

U-Pb zircon dating and zircon population analyses of the Paleogene magmatic rocks in Kyustendil and Kratovo area

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The investigated Paleogene magmatic rocks crop out mainly in the Serbo-Macedonian Massif and share the eastern part of the Vardar zone. They belong to: (1) the Kyustendil magmatic zone in Bulgaria (Harkovska, 1984) and (2) the northern part of the Kratovo-Zletovo area (Boev, Yanev, 2001 and references therein) in FYR Macedonia.

The Paleogene igneous rocks from the Kyustendil magmatic zone have predominantly acid composition (plot in the field of dacites, rhyolites, trachydacites) and high-K calc-alkaline magmatic seriality. The trace elements contents of these rocks reveal mainly magmatic arc geochemical characteristics (VAG). The REE-normalized patterns show that they are formed in the continental crust.

The studied Paleogene magmatic rocks from the northern part of the Kratovo-Zletovo area are from the Kriva reka valley and from the Bajlovce region – north of Kratovo. The volcanic rocks from the Kriva reka valley are trachyandesites (latites) to trachydacites, while those from Bajlovce region plot only in the field of the trachydacites (norm Q > 20%). The magmatic rocks from both provinces have high-K calc-alkaline magmatic seriality and magmatic arc geochemical signature.

The LA-ICP-MS U-Pb zircon dating of the rocks from Kyustendil area define a time span from 32.5 to 28.9 Ma. The rocks from Bajlovce region yield an average age of 31.25 Ma, while the age of Kriva reka volcanics vary in a narrow range from 28.9 Ma to 27.5 Ma. More interesting picture is outlined by the analyses of the zircon population about the age of the source rocks and their origin. In the zircon population from the dominant volcanic rock variety in the Ruen magmatic zone (the coarse-porphyric by sanidine trachyrhyodacites) one third consists of own magmatic Paleogene zircon crystals and the bigger part of the zircons have old inherited zircon cores. The inherited zircon cores are from two provinces, one with age-range of 220-280 Ma (Middle Triassic-Permian) and the second in the range 400-460 Ma (Lower Devonian – Upper Ordovician) age. The zircons population from the trachydacites of Bajlovce region consists predominantly of own magmatic crystals (2/3 of them) with well-defined magmatic oscillatory zoning and only one third of the grains are xenocrysts with Lower Permian to Upper Devonian ages. The characteristic feature of the zircons from the volcanics of the Kriva reka valley is their random abundance. Zircon xenocrysts are rare and without particular geological significance.

The isotope ages of the old zircon cores and xenocrysts of the Paleogene Kyustendil magmatic rocks (Grozdev et al., 2012) indicated, that these rocks are formed by melting of parts of the Vertiskos Terrane /Ograzhden Unit (Zidarov et al., 2003; Meinhold et al., 2010). In the Paleogene volcanics from the Bajlovce region, the contamination with old rocks was negligible (some Hercynian? materials) and was not a leading process during their formation. The volcanics from the Kriva reka valley are formed from a substrate of basic to intermediate composition.

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