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A preliminary study of gravity field in the Eastern and Southern Carpathians and the narrow continental rifts in the Pannonian Basin

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Preliminary two-dimensional gravity models are presented along a Eastern Carpathian-Transylvanian basin-Pannonian basin transect and a Eastern Carpathian-Transylvanian basin-Southern Carpathian transect. The models are based on lithospheric cross-section on the Galati-Chisineu Cris profile, geological crustal cross-sections, published maps of crustal, lithosperic and sediment thisknesses, topography and detailed analysis of the long-wavelength Bouguer anomaly in Romania by local isostatic equilibrium study. The results show extensional lithosphere structures of the Transylvanian and Pannonian basin agree with the gravity field. Moreover, they indicate a crustal slab under the Eastern and Southern Carpathians.

The Pannonian basin is very suitable region for study of the image of the narrow continental rift as a mode of continental extension tectonics. In order to constrain the lithospheric structure of the B,k,s basin - the most available example of the narrow rift mode extension - gravimetric and magneto-telluric studies are presented. The study of the narrow rifts in the Pannonian basin suggets that an applied mode of continental extension tectonics from Buck for the B,k,s basin would be modified. The modification consists in consideration of intrusions of the high-density masses within the crust beneath the deep subbasin. The B,k,s basin is characterized by upwelling not only the Moho but also asthenosphere. In spite of significant thickness of the sedimentary basin fill the narrow rifts in the Pannonian basin are followed by relative gravity highs.

Alpine structure and geodynamic evolution of the Balkanides

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Recent plate tectonics concepts interprete the Alpine thrust belt on the Balkans as a mosaic of paleogeodynamic units, some of local and other of exotic origin, accreted to the Eurasian continent during the closure of the Tethys. The Balkanides, thrusted to the north over the foreland, form the external parts of the orogen.

The Alpine orogen is divided into two parts by the Vardar-Izmir-Ankara ophiolite suture - the main trace of the Tethys ocean which opened probably in the Middle Jurassic and closed during the Late Cretaceous or the Middle-Late Eocene. The northern part of the orogen includes mainly geodynamic units of the Eurasian continental margin and the southern one far-travelled fragments from Africa welded by sutures of different age and scale.

Parts of two first-order paleogeodynamic units are identified on the territory of Bulgaria: Moesian microcraton (foreland of the Alpine orogen) and deformed continental margin (the orogen itself).

The Moesian microcraton accreted to the Eurasian margin towards the end of the Paleozoic. It comprises a 3-5 km thick sequence of dominantly subhorizontal Mesozoic and Neozoic sediments overlying a pre-Paleozoic and Paleozoic folded basement. The cover rocks were deposited in shallow marine epicontinental basins with occasional and short continental depositional breaks. Major unconformities have been drilled at the base of the Triassic, Jurassic, Upper Cretaceous and the Neogene.

The deformed continental margin is a system of north vergent thrust sheets which contain fragments of the microcraton; of marginal flysch basin sediments formed during the Early-Middle Jurassic, Late Jurassic-Early Cretaceous and Late Cretaceous; of local, proximal and exotic tectonic units (or terranes) accreted to the continental margin during the Late Jurassic and the Early Cretaceous; of a Late Cretaceous volcanic island-arc system with recognisable frontal, axial and back-arc elements. A system of LateTertiary extensional basins is superimposed upon various units of the deformed continental margin.

Five stages may be recognised in the Alpine evolution of the continental margin: Triassic-Middle Jurassic (stage of passive continental margin in the northern periphery of the Paleotethys); Late Jurassic-Early Cretaceous (stage of passive continental margin in the northern periphery of the Neotethys); Late Cretaceous (stage Auf active continental margin and growth of the Srednogorie volcanic island-arc); Early Tertiary (collisional stage); Late Tertiary: (extensional stage).