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Coeval magmatism in the Cretaceous in a zone between the European and Adria plates in Croatia: same source of alkali magmatism?

Petra Schneider (1), Dražen Balen (1), Hans-Joachim Massonne (2), and Joachim Opitz (2)

(1) University of Zagreb, Faculty of Science, Department of Geology, Division of Mineralogy and Petrology, Zagreb, Croatia (pschneider@geol.pmf.hr), (2) Universität Stuttgart, Institut für Mineralogie und Kristallchemie, Stuttgart, Germany

The red-coloured hematite-bearing granite from Mt. Požeška Gora (N Croatia) and the albite rhyolite from the Rupnica locality (town of Voćin, NW part of the Geopark Papuk, Croatia) with well-exposed phenomenon of columnar jointing are both characterized by a highly siliceous composition and enrichment in alkalies (high-K calc-alkaline series) and aluminium (peraluminous). They belong to a group of oxidized and ferroan rocks with low CaO, MgO, MnO and FeOT contents, and high FeOT/FeOT+MgO ratios. Moreover, standard geochemical classification and spider diagrams show that these rocks might have had the same source of origin.
The Mt. Požeška Gora granite is composed of alkali feldspar and quartz; with a small amount of plagioclase. Hematite, zircon, and apatite are accessory phases. Inclusions of kumdykolite, kokchetavite, hematite and apatite have been detected in zircon. Kumdykolite and kokchetavite are metastable phases crystallized from enclosed melt and are indicators, together with crystallographically oriented ilmenite exolutiosn in hematite and perthite, of a rapid cooling of the host magma. This granite shows a geochemical signature typical for the A2-type of post-collisional granite.
The Rupnica rhyolite is composed of albite and quartz and minor clinopyroxene and amphibole. Zircon, apatite, anatase and Fe-oxides are accessory phases. Analysis of columnar jointing developed in this rhyolite together with Zr saturation temperature point to a high-temperature and rapidly cooled (sub)surface acidic igneous body.
The investigation of the zircon typology resulted in the dominance of the D-type in the granite and the G1-type in the rhyolite. Both types are characteristic for an alkali and dry A-type of (granitic) magma with origin in the lower crust or even the upper mantle. Calculated Zr-saturation temperatures are similar and quite high for both rocks (860-950°C for granite; 840-870°C for rhyolite) compatible with the determined high Ti-in-zircon temperature (930°C for rhyolite) and apatite saturation temperature (900°C for rhyolite). Furthermore, Zr/Hf ratios, which are also similar for granite and rhyolite (39-42 for whole-rock and 54-57 for zircon), together with other characteristic ratios (such as Rb/Sr, K/Ba, K/Rb) point to both crustal and mantle contribution to the granitic melt.
Cretaceous and Miocene ages were suggested for the formation of the Rupnica rhyolite. The ages obtained in this study on zircon using LA-ICP-MS (determined from 206Pb/238U) are 83.8±1.7 Ma for the rhyolite and 85.7±1.7 Ma (SEM) for the Mt. Požeška Gora granite. Thus, we think that regional Late Cretaceous events, which led to the closure of the western Neotethys branch, produced deep-seated magmas that ascended along a zone between the European and Adria plates.
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