Pliocene-Quaternary river-terrace sequences in intramontane basins in the south-eastern Alpine foreland (Slovenia): characterization of morphostratigraphy and provenance

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This study focuses on the Pliocene-Quaternary sedimentary evolution of the fluvial systems in the Slovenj Gradec, Nazarje, Velenje, Celje, Drava-Ptuj and Krško Basins in the south-eastern Alpine foreland, Slovenia. The main aim was to determine the composition, morphostratigraphy, provenance, sedimentary environment and age of the deposits using geomorphological, sedimentological, geochemical, mineralogical and biostratigraphical methods. Pliocene-Quaternary sediments were deposited in fluvial (braided and wandering river systems) and alluvial/colluvial fan environments. The sediments are preserved in the terrace staircase sequences, formation of which is strongly controlled by tectonic activity. Based on geomorphological analyses, low-, middle- and high-level terrace groups were constrained and tentatively attributed to Late Pleistocene, Middle Pleistocene, and Plio-Early Pleistocene, respectively. The provenance analyses focused on the Plio-Early Pleistocene sediments and included lithological and microfacies analyses of the clasts. Based on the provenance analyses and published data, the long-term development of the drainage network was interpreted. Major changes occurred during the transition from Miocene-Pliocene and at the latest at Plio-Early Pleistocene the drainage network reached conformity with the present one. Overall, the spatial distribution of the Pliocene-Quaternary landforms revealed tectonic activity in intramontane basins during their development, from which the landscape evolution was deduced.