The thermotectonic evolution of the Apuseni Mountains (Romania) based on structural and geothermochronological data

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The Apuseni Mountains in Romania take a central position in the Alpine Carpathian Dinaride system between the Pannonian basin in the West and the Transylvanian basin in the East. Following the final Mid-Cretaceous obduction of the East Vardar ophiolite a NW-vergent nappe stack formed, which involves from bottom to top: Tisza-(Bihor and Codru) and Dacia-derived (Biharia) units, overlain by the South Apuseni or Transylvanian ophiolite belt (see Schmid et al., 2008). This study tries to provide new and additional information on the complex structural and metamorphic evolution of these units, from the onset of obduction during Jurassic times, to the (final?) exhumation processes observed during the Eocene (according to Merten, 2011). Based on observed stretching lineation, kinematic indicators such as porphyroclasts, shearbands, etc., were analysed to establish a relative chronological order of deformation and tectonic transport. Two major tectonic events can be differentiated through structural mapping: the first one, represented by penetrative top to the NE structures in the Biharia unit, relates to the thrusting of Tisza over Dacia during the mid-Cretaceous ("Austrian Phase" in local nomenclature). These top to the NE oriented structures are overprinted at internal nappe contacts and at the contacts to Codru and Bihor units by a top to the NW event during the Turonian, which relates to the NW directed backthrusting of Dacia units over Tisza (see Fig. 1). Microstructural studies provide additional data on the relative succession of events and the relevant synkinematic temperatures. A thermochronological study, based on the integration of newly aquired Rb-Sr, Sm-Nd, Ar-Ar and fission track ages with existing data allowed to assign the structures to the tectonic events, as well as to refine the tectonic history of the involved units. The position of the Transsylvanian ophiolites tectonically overlying the Biharia unit, as well as distinct thermochronological data define the need of a Late Jurassic-Earliest Cretaceous exhumation event preceding the earlier mentioned events, but this cannot be directly constrained by structural data so far. Later events, such as the "Laramian Phase" and Palaeogene tectonics caused mainly brittle structures and their thermal imprint is rather scarce.

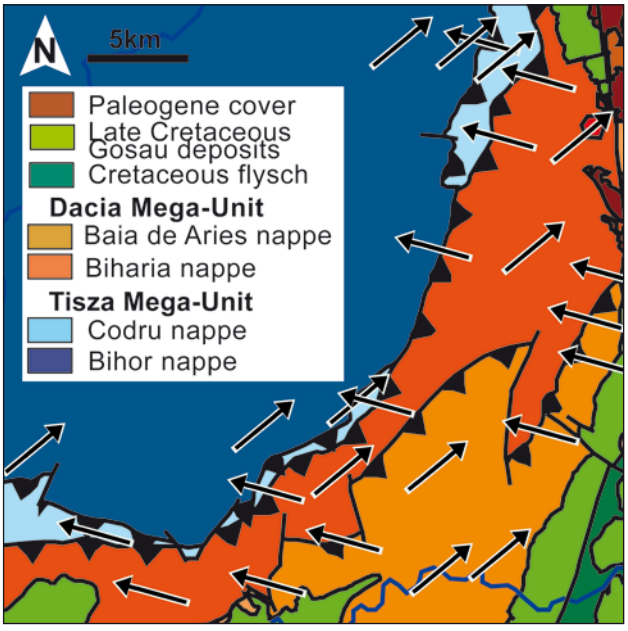

Fig. 1. Arrows show orientation of porphyroclasts. More internal parts of the nappes show the top to the NE orientation of the mid--Cretaceous "Austrian Phase" deformation, while the nappe contacts are overprinted by NW oriented Turonian deformation.

References

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