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Detrital zircon age constraints on the deposition of the Topolovgrad Group, Sakar-Strandzha Zone, SE Bulgaria

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The Topolovgrad Group represents the Sakar-type Triassic in SE Bulgaria, which unconformably overlies the high-grade metamorphic basement, and consists of meta-sedimentary rocks subdivided into three formations (Chatalov, 1988). The lower clastic Paleokastro Formation passes gradually into the overlying clastic-carbonate Ustrem Formation, the upper levels of which contain latest Lower Triassic bivalves, and which is conformably overlain by the Middle Triassic conodont-bearing carbonate Srem Formation. The Topolovgrad Group is interpreted as a basal fluvial-alluvial sedimentary succession (Paleokastro Formation), progressively fining upwards (Ustrem Formation) and grading into a shallow-water carbonate platform (Srem Formation) deposited in a Triassic sedimentary basin. Several authors mentioned that the magmatic rocks of the adjacent Sakar batholith and Melnitsa complex have been reworked as pebbles and clasts in the Paleokastro Formation. In this contribution, we use U-Pb LA-ICP-MS dating of detrital zircons in clastic rocks from the Paleokastro and Ustrem Formations to constrain the timing of deposition of the Topolovgrad Group.

The arcosic schist matrix (sample S8) of a pebbly conglomerate in the basal level of the stratigraphic type section of the Paleokastro Formation fines up to coarse arcose (sample S5) in the topmost stratigraphic levels. Both lithologies were sampled nearby the Sakar batholith dated at 295-296 Ma (Bonev et al., 2017). A coarse-grained arcose (sample S19) of the Paleokastro Formation directly overlies the Melnitsa complex dated at 297-300 Ma (Bonev et al., 2017). The youngest zircon out of 105 grains analyzed in sample S8 yielded an age of 281.5 $\pm$ 2.0 Ma. An age of 305.8 $\pm$ 2.6 Ma was obtained for a cluster of concordant grains out of 105 grains analyzed in sample S19. An age of 259.1 $\pm$ 5.8 Ma yielded the youngest zircon out of 102 grains analyzed in sample S5, and hence, the samples define the maximum depositional age in the Late Permian for the Paleokastro Formation. The youngest zircon out of 104 zircon grains analyzed in the Ustrem Formation on a calcareous subarcose (sample S12) yielded an age of 272.2 $\pm$ 3.1 Ma, and hence, defines a maximum Middle Permian depositional age. A main zircon age cluster in all dated samples comprises Carboniferous-Permian ages in the range 357 to 290 Ma, with minor Neoarchean-Proterozoic (2670-553 Ma), Cambrian (541-498 Ma), Ordovician-Silurian (484-423 Ma) and Devonian (378 Ma) age clusters. These age clusters correspond to known detrital zircon clusters in the metamorphic basement of the Sakar-Strandzha zone in Turkey (Sunal et al., 2008). Our study provides for the first time statistically confident age data about the Late Permian onset of the sedimentation of the Topolovgrad Group, where clastic components were sourced from the underlying metamorphic basement and adjacent Ordovician and Late Carboniferous-Permian magmatic rocks.

References

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