Continental collision in the Romanian Carpathians: incorporation of geophysical data

Victor I. Mocanu[1] & Robert J. Lillie[2]

[1]Department of Geophysics, University of Bucharest, 6 Traian Vuia, RO-70139 Bucharest 1, PO 37, Romania
[2]Department of Geosciences, Oregon State University, 104 Wilkinsion Hall, Corvallis OR 97331-5506, USA

The rise of the Alps and Carpathians and the intermediate-crustal depth earthquakes from the Vrancea seismogenic area is a dramatic expression of the on-going orogeny in Central and Eastern Europe. In order to understand the driving mechanisms of this geotectonism, a good knowledge of lithosphere — astenosphere relationship and its dynamics in Cenozoic time is a necessity.

The scenario for the EUROPROBE–PANCARDI project is provided by the complex interplay of Alpine and Dinaric collisions and inferred lateral extrusions, Carpathian collision and subduction, and the Pannonian extension. The neotectonics is expressed today only by a snapshot of an orogenic process started in the Mesozoic time. It has involved the Paleogene continental collision of the Eastern Alps and the Balkan orogens, as well as the Neogene subduction further east, resulting in the development of the Carpathian volcanic arc and the back-arc Pannonian basin.

Gravity field of the PANCARDI region is one of the on-going PANCARDI research, involving colleagues from University of Bucharest, Oregon State University, Slovak Academy of Sciences, University of Salzburg and University of Karlsruhe. As part of this research, a complex study of the gravity field of the Romanian area of the Carpathian arc and surrounding areas was developed in the last year. Moreover, some other information is taken into account, as topography, sedimentary thickness, Moho geometry as well as the lithosphere/astenosphere boundary. In addition, the depth distribution of Vrancea earthquakes, both intermediate and crustal, seismic reflection and refraction, drillhole information are considered for supplementary constraints.

Previous work has analyzed similar geophysical data to study crustal and lithospheric structure associated to earlier collision in the Eastern Alps and Western Carpathians. High topography, along with thick crust and a broad region of low Bouguer anomalies, suggests about 175 km of continental convergence after the oceanic closure in the Eastern Alps. The Western Carpathians show low topography, thin crust and a narrow region of low Bouguer anomalies, proving only about 50 km convergence after oceanic closure. The European continental passive margin is thought to be beneath the Carpathian mountains.

A network of 12 regional cross sections allows to estimate the regional distribution of topography, Moho, litho-

sphere-astenosphere boundary as well as the sediments and associated gravity anomalies. Preliminary modelling on selected sections will be presented, showing the misfits of gravity. They will also permit to preliminary analyze the position of the European passive margin beneath the Romanian Carpathians.

The future plan, as modelling will progress, is mainly dedicated to study the structure of Eastern and Southern Carpathians at the time when the ocean basin has been just closed. The current study may thus be important to appreciate the stage of continental collision development in new and ancient mountain belts world-wide.