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ABSTRACTS

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Mid-Cretaceous adakite/TTG-like magmatism at the north Getic basement of the South Carpathians (Romania): origin on geochemical basis and age data review

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Mid-Cretaceous trondhjemites and granodiorites (TGSCF), forming a swarm of over 300 sills, dikes and small intrusive bodies along the Sibișel Shear Zone belonging to the Transcarpathian fault system at the north Getic basement of the South Carpathians (Sebeş-Cibin-NW Făgăraş Mountains), are revisited. The rocks are Na_2O-rich (4.5–7%), mainly peraluminous and exceptionally metaluminous in few cases, with I-S type characteristics. Variable Sr (250–900 ppm), low HREE (Yb of 0.05–1.9 ppm) and Y (3–16 ppm) contents, hence medium–high Sr/Y (43–447), $(LaYb)_N$ (6–40.27) ratios and REE trends with small to no Eu anomalies, approximate an adakitic signature. The rocks differ from the real adakites by lower #Mg (20–46), Ni (<7.5 ppm) and Cr (<25 ppm) contents, overlapping the characteristics of some rare tonalite-trondhjemite-granodiorite (TTG) suites formed in the thick lower crust or from slab melts at a low angle subduction. Trace-element behavior and comparison with experimental results indicate that TGSCF rocks crystallized from partial melts of garnet-bearing rocks (garnet amphibolites or eclogites) as part of the mafic crust. Completed with Sr and Nd isotope values [Sr_i of 0.7040–0.7045 and ε_{Nd} (T) from (–2.26) to (+1.22)], the main source may be estimated as EMI-OIB, as island arc tholeiites from a depleted mantle-like component enriched by crustal contaminant or an extension-related underplated mafic material in a region where mantle was previously enriched by subduction. The complex inner structure of the dated zircons (Dobrescu *et al.*, 2010) reveals inherited pre-magmatic zircons of several Proterozoic and early Paleozoic age ranges, meaning old crustal input. Our model for TGSCF genesis implies an asthenolite as a thermal trigger underplating the lower crust, with H_2O source in its hydrated components (phlogopite from garnet-peridotite) or in amphibolite/meta-gabbro dehydration from lower crust, affecting old crust materials. Enriched mantle influence could have induced melting (10–20%) on the hybrid source material at temperatures of 980–1150 °C and P>10 kbar, generating trondhjemite-granodiorite melt and leaving amphibole + garnet + clinopyroxene ± plagioclase residue. The presence of hypabissal textures with partial dissolution and resorption, corroded hornblende and magmatic epidote in trondhjemites and muscovite in granodiorites indicate crystallizing conditions of a deep-seated emplacement, followed by a rapid ascend, tectonic uplift and exhumation. U-Pb zircon ages of 109.8–104.8 Ma interpreted as an intrusion time (Dobrescu *et al*., 2010) coincide with the supposed timing of the Ceahlău-Severin Ocean subduction/collision event. Rapid convergence and shallow subduction followed by tectonic underplating beneath Dacia, presumed by Ducea and Roban (2016) to have occurred at mid-Cretaceous time, provide a tectonic setting consistent with the adakite / TTG signature of the TGSCF rocks.

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