. Furthermore, the latitudinal dependence and perhaps the spatially and temporally asynchronous behavior of catchments due to the effect of climate change on denudation are considered.
Methods used include quantification of paleo-denudation rates from in situ-produced cosmogenic 10Be and 26Al measured in river terraces determined from catchments in southern and northern Spain (Guadalquivir and Esla, respectively), central France (Allier and Loire), and the Czech Republic (Vltava). These five catchments span 12 degrees latitude and provide a rich temporal record of denudation rates.
Results from work in progress indicate that modern denudation rates (over timescales of $\sim$20 kyr) in the Guadalquivir range between 34 to 42 mm/kyr. In the upper course of the Esla denudation rates are 50 mm/kyr and 30 mm/kyr in the lower course of the river system. For the Allier, denudation rates recalculated from measurements by Schaller et al., (2001) are around 40 mm/kyr, The denudation rates of the Vltava and the Elbe are around 30 mm/kyr with the Elbe at 38 mm/kyr. All denudation rates of the four catchments studied are very similar despite the different latitudinal and present day climatic settings. Given these similarities in denudation rates so far suggest that modern catchment denudation is relatively insensitive to spatial variations in climate r. Work in progress is analyzing paleo-denudation rates from terraces in each catchment to further illuminate if any temporal and spatial variations are detectable.