



From Mountain Building to Orogenic Collapse: Interferences Between Dinaridic and Carpathian Orogenic Systems

Uros Stojadinovic (1), Liviu Matenco (1), Paul Andriessen (1), Marinko Toljic (2), and Jurgen Foeken (3)

(1) Netherlands Research Centre for Integrated Solid Earth Science, VU University Amsterdam, Netherlands,
(uros.stojadinovic@fslw.vu.nl), (2) Faculty of Mining and Geology, The Department of Geology, Belgrade University, Serbia,
(3) Qatar Petroleum, Research and Technology Department, Doha, Qatar

Pannonian back-arc basin is formed as a response to the rapid roll-back of a slab attached to the European continent and the invasion of the Tisza-Dacia and Alcapa upper plate blocks into the so-called Carpathians embayment starting at ~ 20 Ma. The general model assumes gradual development, with initial mechanical phase of extensional detachments being identified near the transition between the Alps and the Pannonian basin. This stage was subsequently followed by upper crustal normal faulting and a thermal phase during the Middle-late Miocene, recognized in the central part of the Pannonian basin. In previously published regional studies a discrepancy exists between the limited amounts of extension recorded in the crust and the large scale asthenospheric uprise which took place beneath the basin centre. This problem can be mechanically resolved by the existence of large scale extensional structures in other areas adjacent to the Pannonian basin, such as the Dinarides.

Recent structural studies have demonstrated that the Dinaridic suture zone inherited from the Cretaceous-Paleogene stages of subduction and continental collision (i.e. the Sava zone) has been subsequently reactivated by a series of major detachments accommodating a mechanical phase of extension during the collapse of the Great Hungarian plain. In this study we used magmatic, metamorphic and thermochronology dating in order to constrain the time period during which these detachments were active and quantify the uplift and exhumation along them. The newly obtained magmatic (U-Pb zircon), metamorphic (Rb-Sr) and thermochronology (apatite F-T&U-Th/He) data confirm rapid large-scale Lower-Middle Miocene uplift and exhumation in detachment footwalls from lower crustal levels (~ 350 - 400 °C). This was associated with lower crustal decompressional melting and emplacement or re-juvenation of S-type magmas along the N and NE margin of the Dinarides. The low-temperature thermochronology demonstrates that the Middle to Late Miocene exhumation was coeval with the Carpathians roll-back and the formation of large extensional basins in the hanging-wall of the top-E detachments, accommodating the subsidence observed in the main Pannonian back-arc basin.