

Identification of hydrocarbon accumulation centers in the foundation of ancient platforms (on the example of the Orenburg region)

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Some researchers find a connection between radial-concentric structures and oil and gas fields, assuming that they are hydrocarbon accumulation zones. The centers of such structures are the centers of hydrocarbon generation and have geodynamic activity. Zones of radial and concentric faults - hydrocarbon migration routes. In the Orenburg region, the zoning significance of lineaments in the placement of hydrocarbon reserves has been repeatedly noted. But the connection of centres with oil and gas deposits was not noted, although there are prerequisites for this. Indeed, judging by the location of hydrocarbon deposits around the Orenburg oil and gas condensate field, concentric and arcuate strikes of oil and gas accumulations clearly dominate. The purpose of this work was an attempt to trace the radial-concentric basement structures that control the location of oil and gas fields in the southwest of the Orenburg region.

We have carried out the author's reinterpretation of temporary regional seismic profiles of the southwest of the Orenburg region using the method of successive approximations and detailing, taking into account all possible signs of tectonic disturbances to identify sources of hydrocarbon generation. The analysis of the results of geological-geophysical, geochemical, geomorphological works, interpretation of space images of the study area is carried out.

For regional profiles, general patterns are noted. In the areas of distribution of hydrocarbon deposits in the sedimentary cover, structures of the "flower" type are revealed on the time sections of seismic profiles. Above the accumulations of hydrocarbons, the salts of the Kungurian Stage of the Lower Permian form a dome. Under the deposits, there is a chaotic subvertically directed locally enhanced seismic record propagating below the reflecting horizon, identified with the top of the basement rocks.

Based on structural constructions, taking into account the results of interpretation, geomorphological work, the configuration of salt structures of the Kungurian stage, the location of hydrocarbon deposits, a schematic network of basement faults was obtained, genetically related to the latest tectonic shifts. Judging by the network, the deposits and structures identified by seismic surveys have a regular distribution within a large radial-concentric structure with a diameter of about 250 km. The unique Orenburg oil and gas condensate field is located in its "heart" and, possibly, is the result of the activity of the main centers of hydrocarbon generation in the basement. The Orenburg radial-concentric structure is a hydrocarbon accumulation center (resembling a paleocaldera in structure) in the basement of the East European Platform. Along the radial and concentric faults, which are apparently hydrocarbon migration routes, other smaller oil and gas deposits are concentrated.

In a similar way, several more large radial-concentric structures were identified on the territory of the ancient East European Platform. Exploration for oil and gas should be continued within the limits of the identified radial-concentric structures.