



## **Archaean collisional orogen: the main stages and duration of the Archaean lithospheric evolution of the Belomorian province (Fennoscandian Shield)**

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The Belomorian Province (BP) has important Meso- and Neo-archaeal complexes-indicators of geodynamic settings, such as ophiolites, island-arc volcanics, front-arc basin sediments, eclogite-bearing mixites, collisional granites and metamorphic rocks, volcanogenic-coarse- clastic rocks, subalkaline granitoids and leucogabbro (Slabunov et al., 2006 and references therein). Such complexes are common for Phanerozoic orogenic belts.

The earliest (ca 2.88-2.86 Ga) rocks in BP occur as fragments of the oceanic crust of the Central Belomorian greenstone belt (GB). During the period 2.88-2.83 Ga island-arc intermediate to felsic volcanics of the Keret and Tulppio GBs and metagraywackes of the Chupa paragneiss belt were formed for the first time in BP. Ca. 2.82 Ga the accretion of chiefly these island-arc complexes gave rise to the first fragments of the continental crust.

In the period of 2.8-2.73 Ga at least 3 island-arc systems are distinguished. Together with calc-alkaline- and adakite-series volcanics, one of the subduction systems was found to contain suprasubduction ophiolites (Irinogora complexe). As a result of accretion of these complexes to the sial blocks formed earlier, relatively large fragments of the continental crust were formed.

The next, pre-collisional, stage (2.73-2.71 Ga) of evolution of the BP is indicated by the Notozero moderate-pressure granulite-enderbite-charnockite complex in the western BP and the Gridino eclogite-bearing complex in the eastern BP. Metamorphic and magmatic events in the granulite complex reflect subduction on the active margin.

2720 Ma (Volodichev et al., 2004) eclogites suggest that oceanic rocks plunged to a depth of ca. 60-65 km in the subduction zone and were exhumed more recently.

From ca. 2.72-2.71 Ga onwards, the BP entered a collisional stage of evolution, indicated by nappe-fold tectonics, high-pressure metamorphism and granite formation. Collision resulted in the thicker crust and the collapse of the orogen. 2.69 Ga leucogabbro in BP seem to have arisen under extension conditions. Volcanics and coarse-clastic sediments, similar to volcanogenic molasse and indicative of rugged topography, were derived at the same stage. At the final stage (2.7-2.65 Ga) in the evolution of the system various granitoids were generated.

The Archaean Belomorian collisional orogen is thus correlatable with Phanerozoic structures of this type in both the general pattern and the duration of formation (ca. 200 Ma).

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References: Slabunov A.I., Lobach-Zhuchenko S.B., Bibikova E.V. et al. 2006. The Archaean nucleus of the Fennoscandian (Baltic) Shield. In: Gee D.G. & Stephenson R.A. (eds). *European Lithosphere Dynamics*. Geological Society, London, *Memoirs*, 32, pp. 627-644. Volodichev O. I., Slabunov A. I., Bibikova E. V., et al., 2004. Archaean eclogites of the Belomorian mobile belt // *Petrology*, Vol. 12, No.6, pp. 540-560.