U-Pb zircon dating of the acid volcanic rocks from the Sofia Stara Planina (Balkan) Mountains, West Bulgaria

U-Pb датиране на циркони от кисели вулканити от Софийска Стара планина, Западна България

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The studied volcanic rocks crop out in the western part of the Sofia Stara Planina Mountains, in the southern end of Vlado Trichkov village. They form an elongated W–E body building the Barzova Chukla hill. These rocks are conventionally attributed to the Permian volcanics in the Svoge unit belonging to Srednogorie tectonic zone (Dabovski et al., 2002). The volcanic body intersects the southern vertical limb of the Pchelina syncline (Angelov et al., 2010a). The syncline is sub-equatorial (ENE–WSW) and consists of early Paleozoic sediments (“meta”-silstone and shale with dark gray to gray-green color as well as black shales with cherts) of Tseretsel (Spassov, 1960), Sirman, Saltar (Sachanski, 1993) and Romcha (Angelov et al., 2010b) Formations (O_3 – D_{2-3}). Dimitrov (1927) referred this outcrop of volcanic rocks as a part of the Diabase-keratophyre Formation. Volcanic rocks are characterized by Chunev et al. (1964) as stratified volcanic products with intermediate to acid composition. The studied volcanic body occupies an area of 0.3 km^2 (1.5 × 0.2 km). They have gray-greenish color with a shade of violet and contain visible small plagioclase phenocrysts. The studied sample is dark grey in color with massive structure, fine porphyric texture and contains phenocrysts of plagioclase (mainly), biotite, amphibole and quartz hosted by ground mass with felsitic texture built of plagioclase, quartz, K-feldspar and fine biotite flakes. It is important to note that the rocks are intensively altered and the hydrothermal mineralization is composed of carbonates, chlorite, sericite and clay phases. The rocks contain abundant apatite and fine disseminated pyrite.

Analytical methods and results

Zircon crystals were separated from 63–250 μm sieved fractions using standard heavy-liquid techniques, handpicked and mounted in epoxy resin, and polished to the middle of the grains. To reveal the internal textures of the crystals we made cathodoluminescence (CL) and back-scattered (BSE) images of the zircon grains using SEM-EDS (JEOL

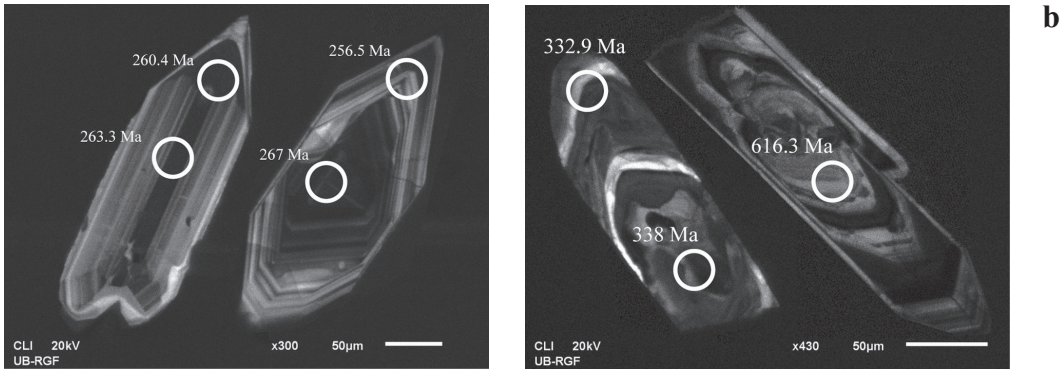

Fig. 1a, b. Cathodoluminescent images of zircons from investigated sample. The circles show the position of the laser-ablation craters with the corresponding $^{206}Pb/^{238}U$ age.

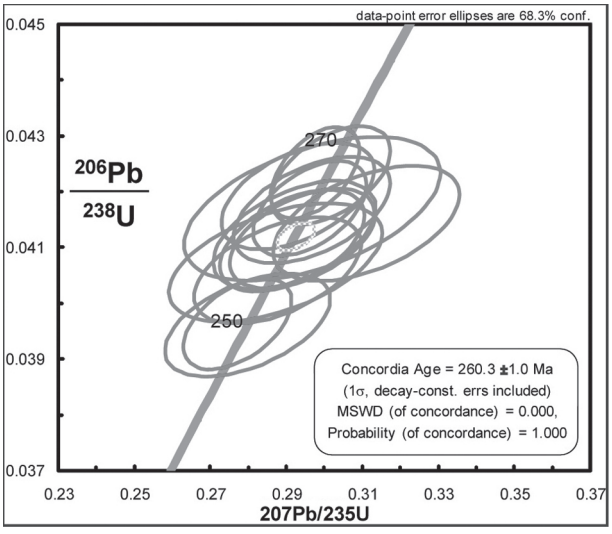

Fig. 2. Concordia diagram for zircon in investigation sample

JSM-6610 LV) scanning electron microscope at the University of Belgrade (Faculty of Mining and Geology). Zircon LA-ICP-MS U-Pb isotope dating was performed at the Geological Institute of BAS using NW excimer laser equipped with DRC-e PE system. Isotope age calculations and plots are obtained via ISOPLOT–v3.

The CL/BSE imaging of the zircons from the studied volcanic rocks revealed zircon crystals with oscillatory igneous zoning, inherited zircons and cores. The age of volcanic rock is determined as Permian – 260.3 ± 1.0 Ma by concordant zircons (Fig. 1a, b). The inherited zircons and cores have Proterozoic and Paleozoic age (Fig. 2).

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