

The Miocene basin opening related to CCW rotations measured in the crustal wedge of ALCAPA domain

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In the Early Miocene (23–20 Ma), the ALCAPA microplate individualization and its following north-eastward escape was coupled with ~50° counter-clockwise (CCW) rotation of the Central Western Carpathians together with the Outer Western Carpathian accretionary wedge and the Northern Pannonian domain. Compression perpendicular to the front of the orogenic system led to a gradual closing of residual flysch troughs and growth of the accretionary wedge. Later on, the deep subsurface load of the sinking slab caused the subsidence of foredeep basins flanking the European Platform margins. Simultaneously, compression controlled disintegration of the forearc basin and opening of new wedge-top basins at the prograding northern edge of the microplate (~20–17 Ma). Along the southern boundary of the escaping ALCAPA, the subsidence of basin depocentres in the orogen rear part reflected initial rifting of the hinterland basin system in a transtensional tectonic regime. Pull-apart depocentres of the Eastern Slovakian Basin opened due to the dextral wrenching compensating the rotation of the microplate at the end of this period (~17 Ma).

The following Middle Miocene movement of microplate toward north-east led to disintegration of the Early Miocene wedge-top basins and to the opening of the Vienna Basin pull-apart depocentres (~16 Ma). This sinistral wrenching event was probably coupled also with ~30° CCW rotation in the outermost unit of Outer Western Carpathians, the Ždánice Unit. Simultaneously, shortening of the prograding accretionary wedge took place with widening of the Western Carpathian foredeep. The foredeep basin extended towards the platform with documented advance of the maximal subsidence from south-west to north-east. The Middle Miocene tectonic escape of ALCAPA resulted in double ~30° CCW rotations and associated with stretching of the orogenic system. The first ~30° CCW rotation (~15–13 Ma) led to opening and synrift subsidence of basins with depocentres west- and east-ward from the Central Western Carpathian stable core. Development of the Danube, composite Southern Slovakia–Northern Hungary, and Eastern Slovakia basins was forced by extension perpendicular to the orogen and associated with

voluminous volcanic activity along the margins of the hinterland (back-arc) basin system. The second $\sim 30^\circ$ CCW rotation (~ 12 Ma) led to a late synrift phase above the stretched microplate in NW–SE oriented transtension. Shift of maximal subsidence from west to east is documented as well. Beside the hinterland basins, also intramontane basins of the Central Western Carpathians subsided again.

The Late Miocene development is characterized by termination of sedimentation in the foredeep on the one hand, and opening of the new – Pannonian Basin System in the orogen hinterland (~ 11 – 10 Ma) on the other hand. This process was accompanied by stretching of both ALCAPA and Tisza-Dacia microplates due to the subduction pull in front of the Eastern Carpathians. Filling up of the hinterland basins associated with thermal subsidence and was followed by the Pliocene tectonic inversion and consequent erosion of the basin system margins.

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