

# Time and geodynamic constraints on the formation and evolution of the Early Earth's crust

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In our presentation we discuss the formation and early evolution of the Earth's crust. We have studied by the isotope-geochronological approach the early evolution of the Ukrainian and Baltic Shields, now both belonging to the East European platform. The oldest data were obtained for close association of pyroxenites and tonalites in two localities of the Ukrainian Shield. The ages obtained exceeded 3.6 Ga [1]. The earliest tonalites were LIL enriched rocks that indicate enriched mantle source. The next frontier in the evolution of these shields was late Archaean volcanism including andesitic and boninitic one and sedimentation [2]. The beginning of this process was established at 3.0 Ga on the Baltic and 3.3 Ga on the Ukrainian Shield. The emplacement of subalkaline sanukitoids at ca 2.7 on the Baltic and at ca 2.95 on the Ukrainian Shield [3] manifested the stage of cratonization.

The time boundaries estimated for the early evolution of the Ukrainian and Baltic Shields coincide mainly with those for other ancient cratons. Based on this we propose the next model of the Earth's crust formation: The process of crust formation started after accumulation of the main part of the Earth core. According to Galimov [4], after the early formation of about 95% of the core, the core-build proceeded at the expense of the mantle FeO. That brought about the gradual oxidation of the mantle. This stage lasted about 150-300 Ma. Melting of the hot dry mantle produced the first Earth's crust represented by the complimentary association of komatiites, basalts and tonalites. By the end of this stage the mantle was dry and CO<sub>2</sub>-rich. Plume tectonic predominated during formation of the most ancient continental nucleus. During the next stage shallow watering of the mantle induced the greenstone belts formation. These belts are dated at c.a. 3.5 – 2.7 Ga. The first indication of deep penetration of water into the mantle and mobilization of alkaline elements was the formation of subalkaline granites –sanukitoids at 2.9 - 2.5 Ga on different cratons. The plate tectonic became predominant.

## References

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