

Geophysical exploration of the Black Sea Region

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A study based on an extensive geophysical exploration conducted by Italy, the Soviet Union and Bulgaria has provided an important contribution to the reconstruction of the structures, stratigraphy and evolution of the Black Sea and surrounding area.

The Black Sea is formed by two basins separated by the Mid-Black Sea Ridge with a NW-SE trend. In the deep W-Black Sea basin the seismostratigraphic reconstruction indicates that, on a substantially flat acoustic basement attributable to a basaltic layer, a very thick (over 14 Km) sedimentary sequence lies. Sedimentary cover started in the upper part of Lower Cretaceous and continued until the present. In the E-Black Sea basin the acoustic basement is affected by tectonization and fault displacements and is covered by a sedimentary succession which began in the Middle Jurassic phase and continues until the present with a total thickness of about 13.5 Km.

The geodynamic reconstruction of the region is considered beginning from Middle Jurassic when the relative motion between Africa and Europa, and consequent North-ward subduction of Tethys, originated the back-arc basin of Great Caucasus where a complete crustal opening took place. In the same time the Black Sea area was stretched and sea channels and epicontinental sea were created. A successive more important distensive phase occurred in the Lower Cretaceous when, according to a common scheme about the back-arc basins migration, the rifting moved Southward, producing Black Sea opening with formation of two basins the W-Black Sea basin evolved to the stage of complete crustal opening, the E-Black Sea basin to a stage of a very thin crust affected by numerous listric faults and block-tilting. This rifting process continued until the Paleocene.

From the Paleocene Black Sea margins were affected by different compressive phases that deformed and partially masked the distensive tectonic of the previous rifting phase. In Paleogene the N-ward movement of African mega-plate caused an anticlockwise rotation of the Black Sea crust producing a compressive phase the Great Caucasus region and the closure of the basin. In Middle Eocene time Shatsky Ridge was formed simultaneously to the Balkanides chain and the thick Kemchian foredeep.

The compressive movements continued later with development of the important alpine system of Crimea, Great Caucasus and Lesser Caucasus. The deformation, mainly South-verging, presents also important North-verging back-thrusts in front of which we can observe its Oligocene-Miocene (Maikopian for soviet Authors) foredeep named Indol-Kuban basin. The shortening is actually active with very evident thrusting process in the NE margin of the Black Sea and in the Lesser Caucasus where big earthquakes frequently occur.