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Quantitative morphotectonic analysis of the South-Eastern Carpathians

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South-Eastern Carpathians (Vrancea Region) have received an increasing scientific attention during the past years, mostly resulting in a detailed reconstruction of their exumation history. Moreover structural and thermocronological data suggest that the frontal part of the SE Carpathians conserves the youngest topography in the Romanian Carpathians resulting from a deformational process occurring during the late Pliocene – Early Pleistocene. This significant tectonic activity continues to the present time as it is confirmed by the geodetic measurements and by the frequency of crustal earthquakes. The specific effects of the Quaternary deformations on the regional fluvial system were associated so far with an increased incision and the formation of the degradational (strath) terraces, downstream tiling of terraces, the establishment of local drainage divides and young longitudinal river profiles. Our study further investigates the possible influence of the recent tectonic activity on the characteristics of the drainage basins in the area and the distribution of the over-steepened stream reaches using spatial autocorrelation techniques (Getis Ord Gi* statistics and Anselin's Local Moran's I). For the first, hypsometric integrals (Hi) and transverse topographic symmetry factor were analyzed. For the last, we used locally computed normalized channel steepness index (k_{sn}). Due to the highly variable lithology in the region (specific to the Flysch areas), additional correlations of the determined values with the geological units and rock types have been made in order to assess the effects. The results show that the geographic clustering of the high Hi and k_{sn} values is more significant than the lithological one, and, although the rock strength have local influences, this is not sufficient to explain the regional distribution of the values, generally between 26.5^o and 26.66^o E ($p<0.05$). This corresponds with the eastern part of the SE Carpathians nappe system, partially with the exposure of the oldest, Cretaceous, sediments in the Vrancea half-window and also with the highest concentration of seismic hypocenters. Consequently, many of the fluvial aspects in the region, at least at medium scale, can be considered to be the effects of the last postcollisional exhumation stage.