Continent Nucleation and Evolution in the Early Precambrian

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Current petrological reconstructions based on isotopic and geochemical data suggest that prerequisites for the origin of the continental crust appeared as early as the late pregeological period of the Earth's evolution, when the uneven crystallization differentiation of the global "magmatic ocean" of chondritic composition and the piling of fragments of the developing protocrust resulted in its lateral heterogeneity in terms of both composition and thickness, and the planet's surface became differentiated into precontinental and preoceanic blocks.

In the Early Archean, precontinental segments, which were characterized by large thicknesses of the mafic protocrust, granite-greenstone terranes were formed in relation to plume tectonics. These terranes were protocontinents with sedimentary-volcanogenic and tonalite-trondhjemite layers in their cores and predominantly komatiite-tholeiite peripheral zones. Further isostatic uplift of the continental cores was accompanied by their denudation and facilitated the onset of subduction of the outer-zone blocks. This process brought about spreading in protooceanic areas and the differentiation of the lithosphere into plates.

In the Late Archean, gneiss-greenstone terranes developed at the margins of protocontinents in a regime of embryonic plate tectonics. The process ended with the lateral growth, complication, and cratonization of the subcontinental crust. Collision of the produced continents resulted in a significant increase in their sizes and crustal thicknesses.

The complete cratonization of the continents was connected with the origin of Early Proterozoic mobile belts, which developed in accordance with the stages of Wilson cycle.