

The Pannonian basin: Review of evolution of a
Mediterranean inter-arc basin

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Summary

The Pannonian basin is a Neogene-Quaternary intermountain depression of the Alpine-Mediterranean region. Geological and geophysical data suggest that the formation of the basin has been controlled by upwelling partially molten mantle material. This mantle diapir was presumably generated by the Late Oligocene - Middle Miocene subduction along the Carpathian arc.

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Le Bassin pannonique présente une dépression intermontaine néogène-quaternaire du territoire alpin-méditerranéen. Des données géologiques et géophysiques indiquent que la formation du bassin était contrôlée par une matière de manteau ascendante, en partie fondue. On suppose que ce manteau diapirique a été généré par la subduction carpathique déroulée dans le Miocène inférieur et moyen.

The intra-Carpathian region is presumably composed of an African and a European microcontinent which came into contact towards the end of Oligocene. Geological data show that in the Late Oligocene-Early Miocene the unified Pannonian region was emergent. The region started to subside from the Middle Miocene and as a consequence of intensive andesitic-rhyolitic volcanism mainly volcanogenic sediments were deposited. The subsidence got accelerated during the Pliocene and it had an overall areal extent. The Quaternary has been characterized by fast subsidence in some part and by moderate uplift in other part of the basin. The Pliocene-Quaternary volcanism produced basaltic material. The average value of Neogene-Quaternary /mainly Pannonian/ subsidence is about 3 km and the contemporaneous horizontal extension is estimated to 20-50 km.

Geotemperatures /60-80°C in 1 km depth/ and heat flow values /2,0 HFU in average/ show that the crust and upper mantle of the Pannonian region is anomalously warm. The thin continental crust /24-28 km/, the elevated position of electrically highly conducting layer and low velocity zone of upper mantle /40-60 km and 60-70 km resp./, the low average Bouguer anomaly /+15 mgal/ and the positive seismic travel-time residuals /0.5 - 2.5 sec/ indicate a partially molten upper mantle diapir under the Pannonian basin.

It is suggested that the Late Oligocene - Early Miocene Carpathian subduction has generated the mantle diapir which has controlled the formation of the basin.