



The Hidden Zone of the Skaergaard Intrusion Revealed

Christian Tegner and Lars Peter Salmonsén

Department of Geoscience, Aarhus University, Denmark (christian.tegner@geo.au.dk)

The Hidden Zone of Skaergaard was hypothesized by LR Wager and co-workers as representing a large, unexposed, basal cumulate series rich in calcic plagioclase and with subordinate olivine and pyroxene. Although the size, shape and composition of this subzone have been debated, all subsequent works include it in their models. In 1966 a team from Oxford and Cambridge drilled a core penetrating most of Lower Zone a of the exposed Layered Series and c. 150 metres into the Hidden Zone. This core was drilled close to the western margin of the intrusion but did not reach the base although S. Maaløe argued it stopped near to the basement contact. Recent work on this core is underway by M. Holness and co-workers.

Here we report on "new" outcrops at Dobbeltgletscheren in the central, basal zone of the northern part of the intrusion; these outcrops appear to be exposed only recently due to melting of the glaciers. A c. 200 m thick section is exposed. Upwards the section grades into typical Lower Zone rocks. Downwards the section is covered by ice and moraine, and the contact to the underlying basement is not exposed. The lowermost outcrops are composed of fine-grained, olivine-rich micro-troctolite layered on a scale of centimetres to decimetres. The melanocratic layers have a distinct sugary texture due to abundant (up to 60% by volume), equant olivine grains typically 0.5-1 mm across. The plagioclase is of similar size and with habits ranging from subhedral laths to anhedral grains interstitial to olivine, and oikocrysts of Ca-rich and Ca-poor pyroxene enclose equant olivine and subhedral plagioclase laths as chadacrysts. The lighter coloured mesocratic layers show the same mineralogy with less olivine (up to 40%) and more and slightly larger plagioclase relative to the melanocratic layers. Upsection the layering largely fades away and the grain size increases gradually reaching textures similar to typical Lower Zone a.

Olivine (Fo₇₂₋₆₄, 0.22-0.17 wt% NiO) and plagioclase (An₇₇₋₆₁) from Dobbeltgletscheren extent to more primitive compositions than reported for the Layered Series and the Hidden Zone drill core, but overlap with the most primitive samples from the outermost Marginal and Upper Border Series (JD Hoover and our unpublished data).

We interpret the outcrops at Dobbeltgletscheren as representing the Hidden Zone of Skaergaard grading upwards into the Layered Series. The similarity of mineral compositions in the most primitive rocks of the outermost parts of the wall, roof and floor supports the model of filling the chamber in a single event, and indicate the lowermost rocks at Dobbeltgletscheren are close to the base of the intrusion. This is supported by the fine-grained nature of these rocks.