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Permian magmatism in the Carpathian–Panonnian region (Hungary and Romania): New geochronological and geochemical results

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In the Carpathian–Pannonian region (Pannonian Basin, Hungary and the Apuseni Mts, Romania) several Late Paleozoic magmatic episodes were revealed by zircon U-Pb geochronology. These events were genetically controlled by a post-collisional to extensional tectonic regime and occurred along the European Variscan Orogenic Belt. Detailed geochronological and geochemical information about the products of this magmatism play crucial role in the regional correlation studies which is the main goal of our research.

In the Tisza Mega-unit, including southern Transdanubia and the eastern Pannonian Basin (Hungary) as well as the Apuseni Mts (Romania), Permian felsic (dominantly rhyodacitic-dacitic) ignimbrites are common. In the western–central part of the Apuseni Mts, they are accompanied by basaltic and subordinate andesitic lavas, corresponding to a bimodal volcanic suite. Cogenetic plutonic (granites, diorites, gabbros) and subvolcanic rocks (felsic–intermediate dykes) occur in the SW part of the Apuseni Mts, Highiş massif. Immobile element features (REE patterns and multi-element spider diagrams) are similar for all of the aforementioned rock types, suggesting fractional crystallization from a common or similar source. Zircon U-Pb ages of this cogenetic rock assemblage overlap each other and fall within a ~10 Myr long time-span (269–259 Ma, Guadalupian). In contrast to the previous assumptions, the Permian felsic volcanites in the Tisza Mega-unit are not in connection with the granitoid rocks known in the basement of the eastern Pannonian Basin (e.g., Battonya granite). Based on our new data, the granitoids represent a Variscan (~356 Ma, Mississippian) plutonic body.

The dacitic subvolcanic rocks (dykes) and lavas in the ALCAPA Mega-unit, Central Transdanubia (Hungary) represent an older (~281 Ma, Cisuralian) and geochemically distinct volcanic episode than the magmatism in the Tisza Mega-unit. Associated plutonic rocks, however, are not known in the study area.

Regarding a broader correlation, the zircon U-Pb ages of the studied Permian plutonic and volcanic rocks of the Tisza Mega-unit are significantly younger than the ages of other well-studied parts of the Central European Variscides (e.g., Intra-Sudetic Basin, NE Germany) where much older ages were identified (300–280 Ma). On the other hand, felsic volcanic rocks of the ALCAPA Mega-unit do not differ from the aforementioned parts of the European Variscides in age. Based on whole-rock geochemistry and zircon geochronology, all of the observed Permian magmatic rocks show similarity with the Permian felsic volcanites of the Western Carpathians (Slovakia). Some further assumptions have been raised: (1) felsic volcanic rocks of the Tisza Mega-unit could correlate with similar rocks of the Southern Gemeric (Vozárová et al. 2009) and Silicic Units (Ondrejka et al. 2018) of the ALCAPA Mega-unit, while (2) the studied samples of Central Transdanubia might be in relationship with the felsic volcanites of the Northern Veporic Unit, ALCAPA Mega-unit (Vozárová et al. 2016). This study was financed by NRDIF (K131690).

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