O10-6	BLACK SEA BASIN: GRAVITY FIELD AND CRUSTAL STRUCTURE

I. MAKARENKO[1], V. BURYANOV, Y. OROVETSKY, V. STAROSTENKO, and O. LEGOSTAEVA[5]

[1] 32, Palladin prospect, Kiev, 252142, Ukraine
E-mail: irinam@igph.kiev.ua

The gravity field of the Black Sea Basin has been analysed at a scale of 1:1000000 and some of its local structures at a larger one as well. The studies were in two orientations: 1) 3-D modelling of the basins crustal structure was made by subdividing the complex field to set up a Moho discontinuity scheme scaled at 1:1000000; 2) the anomalies on three local structures of the basin were interpreted by separating a useful signal from the «noises».

I. By using a new automated interpretation system a detailed area calculations of the gravity effect of water and three layers of the sedimentary cover to 16 km depth were made, namely: 1) light, young Pliocen-Guarternary sediments (2,15 g/cm^3 density); 2) maikop sediments (2,35 g/cm^3) that are to 5—7 km thickness in the depressions; 3) compact Paleocene and Eocene sediments of 2,6—2,65 g/cm^3 density.

For the first time the contribution of intrusive bodies situated along the Black Sea Basin edge and producing large anomalies has been studied.

By excluding the effects of water, sediments, the previously obtained mantle component and the intrusive rocks the influence of the layer of the lower crust from 16 km depth to the M-surface has been detected. Interpretation of it field gives a detailed scheme of the crustal thickness of the Black Sea Basin [1].

The determined depth of the M-discontinuity is 19—20 km for the Western and 22 km for the Eastern Black Sea Basin, 32—33 km for the Central Black Sea rise, ca. 40 km for the Shatsky rise, 28 km for the Tuapse depression and 34 km for the Sorokin depression.

II. A detailed interpretation of gravity field of some local structures being in different tectonic situations also was made. An area geological reduction was made for three anomalous regions: 1) the *Sinop-Arkhangelsk region* consisting of two conjugated anomalies of different sense: the positive Sinop anomaly beginning from the eastern closure of the western Black Sea Basin and reaching the Anatolian coast and the negative Arckhangesk anomaly — a continental crust protrusion; 2) the *Crimea-Caucasus region* striking latitudinally from the southern mountainous part of the Crimean peninsula, crossing the sea south of the Kerch strait and is traced along the Caucasian coast to Abrau-Diurso inclusive; 3) an *anomaly situated on the NW shelf* with a linear branch toward the center of the western Black Sea Basin (the Radial anomaly).

The interpretation method using a new system [2, 3] of the input of geologic-geophysical maps to computer by scanning enabled us to separate local effects whose interpretation has determined the parameters of anomaly-forming bodies.

For the Sinop-Arkhangelsk region the following parameters of anomaly-forming bodies have been obtained: 4 km depth of the upper edge of the Sinop anomaly, 1 km one for the Arkhangelsk one, 20 km one for the lower edge; their densities are 3,3 and 2,52 g/cm^3 , respectively. It may be assumed that the Sinop anomaly is due to the exposures of hyperbasites in the weakened radial zone, their upper edge being situated in the sedimentary layer and the Arkhangelsk anomaly is a granitoid massif typical of the crust [4].

In the Crimea-Caucasus anomalous zone a two-stage evolution (progressive at the end of Mesozoic and regressive in Paleocene-Eocene) has been established for the first time. Magmatic masses controlled by the linear Radial anomaly initially intruded in Trias as a result of rifting over the ascending Western mantle diapir at the progressive stage of the Black Sea Basin evolution.

The anomaly of the NW shelf is produced by rocks with excess density of 0,2 g/cm^3 situated at 2 to 7 km depth. In the Radial part the depth of the upper edge is 4,0—4,8 km, thus covering the Pliocene-Guarternary sediments and that of the lower edge is 20 km. The magmatic masses intruded later in the Cretaceous-Paleogene interval at a tectonic node formed between the NW rift and the Circum-Black Sea fault of the continental slope of the Black Sea. The Paleogenic magmatism is associated with the regressive period of the Black Sea Basin evolution.

Genetic relation of the continental and the submarine magmatism with mantle diapirs of the deep troughs of the Black Sea Basin has been established.

References

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