



Geochronology and isotopic characterization of the Vaasa migmatite complex in western Finland

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The Svecofennian domain of the Fennoscandian shield was accreted onto the Archean Karelian craton \sim 2.0-1.9 Ga ago with several magmatic events, collectively known as the Svecofennian orogeny. In central Finland, microcontinents and arcs assembled together with newly-formed crust. The Vaasa complex in west-central Finland is thought to represent a metamorphic core complex, formed after the initial collision in an extensional environment. The structure consists of an anatectic granitoid-migmatite center surrounded by metamorphic rocks, whose grade decreases concentrically outwards from the core. Reflection seismic studies show the low-angle uplift of the middle crust towards the center of the complex. The transition between upper and middle crust is currently exposed in the area.

Our new U-Pb data on zircon from granitoids and diatexitic migmatites from the Vaasa complex indicate emplacement ages of \sim 1.88-1.85 Ga, i.e. after the culmination of the Svecofennian orogeny. In addition, inherited zircon populations were encountered. Typically, the inherited ages are either 2.1-1.9 Ga, or Archean. The multiple inherited zircon populations point to sedimentary sources, complying with the peraluminous, leucocratic nature of the studied rocks. Whole-rock Nd isotopes, as well as zircon Hf isotopes display relatively unradiogenic compositions. However, there is a clear trend to more radiogenic initial ratios in the Hf isotopes towards the north, a feature that is not seen in Nd isotopes. This is probably due to retention of Lu by residual garnet, as its amount is highly variable within the rocks of the Vaasa complex. Based on structural, geochemical and geochronological data, the Vaasa complex was formed in situ in a late, extensional stage of the Svecofennian orogeny, possibly by partial melting of the schists that surround the complex today.