Features of the Structure of the Basement of the Southeast Part of the Pripyatsko-Dneprovsko-Donets Aulocogen

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On a basis of modern ideas of movement of lithospheric plates, the history of development of the Pripyatsko-Dneprovsko-Donets aulocogen is explained as episodes associated with a mantle convection cell.

1. Late Proterozoic with the beginning of a general rise of the crest region of the Sarmatian shield. There was localization of the main stresses along the marginal divergent part of the convection cell toward the southeast and northwest. Rising flow of mantle material in the sub-crustal zone led to gradual uplift of the region. Along with this there was an increase in stresses related to horizontal spreading of mantle material beneath the lithosphere. However, the lithospheric plate did not rupture.

2. Middle Paleozoic. In the subsequent stages in the life of the convection cell, tectonic activity in the region increased sharply. This led to a break in the continuity of the lithospheric plate of the Sarmatian shield and to initiation of the primary Central Donets fault.

One of the characteristic features of the history of geologic development of the aulocogen is an increase in tectonic activity of this geostructure toward the southeast. This is attributed to increasing heterogeneity of consolidation of the basement, indicating a gradual rejuvenation toward the east. See Fig. 1.

Since complete opening of the structure did not take place, oceanization of the crust in the aulocogen reached only an initial stage. This was marked by an increase in volcanic activity and also by the processes of intensive Devonian salt formation, which is characteristic of young oceans in their initial stages. At this point in time the convection cell ceased to operate. Further geologic development of the region took place on a consolidated lithospheric plate in the form of development of synclizes. Thus, there were three main periods in the development of the region: pre-aulocogen, early aulocogen embracing the time from the Middle Devonian to the beginning of the Carboniferous, and late aulocogen.