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Archaean TTG of Vodlozero Terrain, Fennoscandian Shield

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The Vodlozero terrain is the largest (about 270*240 km) early Archaean fragment of Fennoscandian Shield and composes its eastern part. The granitoids of TTG suite are predominant component of the terrain.
The greenstone belts are placed along the margins of the terrain. Several stages of TTG formation can be distinguished in Achaean crust history. (1) The oldest TTG are trondhjemites and tonalities with age of 3240 Ma. They contain rare and small amphibolite inclusions of the same age. These TTG are characterized by high Sr (av. 412 ppm), Sr/Y (70), (La/Yb)n (54) and low Y (av. 7 ppm), Yb (0.32 ppm) and Nb (4 ppm). It was shown (Lobach-Zhuchenko et al., 2000), that the source of these TTG could be basic rocks, having composition similar with TH1 by K.Condie. (2) The tonalities and granodiorites with age of 3150 Ma are disposed near greenstone belts and contain compared to TTG of the first group less Sr (av. 250 ppm), Sr/Y (22), (La/Yb)n (18) and more K, Rb (av. 70 ppm), Ba (470 ppm), Y (11 ppm),Yb (1.16 ppm). TTG of both groups have identical T(DM)Nd (3250-3400 Ma) and differences in composition is evidently connected with lower level of source melting of the second group and also with K-metasomatism. The volcanics of the greenstone belts have age 3020 - 2940 Ma. Dykes of gabbro-amphibolites and andesites with the same age and composition cut TTG of the first and the second groups. The age of the third TTG group is about 2900 Ma ago. These rocks form leucosoma of migmatites within TTG of the second group. The composition of the third TTG and Nd isotope data suppose their origin by the melting of ancient TTG crust simultaneously with greenstone belt emplacement. The fourth TTG group with age 2780-2850 Ma forms a small intrusions, cutting older TTG and greenstone rocks. Their composition is similar to 3150 Ma TTG. Nd isotope data indicate that these TTG have younger (about 2850 Ma) source. Thus there are four TTG groups formed into interval more 400 Ma. The age and composition of the rocks indicate on the absence of connection in origin of TTG and volcanics.

References

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