Magmatic evolution of a ~1.88 Ga core complex granite in Finland as revealed by *in situ* geochemistry of alkali feldspar megacrysts

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Metamorphic core complexes provide an important tool in the study of the dynamic evolution of crustal domains undergoing post-convergence extension. In the Precambrian of Finland, the ~1.88-1.87 Ga Vaasa complex exposes a granitic core surrounded by migmatites and metasedimentary rocks. We have examined alkali feldspar megacrysts from the magmatic core for *in situ* major and trace element geochemistry using EPMA and LA-ICP/MS. A disk-shaped (1.5 by 7 cm) megacryst from the east-central part of the complex lacks major element variation from the megacryst center to the margin (over a distance of 30 mm), (on average, 84.9 ± 3.1% Or, 13.4 ± 2.9% Ab, and 0.9 ± 2.6% An). Compatible trace elements Ba (~3000-3500 ppm), Rb (~200-250 ppm), and Sr (~300-350 ppm) are quite constant throughout the examined profile, and Pb shows slight overall increase (~60 to 70 ppm) from the center to the margin. Incompatible trace elements reveal two compositional segments in the megacryst – from the center to a distance of 17 mm (inner segment) and from 17 mm to the margin at 30 mm (outer segment). The inner segment shows a decline in total LREE from ~20 ppm to 5 ppm; whereas, in the outer segment the LREE are ~constant between ~5 ppm and 10 ppm. The (La/Sm)N ratio increases outward in both segments. U straddles the detection limit (~1 ppb) in the inner segment and is clearly higher (up to 25 ppb) and variable in the outer segment. The results show that the megacryst grew from the center outwards. Growth from relatively homogeneous magma, early garnet control, and subsequent enhanced crystal-liquid fractionation are implied.