



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 lineations, kinematic indicators such as porphyroclasts, shearbands etc. were analyzed to establish a relative chronological order of deformation and tectonic transport. Microstructural studies provided additional data on the relative succession of events and the relevant synkinematic temperatures. A thermochronological study, based on the integration of newly acquired Rb-Sr, Sm-Nd, Ar-Ar and fission track ages with existing data allowed the construction of a time-temperature deformation path. Our data indicate three major events, a Late Jurassic-Earliest Cretaceous exhumation event, which cannot be directly constrained by structural data so far. Yet the position of the Transylvanian ophiolites tectonically overlying the Biharia unit as well as distinct thermochronological data are self-explaining. The second event ("Austrian Phase" in local nomenclature), documented by structural and thermochronological data, is related to the top to the NE thrusting (i.e. in present-day coordinates) of Tisza over Dacia during the Mid-Cretaceous. This penetrative event in the Biharia unit is overprinted at the contact between nappes by a third, top to the NW event during the Turonian, which relates to the NW directed backthrusting of Dacia units over Tisza. According to the position of the units in the nappe stack during the tectonic events, different structures and ages dominate within these units. The topmost nappe of the Biharia unit (Vidolm nappe), is a striking example for this position dependent overprint, by showing a strong "Austrian Phase" overprint and "Turonian" structures only at the contact to the Baia de Aries nappe. Tectonically deeper units are characterized by the dominance of "Turonian" relative to "Austrian" structures. Later events, such as the "Laramian Phase" and Palaeogene tectonics caused mainly brittle structures and their thermal imprint is rather scarce.

References:

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