

Trace elements and zircon ages to unravel Late Palaeozoic igneous episodes and Variscan geodynamic processes in the Tisza Mega-unit (Carpathian–Pannonian region)

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In the Tisza Mega-unit, the products of several Permo-Carboniferous magmatic episodes occur in outcrops (e.g., Apuseni and Mecsek Mts.) or were drilled in the Pannonian Basin. Despite their common presence, neither the Variscan tectonic settings in which they were generated, nor the ages of these formations were satisfactorily answered so far. As the studied rocks were often affected by post-magmatic alterations (e.g., shearing, low-grade metamorphism, hydrothermal overprint, K/Na metasomatism), our interpretations and geotectonic implications were based on relatively immobile trace elements (HFSEs). The following major magmatic events were revealed:

(1) An Early Carboniferous (~356 Ma) S-type granite magmatism in the western Apuseni Mts. and in the basement of the Eastern Pannonian Basin, as monzogranites and granodiorites, with subalkaline, peraluminous, alkali-calcic or calc-alkalic, and magnesian character associated with the Variscan orogeny. Despite their typical S-type mineralogy (e.g., muscovite, monazite, garnet) that should refer to the purely continental crustal (syn-collisional) derivation of the rocks, geotectonic discriminations (e.g., Yb vs. Ta, Yb+Ta vs. Rb) suggested an arc origin. However, other means of discrimination (e.g., relatively high Sr/Y and La/Yb ratios) raised the possibility that the studied granitoids bear the geochemical signature of a slab break-off.

(2) A Mid-Permian (~271–259 Ma) magmatic system was explored in a relatively large area of the mega-unit, from the Mecsek to the Apuseni Mts. Although this igneous system is

rather complex and consists of plutonic and subvolcanic rocks (gabbros to granites, the so-called Highiş igneous complex, SW Apuseni Mts.) as well as mafic-intermediate lavas and felsic pyroclastic rocks (western–central Apuseni Mts., basement of the Pannonian Basin, Mecsek Mts.) which were separated from each other by subsequent Alpine tectonism, the practically identical trace element (e.g., HFSE, REE) distributions of the rocks and the numerous obtained zircon ages refer to their common, anorogenic (A-type) origin. According to all geotectonic discriminations, the Mid-Permian magmatism was associated with a continental rifting in the Palaeo-Tethyan realm.

In a regional scale, both the Early Variscan orogenic and the Mid-Permian rift-related rocks show a close similarity to those of the Western Carpathian units.

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