P4-1 IMPROVEMENT OF THE CRUSTAL STRUCTURE MODEL IN AND AROUND THE EASTERN CARPATHIANS ARC BEND BY DEEP REFRACTION PROFILES

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The Eastern Carpathian Arc Bend was formed during the Alpine orogeny, beginning in the Mesozoic and was developed as an active area until presently. The particular interest of the ECAB study comes both from its structural complexity and from its affiliation to the Tornquist -Teisseyre zone.

Generally ECAB consists of several tectonic units affected by over-thrusted faults from west to east and having an internal structure of fold-faults, constituting a complex dystrophic structure. Sedimentary thickness reaches about 17 - 18 km on the eastern flank of the Foredeep situated in front of the ECAB. The whole region presents an axial sinking of all geological layers and a maximum crustal thickness of about 55 km (peak value for Romania). The Moho boundary sinking towards the mountain arc is in agreement with a supposed subduction process in the subcrustal domain and suggested by the hypocenter distribution placed in a near - vertical domain.

The strong absorption of seismic waves shown both by the explosion seismology and the relatively weak intensity of Vrancea earthquakes in Transylvania, some plasticity and an absorption role of the mountain roots; the same phenomenon is supported by the seismic gap in the 40-70 km depth interval. The relation between the tectonic areas in contact with ECAB both at crustal and subscrustal levels are poorly known. Geophysical research work, especially deep seismic sounding performed so far in parts of ECAB have brought some deep information, which is barely able to create a crustal image which can reflect all the structural complexity and to explain the mechanism of Vrancea earthquakes and their position within the lithosphere slab.

The investigation of ECAB using projected seismic refraction methods must bring new and valuable information about:

1. Crustal and possibly subcrustal structure of ECAB and adjacent areas; major discontinuities and crustal faults in the Carpathian Arc Bend; position of the Moho boundary in the Carpathian Arc Bend and adjacent Foredeep.

The length and location of the two projected refraction lines will enable a more detailed crustal structure model for the region where at least three tectonic plates are in contact: Moesian Plate, Intra-Alpine sub-plate and East European Plate.

2. Physical properties of the crust: seismic wave velocities, attenuation of seismic waves, crustal reflectivity and low velocity zones.

Two seismic refraction lines are projected to be performed in 1999 in Romania. The first line, with the orientation Bacau - Vrancea - south Bucharest, has 230 km in length and will have 114 recording seismic stations with a spacing of 2 - 5 km; 12 explosions of 300 - 900 kg TNT are to be shot on this profile. The second profile is a fan profile between Tg. Secuiesc and Marasesti and will be covered with 20 recording stations with the same spacing. Two explosions will be shot at both ends of this line. A sketch of these lines is presented in Figure 1.

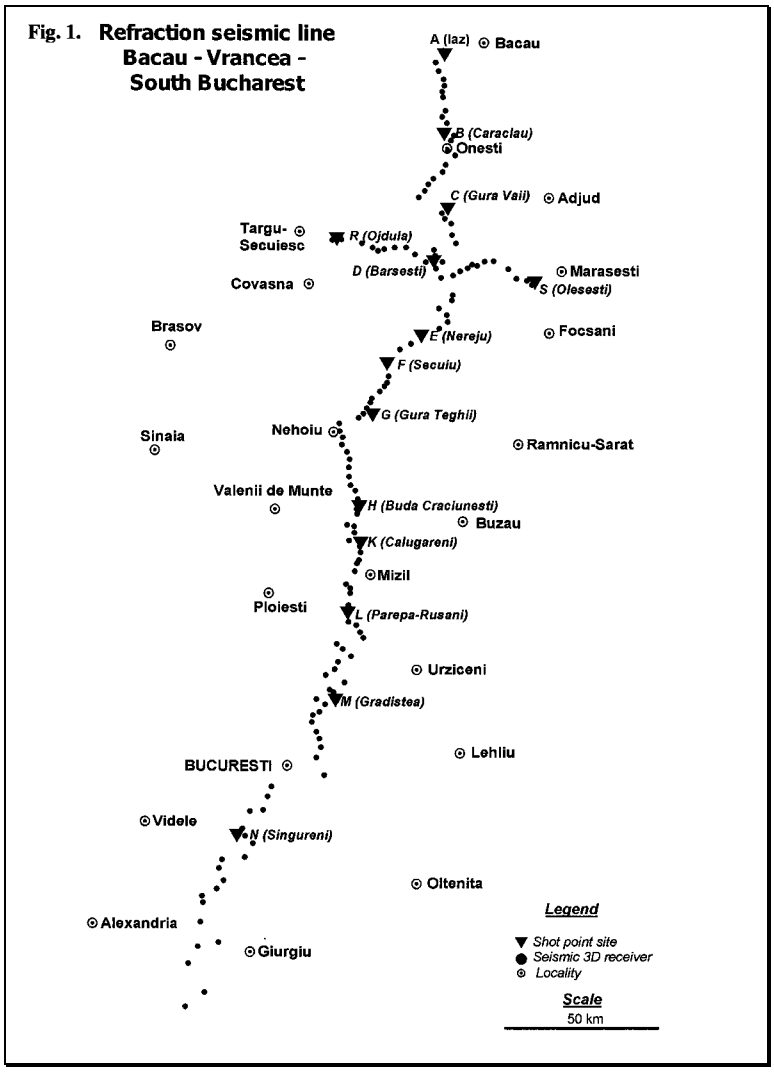

Fig. 1. Refraction seismic line Bacau - Vrancea - South Bucharest

Gravity, magnetics and high precision leveling are represented along the refraction profile to create a state of the art geophysical image in the area and to help interpretation and the construction of an improved crustal model of the region crossed by the refraction profile.