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Permian plutonic-volcanic connections in the Tisza Mega-unit (Carpathian–Pannonian region): insights into a complex magmatic system by whole-rock geochemistry and zircon U–Pb geochronology

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Late Palaeozoic times were characterized by intense magmatic activity in the European Variscides controlled by a post-collisional extensional tectonic setting. Permian felsic ignimbrites and lavas are widespread in the Tisza Mega-unit, including Southern Transdanubia, the basement of the eastern Pannonian Basin (Hungary), and the Apuseni Mts (Romania). In the eastern areas mafic–intermediate lavas occur too, forming a bimodal volcanic suite with felsic ignimbrites. A Permian igneous complex (gabbros, diorites, granites, and felsic dykes) is exposed in the Highiş massif (SW Apuseni Mts); however, the connection of this suite with the aforementioned volcanic rocks have not been studied yet. Trace element geochemistry and zircon U–Pb geochronology were applied to investigate plutonic-volcanic relationships between variously altered magmatic rocks, structurally separated by Alpine nappe stacking and Neogene extension.

Felsic rocks are peraluminous, subalkaline, and A-type, showing quasi identical trace element characteristics. They are enriched in Rb, Th, and U and depleted in Ba, Nb, Sr, and Ti. REE patterns show high enrichment in LREEs, slight enrichment in HREEs, and a strong negative Eu/Eu*. Intermediate and mafic rocks show similar trace element patterns, but moderate enrichments and depletions, and negligible Eu/Eu*. According to numerous zircon U-Pb datings, the igneous rocks are Mid-Permian (~270–260 Ma) and represent a relatively short timespan. This complex, cogenetic system shows analogy to the Early Permian Sesia Magmatic System in the Southern Alps [1,2].

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[1] Karakas et al. (2019) *Geology* **47(8)**, 719-723. [2] Tavazzani et al. (2020) *J. Petrol.* **61(5)**