



The relationship between collisional and trap magmatism of Taimyr from geological data and computer simulation results

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The Taimyr folded region was formed as a result of the collision of the Kara and Siberian continents at late Permian – early Triassic age. Geological data shown that in the Taymyr folded region the collision and trap magmatism are spatially combined [Vernikovskii, 1996]. At the collision stage (306-258 Ma) appears calc-alkaline granitic magmatism and zonal metamorphism. From 264 to 247 Ma post-collisional granitoid magmatism appeared, which was replaced by intensive trap magmatism (249-242 Ma). In time trap magmatism is associated with late-collision and post-collisional stages.

We use computer modeling to explain the relationship between collision and trap magmatism. In this work we show results of numerical computations based on petrological and thermomechanical 2D model [Gerya, Yuen, 2003], which simulates the process of collision between two continental plates, each 100–120 km thick, with convergence rate 3–5 cm/year.

Modeling shows that in the early stages of the collision the subducted continental crust melts, and acidic granitoid magmatism occurs. Collision leads to the growth of the orogen (up to 4-5 km in height). In the late stages of collision orogen is underplated by upwelling wet melt-bearing asthenospheric mantle and widens with time due to the delamination of the lithospheric mantle. Modeling showed the possibility of mantle and crust heating in the late stages of collision, accompanied by basaltic magmatism in a quite large amount. The width of the basalt magmatism zone is about 200 km, the thickness is 1-2 km. The proposed model of collisional and trap magmatism relationship seems preferable to the plume hypothesis.

The research is carried out using the equipment of the shared research facilities of HPC computing resources at Lomonosov Moscow State University.