PLIOCENE TO ACTIVE TECTONICS IN THE AFTERMATH OF THE CONTINENTAL COLLISION IN THE SE CARPATHIANS CORNER: INFERENCES FROM SEISMIC, KINEMATIC, GEOMORPHOLOGICAL AND REMOTE SENSING STUDIES

L. Matenco (1,2), G. Bertotti (3), S. Cloetingh (3), M. Tarapoanca (2,4), K. Leever (2,3)

(1) University of Bucharest, Faculty of Geology and Geophysics, (2) Netherlands Research Centre for Integrated Solid Earth Sciences, (3) Vrije Universiteit, Faculty of Life and Earth Sciences, (4) S.C. Prospectiunii S.A. matl@gg.unibuc.ro

Much attention has been focused recently on the spatial and temporal variations in thrusting along the Carpathian arc and its relationship to unusual foredeep geometry and flexural behavior. The reconstruction of uplift and erosion history in and around the Carpathians and subsidence modeling in its foreland have elucidated for the first time the complex interplay of flexural downloading during collision, followed by unroofing, by unflexure and isostatic rebound. Late Miocene to Quaternary basin evolution studies demonstrate large scale subsidence in front of the SE Carpathians, culminating with significant differential vertical motions along and across the arc during the later stages. Consequently, as much as 1 km of Quaternary sediments were accumulated in the foredeep, while a similar amount of uplift is recorded towards the neighboring nappe pile, with no apparent role played by typical orogenic thrusting mechanisms. The entire western flank of the Focsani basin is tilted, indicating that differential movements are not controlled by single faults but are related to large-scale mechanisms with a wavelength of tens of kilometers. Active topography development appears to be the consequence of both neotectonics and significant climatic changes during the Quaternary, resulting in variations of erosion rates and sediment supply.
Quantification of the uplift in the western Focsani, at the limit with the previously deformed orogen, was possible through a careful geomorphological study combined with field kinematics and correlation between Pliocene-Quaternary stratigraphic units. Coeval subsidence is taking place a couple of tens of kilometers eastward, in the depocenter of the Focsani basin. The most apparent neotectonic feature relates to the NNW-SSE oriented Peceneaga-Camena fault system(s) which account for the gradual subsidence of the Moesian platform in respect to the surrounding uplifting blocks. Faults reach offsets of 200m during Quaternary as demonstrated by the combined seismic lines and field analysis. These features relate to differences inherited in rheology and the lithospheric memory of the lower plate(s) from the 11Ma collision time. The unusual character of the subduction along the Carpathian arc appears to be primarily controlled by the mechanical age of the underthrust lithosphere and lateral variations in the interplay between the lithosphere and surface processes.