

# 1865 Ma Svecofennian extensional magmatism in Nagu, SW Finland

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The Svecofennian orogeny in southern Finland is traditionally divided into two compressional stages, the 1.89-1.87 Ga (synorogenic) stage and the ca 1.84-1.82 Ga (lateorogenic) stage. The term “intraorogenic” that was introduced by Simonen (1980) is used to describe the poorly defined phase that occurred between these two, with some overlapping. Intraorogenic magmatism is typically bimodal and the mafic components show MORB affinities that imply extensional tectonics. During the last 20 years, an increasing amount of mafic intrusions (i.e. Kara et al. 2020 and references therein) of intraorogenic ages have been identified in the Late Svecofennian Granite and Migmatite zone (LSGM, Ehlers et al. 1993) in the Southern Finland Subprovince (SFS), continuing into both Sweden and Russia. Mature quartzites (Bergman et al. 2008, Lahtinen & Nironen 2010) occur in the same area. Parts of the BABEL (Korja & Heikkinen 2005) and FIRE (Lahtinen et al. 2009a) seismic profiles from the SFS and Bothnian basin region have been interpreted to reflect upwelling of mantle material in extensional sedimentary basins that were later subject to high-T low-P lateorogenic metamorphism.

The Kaiplot gabbro is situated on a number of islands and islets in Nagu in the southwestern archipelago of Finland. The outcrops occur as dykes as well as plutonic bodies and have been emplaced in at least two separate pulses. U-Pb dating (TIMS, zircon) gave an age of 1865±2 Ma, i.e. an intraorogenic age. Net-veining structures and incomplete mixing between the Kaiplot gabbro and a felsic magma is seen in places, a feature also described by Väisänen et al. (2012a) regarding slightly younger intraorogenic rocks in the nearby area.

The tholeiitic Kaiplot gabbro has Mg# of 62.75 to 37.05, with the most primitive samples being close to chemical equilibrium with the mantle. During transport and emplacement, both differentiation and assimilation of crustal material have taken place. The incompatible trace element signatures show that the Kaiplot gabbro is transitional between volcanic arc and back-arc basalt, and further imply depleted to slightly enriched MORB and back-arc basin basalt affinities. The Kaiplot gabbro confirms an extensional tectonic episode at around 1865 Ma.

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