



Detrital zircon and Sr isotope constraints on the deposition of the Pirin-Pangeon carbonate platform, Lower Rhodope Thrust System, Pirin unit, Bulgaria

Nikolay Bonev (1), Petyo Filipov (2), Raya Raicheva (2), Massimo Chiaradia (3), and Robert Moritz (3)

(1) Department of Geology, Paleontology and Fossil Fuels, Sofia University St Kliment Ohridski, Sofia, Bulgaria, niki@gea.uni-sofia.bg, (2) Department of Geochemistry and Petrology, Geological Institute of the Bulgarian Academy of Sciences, Sofia, Bulgaria, (3) Department of Earth Sciences, University of Geneva, Geneva, Switzerland

A marble-dominated succession represents a carbonate platform that constitutes the lower Rhodope thrust system of Bulgaria and Greece. It is known as the Pangeon or the Pirin-Pangeon unit. The deposition of the Pirin-Pangeon carbonate platform is assumed to be from Silurian to Carboniferous based on a single coral find. The depositional age of this carbonate platform is critical for a better understanding of the paleogeography and geodynamics of the Tethyan realm in the Aegean region.

In this contribution, we combine U-Pb LA-ICP-MS dating of detrital zircons from schist layers interstratified with the marble and Sr isotopic compositions of the marble in the Pirin unit in Bulgaria to constrain the timing of deposition of the Pirin-Pangeon carbonate platform.

Thin schist layers have been documented in marble of Pirin unit at localities near the villages of Ilindentsi and Petrovo. At Ilindentsi, an amphibole-biotite schist layer is interbedded with marble. The schist layer is overlain by gray marble and underlain by impure white mica-rich marble that passes into white marble. The youngest zircon out of 92 zircon grains analyzed in Ilindentsi schist sample yielded an age of 266.4 ± 4.8 Ma, and hence, defines the maximum depositional age in Mid-Late Permian. A main zircon age cluster comprises Cambrian ages, with minor clusters of Neoproterozoic, Ordovician and a single Carboniferous age. Six discordant grains range in age from 563 Ma to 466 Ma. At Petrovo, a layer of Fe-rich calc-schist is underlain by a layer of biotite schist, and both are interbedded within the marble. The overlying white marble demonstrates preserved fine shale laminae underneath a medium-grained white marble. The youngest zircon out of 105 zircon grains analyzed in Petrovo calc-schist sample yielded an age of 290.2 ± 3.7 Ma, and hence, defines a maximum Early Permian depositional age. This age is confirmed by four grains that yielded a concordia age of 299.5 ± 1.3 Ma. Zircon ages span the Carboniferous, with a peak at 317 Ma. Our study provides for the first time age data about the Early-Mid Permian carbonate sedimentation along the Rhodopian margin of Eurasia as revealed by the detrital zircons in the schist layers within Pirin-Pangeon marbles. Noteworthy is the absence of detrital zircon input from the nearby Triassic granitoids. Sr isotopic compositions of three marble samples range from 0.707420 to 0.707653, and are consistent, with the Mid-Late Permian depositional age.

The results will be evaluated against the provenance from the Rhodope basement and adjacent units and the paleogeographic setting of the Pirin-Pangeon carbonate platform in the Tethyan realm.

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