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Buried paleo-sedimentary basins in the north-eastern Black Sea-Azov Sea area and tectonic implications (DOBRE-2)

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A number of independent but inter-related projects carried out under the auspices of various national and international programmes in Ukraine including DARIUS were aimed at imaging the upper lithosphere, crustal and sedimentary basin architecture in the north-eastern Black Sea, southern Crimea and Kerch peninsulas and the Azov Sea. This region marks the transition from relatively undisturbed Precambrian European cratonic crust and lithosphere north of the Azov Sea to areas of significant Phanerozoic tectonics and basin development, in both extensional as well as compressional environments, to the south, including the eastern Black Sea rift, which is the main sedimentary basin of the study area. The wide-angle reflection and refraction (WARR) profile DOBRE-2, a Ukrainian national project with international participation (see below), overlapping some 115 km of the southern end of the DOBREfraction'99 profile (that crosses the intracratonic Donbas Foldbelt) in the north and running to the eastern Black Sea basin in the south, utilised on- and offshore recording and energy sources. It maps crustal velocity structure across the craton margin and documents, among other things, that the Moho deepens from 40 km to ∼47 km to the southwest below the Azov Sea and Crimean-Caucasus deformed zone. A regional CDP seismic profile coincident with DOBRE-2, crossing the Azov Sea, Kerch Peninsula and the north-eastern Black Sea southwest to the Ukraine-Turkey border, acquired by Ukrgeofisika (the Ukrainian national geophysical company) reveals in its inferred structural relationships the ages of Cretaceous and younger extensional and subsequent basin inversion tectonic events as well as the 2D geometry of basement displacement associated with post mid-Eocene inversion. A direct comparison of the results of the WARR velocity model and the near-vertical reflection structural image has been made by converting the former into the time domain. The results dramatically demonstrate that there are major, rift-like, sedimentary basins underlying the area of the Azov Sea and the inverted north-eastern margin of the Black Sea. It can be speculated that one of these basins may represent the previously unknown western prolongation of the Jurassic-aged Greater Caucasus back-arc basin and that the other may be the legacy of earlier – Late Palaeozoic-Triassic – extensional tectonics in this area.

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