

Petrological geodynamic model for evolution of the crystalline basement of the Eastern Russian plate

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ABSTRACT

East of Russian plate is a typical platform area of the Earth crust. Geological, geophysical, seismic studies show active geodynamic processes within the region. Due to the active geodynamic processes subhorizontal tension is formed in the crystalline basement rocks. It leads to subhorizontal displacements – “disruption” of large blocks of rocks which are associated with occurrence of decompressed zones – zones of destruction. Formation of destruction zones in the Eastern Russian plate is associated with the general course of platform formation. According to geodynamic, mineralogical and petrological studies of deep and ultra-deep drilling there are the following stages of geodynamic development of the region: I. Initial (nuclear) stage. Formation of primary protocrust folded by poorly differentiated ultramafic material, which was later transformed by high temperature metamorphism (Katarchean period). II. Stage of the early differentiation and occurrence of aluminous and mafite silicate strata. There was an active developing of sialic crust by products of internal mantle differentiation (Archean period). III. Stage of the late differentiation and granitisation under inhomogeneous thermal field through active processes of heat and mass transfer in deep horizons (Late Archean, Proterozoic periods). IV. Stage of consolidated basement development. At this stage there was inception of extensive rifts limited by regional faults. As a result, stable basement elements - Tatar arch and Perm-Bashkir arch were jammed between the rift zones. Lowering of rift zones by system of inclined faults contributed to the horizontal stress and “disrupt” of individual plates of the basement. This was the cause for destruction zones – zones of compression and decompression. In the future, in times of geodynamic activities there was a renewal of these zones in the next Caledonian, Hercynian and Alpine tectonic genesis.

Key words: Crystalline basement; geodynamic processes; destruction zones.

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