

Mantle heterogeneities under the Black sea-Crimean oil-gas province

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Model is a basic foundation of a prediction of the geological structure with using seismic and seismological observations that captures the level of ideas about the environment and teaching methods of its study.

Mantle under the northern part of the Black Sea (Black sea-Crimean oil-gas province) [1] was study on the basis of 3-D P-velocity model of the mantle of Eurasia [2]. For interpretation of the 3-D P-velocity model of the mantle the method of analogies was used, consisting in the use of well-known and widely used in geophysical prospecting methodology of interpretation of seismic models - morphological analysis of the behavior of velocity limits and distribution of velocity anomalies [3].

Velocity heterogeneities (seismic domains) were provided on the basis of morphological analysis, which corresponding on the surface of the north-west shelf of the Black Sea, Crimean peninsula and the Azov sea. Velocity model of the mantle under the region reflects the complex nature of the interaction of two different geodynamic systems - orogenic surrounding and East-European platform. This is reflected in vertical zonation of a distribution δV_p , alternating high and low-velocity anomalies that apparently shows the active state of the mantle. Location of low-velocity anomalies in the upper mantle at depths of 150-300 km and 600-700 km spatially coincident with the oil and gas area Black sea-Crimean oil-gas province (Indol-Kuban, Black Sea, Azov-Berezansky, Black sea-Crimean). Placement of the major amount of proved reserves and the most promising sites for their search coincides with the boundaries of the selected velocity domains (blocks) of the mantle. Such regularity is observed and for mantle under other oil-gas provinces in particular for the Caspian region. Assumptions about the correlation of fluid flows with gradient zones of V_p confirmed by concurrence such zones with the areas of active volcanism. The possibility of interpretation of low-velocity anomalies as layers containing of a fluid confirmed balance and thermodynamic calculations showing the possibility of existence in the upper mantle of heavy hydrocarbons, that in equilibrium conditions and with an excess of carbon are replaced by methane in the Earth's crust and its closest homologues.

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3. Shumlanska L.A. Mantle blocks and zones of increased permeability of the mantle of the Ukrainian Shield // Geophysical Journal. - 2008. - Volume 30, № 2. - S.135-144.