



Fluid regime of the crystalline basement of the Tatarstan Arch

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The crystalline basement of the Tatarstan Arch is one of the central structures of the Volga-Ural anticline. The performed studies indicate that the crystalline basement is an ever-evolving geological structure in the ever-changing field of geodynamic stress. The active migration of fluid systems in crystalline rocks has been practically proven but its forms and mechanisms are still under discussion.

Most researchers link the migration of deep fluids to the deep faults in the Earth's crust that are considered the natural fluid-conducting channels. One of the major factors of fluid migration within the Tatarstan Arch's hydrothermal systems is the constant geodynamic evolution of the basement. This migration takes place in various forms depending on the geological conditions in the stress zone.

The crystalline basement and its periphery contain various fault systems disrupting the integrity of basement rocks. Fluid migration through deep faults occurs in the form of the movement of hydrothermal systems in weak/low-coherence zones, resulting in the development of metasomatic processes and fields of hydrothermally altered rocks in the basement.

However, according to the author's data, the stress state of basement rocks constantly changes. In some portions of the basement with no disruption of the rock integrity, fluids can migrate in the form of hydrothermal inclusions along the dislocation planes in the crystalline lattice of minerals.

This form of migration is very widespread and accounts for the formation of regional

fields of metasomatites of granite-gneiss structures of the ancient shields and other geological regions within the deformed geological environments.

The authors' research indicates that the corresponding capillary channels are formed within the dislocation systems of the crystalline lattice of minerals. Raster electron microscopy shows that such crystals of metamorphic rocks can be channels for hydrothermal fluids carrying gas-liquid inclusions.