

MAJOR AND TRACE ELEMENT GEOCHEMICAL ANALYSIS OF NORITES IN THE HAKEFJORDEN COMPLEX TO CONSTRAIN MAGMA SOURCE AND MAGMA PLUMBING SYSTEMS

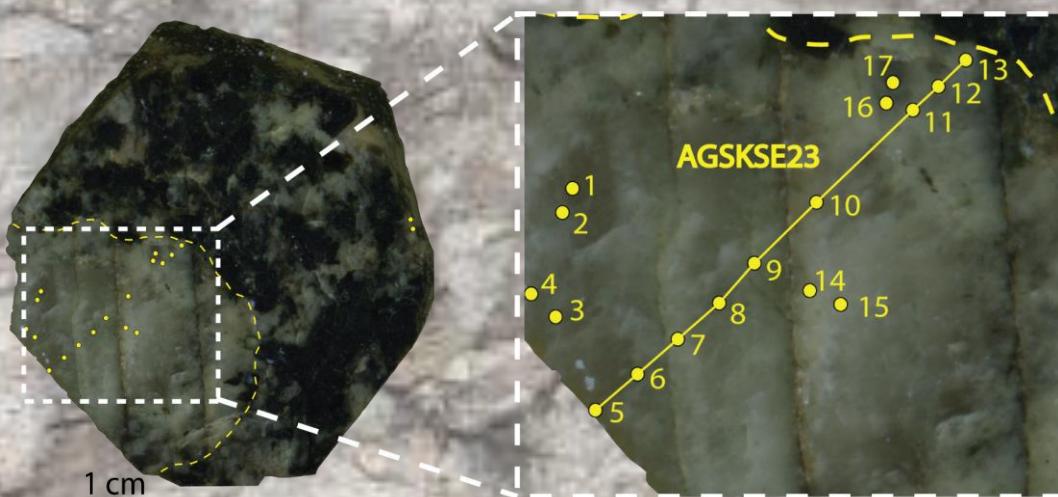
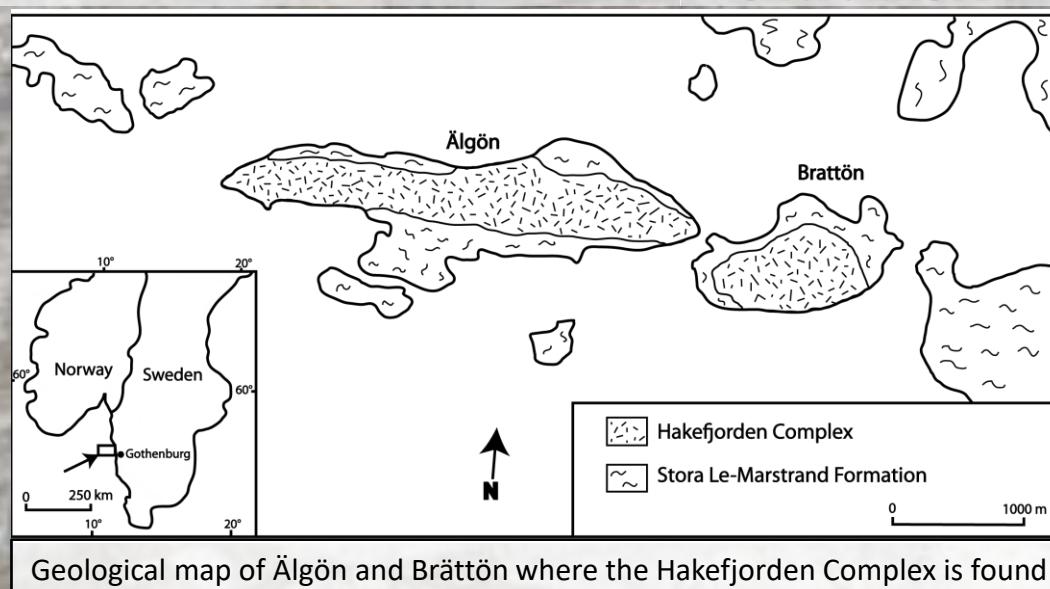


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Aodhan Barrett | 2020 | MSc Thesis | Lund University | Department of Geology | Supervisor: Anders Scherstén

Background & Aim

The Hakefjorden Complex is an anorthosite-norite intrusion located in the Sveconorwegian province, SW Sweden. The magma source and tectonic setting of these types of rocks have been long debated. The plagioclase found in the norite units in this complex can occur as large 'megacrysts' making them suitable for tracking the evolution of the magma chamber. The aim of this study was to constrain a magma source, and by extension a tectonic setting by investigating major and trace element zoning in plagioclase megacrysts.



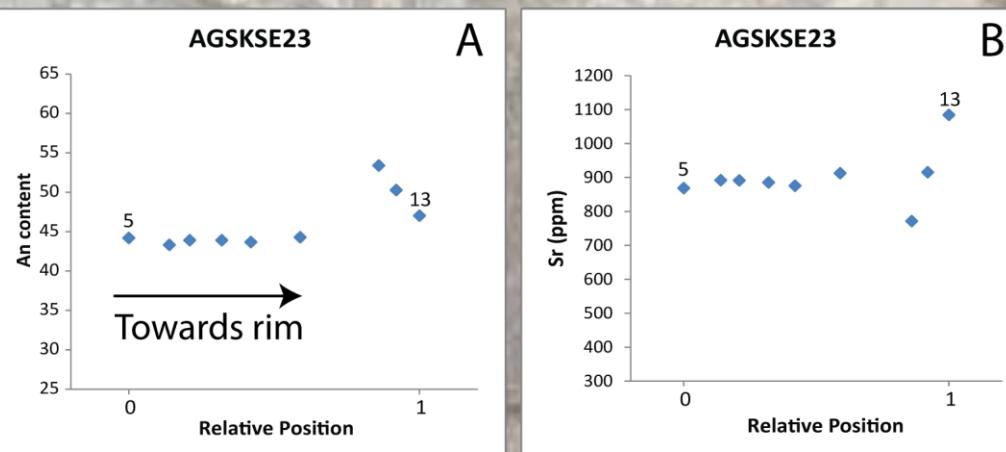
Method

Plagioclase from a series of samples from the Hakefjorden complex were analysed for major and trace element concentrations using SEM and LA-ICP-MS instruments respectively. Most of the focus was given to three plagioclase megacrysts; spot analysis was done to record the chemical profile from the core to the rim of these plagioclase megacrysts.

A display of a plagioclase megacryst and the analysis points taken within

Results

From the three observed megacrysts, all three showed an increase in An-content in the rims of the plagioclase and two megacrysts showed an increase in Sr concentrations in the rim. The increases in Sr at the rim were interpreted to be caused by magma recharge events and the increase in An-content were interpreted to reflect a pressure decrease in the system and/or also related to the recharge events.



An% and Sr (ppm) results from the transect of a plagioclase megacryst

Conclusions

The presence of magma recharge events has direct implications on the magma source. Prior studies on these samples observed homogenous $^{87}\text{Sr}/^{86}\text{Sr}$ values in the plagioclase that indicated a lower crust signature, but was inconclusive if it was caused by crustal contamination or reflected the source of the magma. The presence of recharge events now effectively rules out the possibility of the values being caused by crustal contamination, as there should be more variability in $^{87}\text{Sr}/^{86}\text{Sr}$ values with the presence of magma recharge events. This indicates a lower crust magma source. These melts were likely generated by a post orogenic decompression in a continental convergent margin setting, due to crust magma source and the temporal relation between the Hakefjorden Complex and the Sveconorwegian Orogeny.