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New constrains on the thermal history of the Miocene Jarando basin (Southern Serbia)

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The Jarando basin, located in the internal Dinarides, formed in the course of the Miocene extension affecting the whole Alpine-Carpathian-Dinaride system (Schmid et al., 2008). In the study area Miocene extension led to the formation of a core-complex in the Kopaonik area (Schefer et al., 2011) with the Jarando basin located in the hanging wall of the detachment fault.

The Jarando basin is characterized by the presence of bituminous coals, whereas in the other intramontane basins in Serbia coalification did not exceed the subbituminous stage within the same stratigraphic level. Furthermore, the basin hosts boron mineralizations (borates and howlite) and a magnesite deposit, which again implies elevated temperatures. This thermal overprint is possibly due to post-magmatic activity related to the emplacement of Oligocene I-type Kopaonik and Miocene S-type Polumir granitoid (Schefer et al., 2011.). This research project is aimed at providing new information about the thermal history of the Jarando basin. Fifteen core samples from three boreholes and 10 samples from the surrounding outcrops were processed for apatite fission-track analysis. Additionally, vitrinite reflectance was measured for 11 core samples of shales from one borehole and 5 samples of coal from an underground mine.

VR data of Early to Middle Miocene sediments reveal a strong post-depositional overprint. Values increase with the depth from 0.66-0.79% to 0.83-0.90%. Thus organic matter reached the bituminous stage and experienced temperatures of around 110-120˚C (Barker and Pawlewicz, 1994). FT single grain ages for apatite scatter between 45 Ma to 10 Ma with a general trend towards younger ages with depth. Both, the spread in single grain ages together with the bimodal track lengths distribution clearly point to partial annealing of the detrital apatites. With the temperature given from the VR values the partial annealing points to a rather short-lived thermal event. This is assisted by thermal modelling of our fission track data indicating that maximum temperatures of <120°C around 15-12 Ma. We correlate the thermal event with the extension and core-complex formation followed by the syn-extensional intrusion of the Polumir granite. Later cooling from 10 Ma onwards is related to basin inversion and erosion.