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The Cer massif in the internal Dinarides: Exhumation triggered as a far-field effect of the Carpathian slab roll-back

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Extension across the southern Pannonian Basin and the internal Dinarides is characterized by the occurrence of a chain of Oligo-Miocene metamorphic core complexes (MCCs) exhumed along mylonitic low-angle extensional shear zones which in part represent former suturing thrusts. Cer MCC at the transition between the internal Dinarides and the Pannonian Basin occupies a structural position within the distal-most Adriatic thrust sheet and originates from two different tectonic processes: Late Cretaceous-Paleogene nappe-stacking during continent-continent collision between Adria and fragments of European lithosphere with Adria residing in a lower plate position, followed by Miocene exhumation. Structural data and a balanced cross section through the Cer massif show that the exhuming shear zone links to a breakaway fault, which reactivated the early Late Cretaceous most internal nappe contact between the two distal-most Adriatic thrust sheets. At Cer MCC, Paleozoic greenschist- to amphibolite-grade lithologies surround a polyphase intrusion composed of I- and S-type granites. These lithologies were exhumed along the shear zone by top-N transport. Thermobarometric analyses indicate an intrusion depth of 7-8 km of the Oligocene I-type granite; cooling below ~500°C occurred at 25.4±0.6 Ma (1σ) yielded by ⁴⁰Ar/³⁹Ar dating of hornblende. Biotite and white mica from this intrusion as well as from the mylonitic shear zone yield ⁴⁰Ar/³⁹Ar ages of 17-18 Ma independent of the used techniques (in-situ laser ablation, single-grain total fusion, single-grain step heating, and multi-grain step heating). White mica from the S-type granite yield an ⁴⁰Ar/³⁹Ar age of 16.7±0.1 Ma (1σ). Associated dikes intruding the shear zone were also affected by N-S extension, indicating that deformation was still ongoing at that time. Our data suggests that exhumation of the MCC was related to the opening of the Pannonian back-arc basin in response to the Carpathian slab-rollback and triggered extensional reactivation of thrusts in the internal Dinarides.