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Timing and rate of exhumation of Central Sredna Gora Zone basement, Bulgaria

Eleonora Balkanska[1], Stoyan Georgiev[2], Alexandre Kounov[3], Irena Peytcheva[2], Takahiro Tagami[4], and Shigeru Sueoka[5]

[1]Department of Geology, Paleontology and Fossil Fuels, Sofia University, 1504 Sofia, Bulgaria (balkanska@gea.uni-sofia.bg)
[2]Geological Institute, Bulgarian Academy of Sciences, Sofia, Bulgaria, (kantega@abv.bg, peytcheva@erdw.ethz.ch)
[3]Department of Environmental Sciences, Basel University, 4056 Basel, Switzerland (a.kounov@unibas.ch)
[4]Department of Geology and Mineralogy, Kyoto University, 606-8502 Kyoto, Japan (tagami@kueps.kyoto-u.ac.jp)
[5]Tono Geoscience Center, Japan Atomic Energy Agency, 509-5102 Toki, Japan (sueoka.shigeru@jaea.go.jp)

Sredna Gora Zone in Bulgaria is confined between the Balkan fold-thrust belt to the north and the Rhodope metamorphic complex to the south. The pre-Mesozoic basement of the central parts of the zone consists of Variscan high-grade metamorphic rocks intruded by Late Carboniferous granitoid plutons. They are transgressively overlaid by Triassic epicontinental, arc-related Upper Cretaceous volcaniclastic and Paleocene continental deposits. The Paleogene-Neogene sediments of the Thrace basin cover unconformably the older rock sequences. The zone experienced several compressional and extensional events during the Alpine time followed by post-orogenic extension in the Cenozoic.

We performed apatite fission-track analysis on rocks from the central, topographically highest parts of the Sredna Gora Zone in order to constrain the cooling history of the Variscan basement. With this aim four granitic samples were collected at different altitude (between 565 and 1604 m) from the tectonically uninterrupted section along the slope of Sredna Gora Mountains. The samples were processed and analyzed in the newly established Low-Temperature Thermochronology Laboratory in Bulgaria using LA-ICP-MS technique.

The samples yield apatite FT ages between 41.6 ± 2.6 (the highermost sample) and 39.4 ± 3.1 (the lowermost sample). The obtained confined mean tracks lengths are between 12.81 and 14.06 μm with standard deviation between 0.99 and 2.11 μm. The Dpar values vary from 1.75 μm to 1.46 μm (with standard deviation of approx. 0.20 μm).

The obtained positive age-altitude correlation suggests indeed that the studied part of the basement has cooled as one single block. The apparent exhumation rate is estimated to 0.46 mm/year. However, the positive Dpar-age correlation implies that the age dispersion could be influenced by apatite kinetic variability and hence relatively different closure temperature for the analysed samples may be suggested. Therefore, we consider the estimated apparent exhumation rate as only the minimum possible rate. The thermal models of the analysed samples (using HeFTy software) also show moderate cooling rates in the period between 45 and 35 Ma. This cooling

could be related to the period of post-orogenic denudation and extension during the Eocene, associated with formation of the Thrace basin to the south-southeast. This extensional event, known from the whole Balkan Peninsula, is well documented in the neighbouring Balkan fold-thrust belt and the Rhodope metamorphic complex from where much faster exhumation rates were reported.

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