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A new geological map of the SE Fennoscandian Shield as a basis for the study of the evolution of the early earth crust

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A 1:750 000 scale geological map of SE Fennoscandia, which includes the Karelian, Belomorian and SE Svecofennian provinces, was compiled in the Institute of Geology, KarRC, RAS [1]. Its legend is based on the International Stratigraphic Scale. The geological structure of the territory consists of the geological units of three eons: the Archaean, the Proterozoic and the Phanerozoic.

The oldest rocks known from SE Fennoscandia are 3.2 Ga TTG granitoids that have been reported only from the SE Karelian craton. At least 16 magmatic events, which occurred in the time intervals 3.0–2.9, 2.9–2.8, 2.8–2.7, 2.7–2.6 Ga in the Archaean eon (Mesoarchaean and Neoarchaean eras), are recognized. Komatiitic-basaltic assemblages in Archaean greenstone belts were formed in oceanic settings under the influence of mantle plumes and andesite-dacite series of adakitic and BADR-ADR types generated in convergent geodynamic systems; sedimentary and chemically precipitated complexes are common. Archaean suprasubduction ophiolites and eclogites are essential for geodynamic reconstructions. 3.1-2.7 Ga TTG, 2.74-2.70 sanukitoids (Mg-granitoids) and 2.7–2.6 Ga normal to elevated alkalinity granitoids are widespread in the craton. Active metamorphic processes took place in the 2.9–2.8, 2.8–2.72 (including the world's oldest eclogites) and 2.71–2.68 Ga periods [1 and references therein].

In the Proterozoic eon, magmatism of varying intensity took place in three eras. In the Palaeoproterozoic, igneous complexes are recognized in all six periods, but the Sumian (2.5-2.4 Ga) formation with layered mafic-ultramafic intrusions and associated volcanics, the Jatulian (2.3-2.1 Ga) trapp formation with volcanic and subvolcanic facies and the Ludicovian (2.1-1.92 Ga) formation with picritic-basaltic volcanism and gabbroic rock and peridotite intrusions are the most significant. Alkaline-ultramafic and carbonatitic intrusive units, as well as kimberlites, were formed in the Palaeoproterozoic.

Palaeoproterozoic metamorphism in the Svecofennian (1.89–1.81 Ga) and Belomorian (1.94–1.85 Ga) provinces was quite intense.

An anorthosite-rapakivi granite formation was common in the southeastern part of the region in the Mesoproterozoic. Rifting events with a trapp formation in the eastern White Sea region and those with a kimberlite-lamproite formation in West Karelia took place in the Middle Riphean superperiod. The Palaeozoic is known as an amagmatic era, except for the Devonian, when events in the Kola alkaline-ultramafic LIP occurred in the northern part of the territory.

Thus, complexes that mark the evolution of the large earth crust segment of North Europe in the Early Archaean (3.2 Ga) to the Late Palaeozoic were identified in the territory of SE Fennoscandia discussed.

References:

[1] Kulikov V et al (2015) In *Petrography of igneous and metamorphic rocks. Proceedings of the 12th All-Russian Petrographic Meeting*: Petrozavodsk, 444-446