



## **The Alpine-Carpathian-Dinaride-orogenic system: correlation and evolution of tectonic units**

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A correlation of tectonic units of the Alpine-Carpathian-Dinaride system of orogens, including the substrate of the Pannonian and Transylvanian basins, is presented in the form of a map. Combined with a series of crustal-scale cross sections this correlation of tectonic units yields a clearer picture of the three-dimensional architecture of this system of orogens that owes its considerable complexity to multiple overprinting of earlier by younger deformations.

The synthesis advanced here indicates that none of the branches of the Alpine Tethys and Neotethys extended eastward into the Dobrogea Orogen. Instead, the main branch of the Alpine Tethys linked up with the Meliata-Maliac-Vardar branch of the Neotethys into the area of the present-day Inner Dinarides. More easterly and subsidiary branches of the Alpine Tethys separated Tisza completely, and Dacia partially, from the European continent. Remnants of the Triassic parts of Neotethys (Meliata-Maliac) are preserved only as ophiolitic mélanges present below obducted Jurassic Neotethyan (Vardar) ophiolites. The opening of the Alpine Tethys was largely contemporaneous with the Latest Jurassic to Early Cretaceous obduction of parts of the Jurassic Vardar ophiolites. Closure of the Meliata-Maliac Ocean in the Alps and West Carpathians led to Cretaceous-age orogeny associated with an eclogitic overprint of the adjacent continental margin. The Triassic Meliata-Maliac and Jurassic Western

and Eastern Vardar ophiolites were derived from one single branch of Neotethys: the Meliata-Maliac-Vardar Ocean. Complex geometries resulting from out-of-sequence thrusting during Cretaceous and Tertiary orogenic phases underlay a variety of multi-ocean hypotheses, that were advanced in the literature and that we regard as incompatible with the field evidence.

The present-day configuration of tectonic units suggests that a former connection between ophiolitic units in West Carpathians and Dinarides was disrupted by substantial Miocene-age dislocations along the Mid-Hungarian Fault Zone, hiding a former lateral change in subduction polarity between West Carpathians and Dinarides. The SW-facing Dinaric Orogen, mainly structured in Cretaceous and Palaeogene times, was juxtaposed with the Tisza and Dacia Mega-Units along a NW-dipping suture (Sava Zone) in latest Cretaceous to Palaeogene times. The Dacia Mega-Unit (East and South Carpathian Orogen, including the Carpatho-Balkan Orogen and the Biharia nappe system of the Apuseni Mountains), was essentially consolidated by E-facing nappe stacking during an Early Cretaceous orogeny, while the adjacent Tisza Mega-Unit formed by NW-directed thrusting (in present-day coordinates) in Late Cretaceous times. The polyphase and multi-directional Cretaceous to Neogene deformation history of the Dinarides was preceded by the obduction of Vardar ophiolites onto to the Adriatic margin (Western Vardar Ophiolitic Unit) and parts of the European margin (Eastern Vardar Ophiolitic Unit) during Late Jurassic to Early Cretaceous times.