First data on Early Cambrian acid magmatism in Central Stara Planina Mountain

Първи данни за раннокамбрийски кисел магматизъм в Централна Стара планина

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The pre-Permian basement of Central Stara Planina Mountain consists of two types of rock units – a low-grade dominantly metasedimentary unit (LGMU) and a suite of syn- to postkinematic plutons. Until recently the only known metaigneous rocks within the low-grade metamorphic unit were rarely occurring bodies of metabasic rocks (Cheshitev et al., 1994). Our detailed mapping reveal the existence of a rather widespread and specific suite of metamorphosed granitoids, which position, structural and petrographic features are almost unknown. They were designated as Ambaritsa metagranitoids (Gerdjikov et al., 2010) distinguished mainly in the allochthon as well as in the autochthon of Botev Vrah Thrust (Cheshitev, 1958; Balkanska, Gerdjikov, 2010).

The most typical exposures of the Ambaritsa metagranitoids crop out in the highest parts of the mountain in the region of the peaks Ambaritsa and Golyam Kupen, where their thickness, measured perpendicular to the main foliation, reaches more than 400 m, and builds almost entirely the allochthon of Botev Vrah Thrust. The rocks occur also at other localities within the Botev Vrah allochthon (east of Golyam Kupen peak), building mostly its lower levels. The Ambaritsa metagranitoids are distinguished within the autochthon of Botev Vrah Thrust as well, predominantly north of the town of Sopot and the villages of Sushitsa and Vasil Levski, at the south foot of the mountain.

The rocks within the suite are presented predominantly by leucocratic fine-grained granitoids metamorphosed at low-grade green schist facies. They are strongly foliated and transformed into banded gray-greenish to green-brown sericite, quartz-sericite and quartz-chlorite schists. In the mylonitic domains the foliation is often isoclinally folded (Fig. 1a) and some of the strongly deformed varieties resemble quartzites (Fig. 1b) that are very difficult to be distinguished from the metasediments of LGMU. Most likely the protoliths of these rocks were mainly hypoabyssal granites with minor presence of acid volcanics and tuffs. Despite the strong deformation, in some cases the primary fabric of fine-grained aplitoid granites is preserved in low-strain lenses. The complex intrusive relations between the LGMU and the Ambaritsa meta-

Fig. 1. Ambaritsa metagranitoids: a, isoclinally folded foliation in mylonitic domains, NE of the town of Sopot; b, strongly deformed rocks, resembling quartzites
granitoids, the close spatial association, as well as their similar deformation style and metamorphic overprint, hamper precise mapping of the contacts of the metagranitoids. Rarely the unit includes also metadioritic and metagranodioritic bodies that are fine-grained, contain small K-feldspar porphyroclasts and often are transformed into chlorite schists.

A specific feature of the Ambaritsa metagranitoids is the presence of numerous xenoliths of phyllites and schists from LGMU. Along some contacts with them black fine-grained hornfelses occur. At many places complex intrusive relations between the two low-grade metamorphic suites have been observed. Alteration and mixing of fine-grained leucocratic metagranitoids with rocks of the metasedimentary suite is characteristic in sections of significant thickness (up to tens of metres). These close relations between the rocks were the reason for assumption of sedimentary origin of the rocks belonging to the Ambaritsa metagranitoids (Kerekov, 1953, etc.).

The characteristic structural features of the Ambaritsa metagranitoids clearly indicate that they are older than the synkinematic and post-kinematic Variscan granitoids that are common in Central Stara Planina Mountain. In order to test this assumption we sampled for U-Pb dating the dominant type of Ambaritsa metagranitoids – leucocratic fine-grained metamorphosed hypabyssal granite (Fig. 2a) with small (up to 0.2 cm) K-feldspar porphyroclasts. The sampled rocks crop out within the allochthon of Botev Vrah Trust, east of Ambaritsa peak. All separated zircon grains display features of magmatic origin. The obtained U-Pb TIMS age (of single zircon grains) – 518 ± 2.5 Ma confirmed the field and microstructural observations (Fig. 2b).

These data unambiguously indicate the presence of Early Cambrian acid magmatism in Central Stara Planina Mountain. Such magmatism is well-known in other segments of the Variscan orogenic belt in Europe (Dörr et al., 1998, etc.). Unlike the common interpretation of the metabasic rocks within the LGMU as olistoliths here we present data that unequivocally point that Ambaritsa granitoids have been intruded into LGMU. The field relations (cross-cutting contacts and local development of hornfelses in the vicinities of Ambaritsa metagranitoids) indicate that the age of the sediments from LGU is Early Cambrian or Late Precambrian. In this regard it is starting to emerge that the protholith age of the low-grade rocks in the pre-Permian basement in Central Stara Planina is different (e.g. possibly Ordovician in Zlatitsa Stara Planina vs. Pre-Cambrian or Early Cambrian in Kalofor Stara Planina).

References


