

Neotectonic activization of the Crimean-Black Sea region

Pavlyuk M., Savchak O., Koltun Y.

Institute of Geology and Geochemistry of Combustible Minerals of the Ukrainian Academy of Sciences, 79060, 3-a Naukova Sr., Lviv, Ukraine, igggk@mail.lviv.ua

Seismic activity of the region, abnormally high formation pressures at local structures, activity of fractures and abnormally high concentrations of the elements of deep genesis are counted as one of the main geological factors determining modern tectonic regimes. The Crimean-Black Sea region for a long time is known by its seismic activity. The location of the earthquake epicenters in the Black Sea region points to that they are controlled by the Southern Bereznyi and Southern Pravdynsk breaks, which separate the Crimean Peninsula from the deep-water Black Sea depression, as well as by the South Azov break. The direction of seismofocal plane, that has a northern dipping, testifies to modern compressing strain and confirms the supposition that the Mountain Crimea was formed in consequence of underthrust (subduction) of the deep-seated zones of the lithosphere and mantle of the Black Sea plate under the Scythian Tectonic Belt, located farther north, with uplifting of its edge area. Analysis of the seismic activity of the Black Sea region shows that the greatest seismic activity is confined to the southern coast of the Black Sea, to Northern Anatolia, that is to say, to the zone included into the Alpine-Himalayas belt of active Alpine dislocations. In the northern Black Sea area, the earthquakes are of rather less activity, and they are concentrated in three areas only: near the Crimean Peninsula, in the Caucasus and in the region of Vrancea in the outlying part of the southern arc of the Carpathians in Romania. The epicenters of the most earthquakes in the region are concentrated in the earth crust at depths from 10 to 50 km. But in the region of Vrancha, except crustal earthquakes, a great number of substructural seismic disturbances were fixed at depths from 100 to 250 km. This fact already long time ago has allowed a number of investigators to identify the Vrancea zone with typical seismofocal Benioff zones. It is obvious that of the same nature are the crustal earthquakes of the southern coast of the Crimea and Caucasus. The epicenters of the Crimean earthquakes form a wide seismofocal plane (about 40 km wide) which is steeply inclined to the north underneath the Crimean Mountain. Just in this zone occurs the transition, the transformation of a "thin" suboceanic Black Sea lithosphere plate (thickness about 30 km) into the "thick" continental plate of the region of the Crimea and the slope of the Ukrainian Crystalline Shield. The thickness of the latter under the Mountain Crimea is 50 km. The activity breaks in the Crimea-Black Sea region is manifested either in restoration activity or is accompanied by the fields of neotectonic stresses only. Abnormally high concentrations of the elements deep genesis such as radon, helium, mercury vapours, etc., are the evidence of tectonic activities of fracture zones. Modern tectonic movements of the earth crust of the Northern Black Sea in the Quarternary time and during the present epoch are characterized by the predominance of uneven uplifting. Moreover, in the neotectonic maps isobases are of sublatitude extending. That may be just one more evidence of underthrusting of the suboceanic crust of the Crimea and Black Sea hollow under the continental crust of the Crimea and northern Black Sea area, the underthrust stimulated the uplifting of the Crimea and Black Sea region. Thus, neotectonic activization of the Crimea-Black Sea region fixed one of the stages of the Alpine tectogenesis connected with the collision of lithosphere plates of Arabian-African and Eurasian. This is in conformity with the northern direction of seismofocal zones of earthquakes of the region, especially in near-Crimean area. Judging from the centres of seismic activity of the region, the main direction of this activity are confined to the Crimean Peninsula, the Caucasus, the Southern Carpathians and Dobrogea (zone of Vrancea). According to our data, just in these areas are butt-ends (protrusions) of the lithosphere plates that are joined.