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Layered intrusions as transitional chambers of magmatic systems of large igneous provinces: Evidence from the eastern Fennoscandian Shield

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Large igneous provinces are usually formed by lava plateaus, dyke swarms, and intrusions.
The rocks of these units show wide variations in composition. However, it is unclear which mechanisms and where produced such a compositional diversity. It is also important to understand whether these complexes are comagmatic or not?
For this purpose, we studied the above mentioned volcanic and plutonic components of two Paleoproterozoic large igneous provinces in the eastern Fennoscandian Shield: (1) early Paleoproterozoic (2.5-2.35 Ga) province made up of siliceous high-Mg volcanics and layered dunite-harzburgite-bronzitite-norite-gabbronorite-anorthosite (Monchegorsky, Fedorovo-Pansky, Burakovsky, etc.) plutonic complexes, and (2) middle Paleoproterozoic (2.35-1.9 Ga) province made up of high- and low-Ti alkaline and tholeiite basalts and wehrlite-clinopyroxenite-gabbro-alkaline gabbros (Elet'ozero, Gremyakha-Vyrmes) plutonic complexes. It is known that layered intrusions were formed by replenishment of solidifying chambers accompanied by magma differentiation and contamination. Geochemical and isotope data showed that all rocks of these complexes are related in different degree and often close in composition to volcanics in lava plateaus, and can be considered as comagmatic in origin.
So, we suggest that these layered complexes represent long-lived magmatic centers - transitional chambers - where melts derived from magma-generation zones were accumulated, subjected to crystallization differentiation, mixed with evolved and fresh magmas, and contaminated. It is highly possible that some batches of evolved magmas arrived to the surface, forming lava successions of different composition. This is consistent with the fact that all volcanics that compose the plateaus are represented by evolved derivatives that presumably formed in transitional chamber, whereas primary melts are practically missing.