

An idea of the earth's hot belts: an application to the origin of the Black Sea depression

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The broad diagonal Persian- British belt of low velocity is recognized up to 800 km depth. It is viewed as a consequence of strong mantle heating. The Black Sea is a fragment of this belt and the trends of its structural lines are ort- and diagonal ones.

The periphery of the Black Sea basin is composed of the standard crust. The prominent feature of the depression is N-S Early Proterozoic deep faults extending from the Ukrainian Shield. In the aseismic inner part of the sea granitic layer is absent. The formation of deep depression is thought to be initiated by the upwelling of hot mantle material of the Black Sea plume. This material has been divided by the ancient Andrusov Rise into the West and East diapirs. The age of the ancient terrigenous material marks timing the diapir intrusion and the formation of the megavault. It is the Middle Paleozoic and the Triassic-Jurassic for the E. and W. Black Sea region respectively. The formation of such a vault is accompanied with the origin of compensating geosynclines surrounding the Black Sea depression. The upwelling of a large amount of melt matter (the first hundreds of thousands cubic kilometers) has resulted in equivalent mass deficit in the upper mantle. As a consequence the compensatory collapse of mass has occurred and the crust has undergone the huge subsidence. There are the mobile compensating features (the Great Caucasus, E. and W. Pontides, Crimean geosynclines) on the periphery of the Black Sea depression. On the other hand the mantle diapirs have resulted in the formation of vaults over them. The erratic boulders of the Riphean granitoids in the Jurassic and Cretaceous sediments of the Mountainous Crimea are believed to be remnants of these vaults. Their absence in younger deposits is explained by disappearing the vaults. On the basis on huge thickness of the sediments in the deep basins of the Black Sea, one can conclude that the vaults have finally been destroyed in the Paleogene.

Thus, the casual mechanism for the formation of the Black Sea is as follows. While cooling and crystallizing the upper part of the mantle diapirs its density isochemically increases. The dense material plunges into underlying partial melting layer causing the subsidence of the crust and the formation of deep basins. The plunge mechanism also results in squeezing melting matter out along contraction fractures and forming intrusions. These intrusive bodies are situated on the Black Sea periphery where they are documented by local positive gravity and heat flow anomalies.

CONCLUSIONS

- 1) The Black Sea depression is a fragment of the Persian-British hot belt.
- 2) The origin of the Black Sea depression has been initiated by extension of the ancient continental crust related to the upwelling of hot mantle material.
- 3) The Black Sea depression has been formed at the two stages .The first of them (progressive) is associated with the emplacement of diapirs and the second one (regressive) is related to the tectonic subsidence and the origin of deep basins.
- 4) The subsidence has taken place along the circum-Black Sea deep fault. The present-day magmatism and seismotectonics show that this subsidence continuous even now. The formation of the continental slope step appears to be linked with the regressive stage.

Formation of the Black Sea and Caspian Basins and the Paleogeography of Pre-, Syn- and Post-Rift Stages