

EGU2020-424

<https://doi.org/10.5194/egusphere-egu2020-424>

EGU General Assembly 2020

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Recognition of a 1.85 Ga oceanic rifting environment in southeastern Sweden

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The Fröderyd Group constitutes a deformed volcanic sequence, which together with the 1834 Ma Bäckaby tonalites occurs as a xenolith, within the 1793-1769 Ma TIB 1b unit of the Transscandinavian Igneous Belt (TIB) in southern Sweden. The Bäckaby tonalites, together with coarse-grained clastic metasedimentary sequences of the Vetlanda Group, belong to the Oskarshamn-Jönköping Belt (OJB; Mansfeld et al., 1996). In turn, the Fröderyd Group was considered to be an older, probably Svecofennian, unit by Sundblad et al. (1997).

The Fröderyd Group is composed of ca. 80% mafic and ca. 20% felsic volcanic rocks, with subordinate carbonate units. Mafic rocks are represented by tholeiitic basalts and spilitized pillow lavas with MORB affinity.

In this study, a sample from a metamorphosed rhyolite, belonging to the Fröderyd Group, was dated at 1849.5 ± 9.8 Ga U-Pb zircon age (LA-ICPMS). This age is significantly younger than the Svecofennian crust, which was formed from 1.92 to 1.88 Ga. Instead, it is coeval with the oldest TIB granitoid generation (TIB 0), which intruded into the southwestern margin of the Svecofennian Domain, but the Fröderyd Group is still the oldest crustal component southwest of the Svecofennian Domain.

Geochronological, petrographical studies and field observations have shown that the southern margin of the Svecofennian Domain was affected by ductile deformation shortly after the intrusion of the 1.85 Ga TIB granites (Stephens and Andersson, 2005). This took place during an intra- or back-arc rifting above a subduction boundary in a retreating mode and caused formation of augen gneisses and emplacement of 1847 Ga dykes into the TIB 0 granitoids. Rifting was followed by a collision of the rifted slab with the Svecofennian crust which is evidenced from emplacement of pegmatitic leucosomes during 1.83-1.82 Ga into the 1.85 Ga orthogneisses.

It is interpreted, that the Fröderyd Group was formed within an oceanic rifting environment, collided with the rifted Svecofennian slab and later amalgamated onto the Svecofennian Domain. The proposed geological evolution includes two deformation events during the period of ca.

1.85-1.82 Ga, which is in accordance with Röshoff (1975). Furthermore, it is evident that the Fröderyd Group was formed as a separate unit outside the Svecofennian Domain, although they have a common geological history.

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