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Tectonic and climatic controlled river terraces in the SE Carpathians during Middle-late Pleistocene time

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Tectonics is one of the key controls for the post-collisional evolution of the SE Carpathians in particular during the Middle-late Pleistocene time. Late Miocene continental collision of the SE Carpathians was followed by Pliocene compression in the bending zone, subsidence in the Focşani foreland basin and local extension in the hinterland intramontane Braşov basin. Apatite fission track data show that 2 km of erosion and uplift is recorded during the Pliocene - Quaternary time due to the cessation of plate convergence and uplift of the entire converging setting (7 - 2 Ma; Sanders et al., 1999). Furthermore, it followed the latest Pliocene - Quaternary uplift which represents the result of crustal folding mechanism triggered by the generalized late Pliocene-Quaternary inversion acting at the scale of the entire Pannonian - Carpathians system. Young tectonic activity has been deduced from the tilted Lower Pleistocene lacustrine deposits and Upper Pleistocene river terraces on the western Focşani basin flank (near the Carpathians orogenic front; Necea et al., 2005). River incision into the actively uplift of the Carpathians chain during the Middle-late Pleistocene time is reflected in the formation of numerous levels of river terraces, well preserved along the main rivers draining westward the hinterland Transylvania and Braşov basins and eastward the foreland Focşani basin. Bedrock surfaces of terrace levels are often

covered by loess-paleosoil sequences, which are equivalent to the upper part of the regional loess sequence carpeting the Lowermost Pleistocene bedrock. Both sequences are partially dated through infrared stimulated luminescence. The results show that initial deposition of regional loess sequence started somewhere around 200 kyr (Mindel/Riss interglacial to Riss glacial; mid-Middle Pleistocene) in the Focşani foreland basin and continued during the Würm glacial (latest Pleistocene). Interesting during the later interval, it covered a larger area, extending as far west as the intramontane Braşov and Transylvania basins. This regional sequence overlies on top of the upper strath-terraces, which indicates that their bedrock surfaces formed mostly during the Mindel/Riss interglacial. Lower terraces are covered by a loess-paleosoil sequence deposited during the Würm glacial. We have obtained successive ages towards the hinterland of $\sim$32 kyr (40 m above the riverbed), $\sim$47 kyr (28 m above the riverbed) and $\sim$92 kyr (20 m above the riverbed). Paleosoils within the loess sequence are well correlated with marine isotope stages 1, 2, 3 and 5a-d (Würm glacial), which indicate that local short cold-warm phases have been recorded during the last glacial. The unconformity between the mid-Middle Pleistocene loess sequence and the underlying Lowermost Pleistocene Cândeşti conglomerates can be explained by subaerial exposure. This is the result of tectonic uplift and tilting during the late Early Pleistocene times which took place on the western Focşani flank. Elevation of terrace bedrock above the actual riverbed and its minimum age served to obtain the value of river incision/uplift rate recorded during the late Pleistocene. They increase eastward from 0.2 - 0.6 mm/yr in the Braşov basin to 1.2 mm/yr in the Focşani basin, pointing to larger amplitude of uplift in the foreland basin. On the whole, this study demonstrates a coeval tectonic and climatic control on river network evolution in the SE Carpathians.

References:

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