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# Liquidus temperatures of the Skaergaard magma

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## ABSTRACT

The liquidus temperatures of the Skaergaard intrusion can be estimated for the layered series from plagioclase compositions. Plagioclase saturation in one-atmosphere melting experiments on evolved North Atlantic basalts is a function of An content (mol%) and can be described by an empirical linear relationship [$T$ (°C) = 899 + 3.6 An; $1\sigma$ = 20 °C]. This relationship predicts a total crystallization interval for the intrusion of ~150 °C. Plagioclase crystallized in the Hidden Zone ($An_{71}$) at 1155 °C, at the base of the Lower Zone ($An_{66}$) at 1137 °C, and finally in the Sandwich Horizon ($An_{30}$) at 1007 °C. These temperatures are in good agreement with previous estimates based on melting studies of suitable chilled margin rocks and gabbros from the Skaergaard intrusion and liquid line of descent modeling. Our temperature estimates, however, are markedly lower (by up to 60 °C) than recent temperature estimates based on an extrapolation of high-pressure experimental data for the Kiglapait intrusion to Skaergaard emplacement conditions. Proposed variations in magmatic pressure during Skaergaard evolution and reasonable estimates of magmatic water contents do not alter these conclusions.

**Keywords:** Skaergaard intrusion, thermal model, plagioclase liquidus temperature, experimental plagioclase thermometer, plagioclase compositions, pressure effects, water effects