QUANTIFICATION OF QUATERNARY UPLIFT RATES IN THE CENTRAL PANNONIAN BASIN: CONSTRAINTS FROM GEOCHRONOLOGICAL DATA

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From late Pliocene through Quaternary, the positive structural inversion of the extensional Pannonian basin has been taking place. The gradual build-up of compressional stresses triggered large-scale folding of the lithosphere resulting in differential vertical movements in the form of accelerated basin subsidence and basement uplift at the wavelength of a few to >100 kms. Whereas the location of the uplifting and subsiding areas is well defined, currently there are only speculations about the actual timing and amount of uplift and subsidence. There are several evidences about these vertical movements in the central part of the Pannonian basin that comprises regions of uplift (Transdanubian Range, TR) and their transitional margin towards the subsiding Great Hungarian Plain. For example position of Quaternary travertine horizons associated with the levels of hydrothermal cave systems suggests cc. 100-150 m base level fall during the last 350 ky. Fluvial terraces indicate gradual incision of the Danube at the Visegrad gorge where the river cuts through the NE trending axis of the emerging TR. Vertical movements are also demonstrated by the deformation pattern of the terrace levels. Based on geomoroplogic studies the age of the Visegrad gorge has been assumed to be early Pliocene, however, no reliable chronological data have been available to quantify landscape forming processes such as uplift, incision or erosion rates. Using terrestrial in situ cosmogenic nuclides (TCN) in the Visegrad gorge it will be possible to define the exposure age of the terrace levels of the Danube. These data help
us to quantify the incision rate of the river and the age of the Visegrád gorge and, thus, the amount and rate of uplift of the TR. Compiling TCN data with geomorphic studies, luminescence dating of loess profiles overlying Danube terraces and U/Th age dating of syngenetic hydrothermal cave minerals, we present new constraints on differential vertical movements and timing of structural inversion in the Pannonian basin system. Morphotectonic analysis has been also carried out in the transitional hilly area of the TR using seismic reflection profiles combined with the study of the surface landforms to characterize the style of active deformation. These data will allow us to reconstruct landscape evolution and to calibrate erosion and uplift rates for the central part of the Pannonian basin.