Geophysical Research Abstracts
Vol. 14, EGU2012-1466, 2012
EGU General Assembly 2012

Thin magmatic layering as a result of magma flow under precrystallizing conditions in hot environment: Evidence from small mafic-ultramafic intrusion of the Anisimov Island, the White Sea, Russia

E. Sharkov

Institute of Geology of Ore Deposits, Petrograpgy, Mineralogy and Geochemistry RAS, Petrology, Moscow, Russian Federation (sharkov@igem.ru)

Intrusion of the Anisimov Island represents a small body with thickness about 50 m which associated with metagabbro-anorthosite massif, one of numerous not large mafic-ultramafic intrusions of the early Paleoproterozoic (∼2.45-2.43 Ga) Drusite Complex within the Belomorian Mobile Belt (north-eastern Fennoscandian Shield) (Sharkov et al., 2004).

Morphologically magmatic layering here is represented by alternation of thin (1-2 cm) layers of pyroxenites and gabbro-anorthosites, and completely similar to picture of liquid laminar flow with partly transition to turbulent flow. Cumulate structures are absent and morphology and size of plagioclase and pyroxene grains are similar; lack of gravitational differentiation suggests that differences in density of the crystals did not play essential role. Moreover, the pyroxenite layers often behave as initially liquid substance, which solidified some later than gabbro layers. Near contact this layering deformed in structures like drag folds as a result of friction on the wall, and in the central part of the body layering look like turbulent flow with small irregular lenses of pyroxenites among leucogabbro. The same picture of thin layering was also established in other small bodies intruded still hot rocks of large intrusive complexes (Monchegorsky pluton, the Kola Peninsula, Zlatogorsky pluton, north Kazakhstan, etc.).

We suggest that origin of such layering was considered with flow of basaltic melt in precrystallizing condition in relatively hot environment when effects of cooling are minimal. In these cases the melt still composed by two types of cybotaxises (clusters): (1) with chain structure (pyroxenes) and (2) with framework structure (plagioclases). Flow of such multicomponent non-Newtonian liquid had to led to separation of different cybotaxises in independent layers.

So, it is discovered the new effect: delamination of a flowing magmatic melt under precrystallizing condition as a result of its multicomponent structure. Considered type of primary magmatic layering in small bodies of mafic rocks can be called a layering of flow, because it was formed at the stage of the melt flow before its crystallization; solidification only fixed the situation.