



Tectonic setting and geodynamics of the Black Sea-Caucasus-Caspian corridor inferred from deep seismic, gravity and magnetic data

S.L. Kostyuchenko (1) and R.A. Stephenson (2)

(1) V.V. Fedinsky Centre GEON, 4, Chisty per., Moscow, 119034, Russia, (2) Netherlands Centre for Integrated Solid Earth Sciences, Faculty of Earth and Life Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, Netherlands (e-mail: randell.stephenson@falw.vu.nl)

The southeastern parts of the Voronezh Massif and the Ukrainian Shield, the Rostov dome, the south-eastern Donbas Foldbelt, the Karpinsky Swell, the Scythian platform, the North-Caucasus dome, and the western flank of the Pre-Caspian Basin constitute the geodynamic ensemble of the Black Sea-Caucasus-Caspian corridor. Data derived from deep refraction and wide-angle reflection seismic soundings, from conventional (exploration) seismic studies and deep CDP profiling, and from the analysis of potential fields (including the results of three-dimensional gravity and magnetic modeling) image the crustal structure of this area and show distinct features that can be related to the main constituent tectonic units. The international DOBRE deep seismic profile in southern Ukraine and combined refraction - wide-angle reflection - near-vertical and converted wave deep seismic experiments along the Morozovsk-Manich-Elbrus regional profile in southern Russia contribute key inferences to the understanding of the evolution of the study area. New maps of depth to crystalline basement, Moho topography, and crystalline crust thickness have been compiled.

It is concluded that the Voronezh Massif, the Ukrainian Shield, and Rostov dome, which are covered by Palaeozoic to Cainozoic sedimentary sequences, are the peripheral elements of the East-European Craton. The Donbas Foldbelt is a thrust-faulted, folded and inverted south-easternmost segment of the Dniepr-Donets Basin, which was an intracratonic rift in the Late Devonian-Early Carboniferous. The Karpinsky Swell is a folded rock ensemble from a paleo-Scythian back-arc basin setting, devel-

oped in Palaeozoic-early Mesozoic time south of East-European Craton, that has been displaced from south to north. CMP data indicate that signatures of shortening and thrusting occur in the crust of the Karpinsky Swell and Stavropol High, which, within the territory of the Scythian platform, separates the (Caucasus) Indol-Kuban foredeep to the west and the Tersk-Caspian foredeep to the east.

There were three main phases of evolution of the Donbas area in pre-Mesozoic times: Late Devonian-Early Carboniferous rifting, post-rift subsidence during the Carboniferous-Early Permian (synchronous with a southward displacement of the Rostov dome and with extension within a paleo-Scythian back-arc basin), and deformation after this. South-west of the Pre-Caspian Basin, in the western portion of Astrakhan dome, a pre-Palaeozoic, possibly Riphean, volcano-magmatic complex is interpreted on the basis of near vertical reflection seismic data. This complex and remnant subduction structures inferred to be in the upper mantle constitute the major features of a Baikalian convergence zone. The Middle Palaeozoic back-arc ensemble, what is now the western (Volgodonsk-Elistian) portion of Karpinsky Swell, was folded during Late Paleozoic-Early Mesozoic times and overthrust from south to north onto the southern slope of the East-European Craton. The Stavropol High was displaced to the north, tectonically transporting the Middle Palaeozoic mostly fore-arc sedimentary complex more than 100 km northward. The Mineralny Vody-North-Caucasus dome was overthrust from south to north onto the Scythian platform unit in the Late Cretaceous.