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Dynamics of uranium ore formation in the basement and frame of the Streltsovskaya Caldera

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The analysis of geological-geophysical, paleogeodynamics, mineralogical, geochemical, isotope, geochronological, and termobarogeochemical data allow us to offer a model of uranium ore formation dynamics in the basement and frame of the Streltsovskaya Caldera connected to activity of the fluid-conducting fault zones network with the aim to identify perspective areas for prospecting works. It was established that:

The most long-living fluid-conducting structures are interblock NE-SW, NNE-submeridional, NW-SE and, probably, WNW-sublatitudinal faults. The oldest NE-SW faults and schistosity zones were formed during Proterozoic tectonic cycle (TC) with reactivation in T3-J2 time due to global reorganization of stress field and reactivation of tectonic movements. The NNE-submeridional and NW-SE faults were extended with increased fluid permeability during Caledonian and Variscan TCs. They also were reactivated in the process of Late Mesozoic tectonic and magmatic activation (TMA). Thus already at early stages of geotectonic evolution within the knots of NE-SW (N-Urulyunguyevskiy fault) and NNE-submeridional (Chindachinskaya zone) faults the areas of increased fluid and magmatic activity were formed.

The dynamics of fault formation in the basement and frame of the Streltsovskaya caldera and its volcanosedimentary cover differs. In the basement and granite framework NE-SW, NNE-submeridional and NW-SE faults are interblock structures of the I rank. Their knots formed areas of long-term circulation of hydrothermal solutions and telescopic appearance of multiage metasomatites that created conditions for localizing of vein-stockwork mineralization. In volcanosedimentary cover the NE-SW and NNE-submeridional faults should be considered as interblock structures of the I rank which knots provided inflow of ore-bearing solutions and their redistribution within the cover. Here the main ore distributing role belongs to NW-SE shears. They are intrablock II rank structures which were formed due to dextral strike-slip displacements along interblock faults during Late Mesozoic TMA. Within the knots of NW-SE shears with stratified low-angle faults the conditions for forming of bedded deposits were created.

At the Paleozoic and Mesozoic border (T3-J2) into the caldera NW frame the pull-apart structure was developed. Dimension of the caldera and structure is comparable, and the latter is now hidden under K1-Q sediments of Sukhoy Urulunguy depression. Combination of paleotectonic analysis and data on dynamics of ore-forming processes and fluid-conducting fault zone formation allows us to allocate three most perspective areas for carrying out prospecting activity. Two of them are located in Sukhoy Urulunguy depression in knots of NE-SW S-Urulyunguyevskiy fault with submeridional Gozogorsky and Meridional faults. The areas have prerequisites for detecting hidden Late Mesozoic mineralization both in volcanosedimentary cover and basement. The third area is located in knot of NE-SW N-Urulyunguyevskiy fault with meridional Chindachinskiy fault where prerequisites for detecting mineralization in Proterozoic-Early Paleozoic basement were found. It is supposed that these areas are mostly required for further prospecting activity and identification of additional uranium resources within the Streltsovskoe ore field.

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