



Archean plate tectonics geodynamics: example from the Belomorian province, Fennoscandian Shield

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A fragment of the Archean collisional Belomorian orogen has been identified as the Belomorian province (BP) of the Fennoscandian Shield (Slabunov, 2008; Holtta et al., 2014). The province consists dominantly of Archean rocks, Early Paleoproterozoic rocks being less abundant. Rock of BP exhumed from middle crustal depths in Paleoproterozoic time (1.94-1.8 Ga).

Seismic (CDP) profiling data (Sharov et al., 2010) show that the internal structure of BP reflects nappe tectonics: in Archean time, a collage of numerous slides was formed, and in Paleoproterozoic time the BP was thrusted on the Karelian craton and, in turn, was thrusted by rocks of the Kola province.

The BP consists dominantly of Meso- and Neoarchean rock association (Slabunov et al. 2006). Neoarchean granitoids predominate, but eclogite-bearing metam?lange (Volodichev et al., 2004; Mints et al., 2010; Shchipansky et al., 2012), island-arc volcanics, front-arc basin sediments, ophiolite-type oceanic plateau-type rocks, collisional S-granites, kyanite-facies metamorphic rocks, molassa-type rocks, subalkaline granitoids and leucogabbro have been revealed among supracrustal rock associations. Rocks of the Belomorian province were subjected to multiple metamorphism in Archean and Paleoproterozoic time at moderately high to high pressures and were considerably deformed.

High-grade supracrustal complexes make up not more than 20 % of the BP, but as they probably host ore and are crucial for the understanding of the formation and evolution of the structure, they are given close attention. Five generations of greenstone complexes of different ages: 2.88–2.82 Ga, 2.8–2.78 Ga, ca. 2.75 Ga , ca. 2.72 Ga and not later than 2.66 Ga, and two paragneiss complex in which sediments were formed 2.89-2.82 and 2.78 Ga ago, are distinguished.

The main stages of crustal evolution in the BP:

ca 2.88-2.82 Ga – the first subduction-accretion event marked by the following complexes: island-arc volcanics of the Keret GB; metagraywacke (front-arc basin sediments) of the Chupa paragneiss belt; Salma eclogites;
2.81?2.78 Ga – the second subduction-accretion event marked by the following complexes: island-arc volcanics, supra-subduction ophiolite (Iringora), graywackes, granulites (Notozero) and 4) eclogites (Kuru-Vaara);
2.75 Ga – the third subduction event marked by island-arc volcanics (Chelozero);
2.73-2.72 Ga – the fourth subduction-accretion event marked by : island-arc volcanics (Mil'kevich et al., 2007), granulites and Gridino eclogites;
ca 2.7-2.66 Ga – collisional event marked by: collisional S-granites, kyanite-facies metamorphic rocks, molassa-type rocks, subalkaline granitoids and leucogabbro.

The crustal evolution of the BP in the period 2.88-2.66 Ga is similar to the evolution of Phanerozoic collision orogens.

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