

From island arc to syn-collisional magmatism: Reconstructing continental growth by accretion in a subduction-collision system, the example of the Krutfjellet Nappe, Köli Nappe Complex, Scandinavian Caledonides.

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The Köli Nappe Complex (KNC) of the Scandinavian Caledonides is a sequence of nappes derived from oceanic island arcs and their associated sedimentary basins, that originated in the Iapetus Ocean. The upper part of the KNC in Västerbotten in Sweden and Nordland in Norway can be observed in a series of discontinuous tectonic megalenses; the Norra Storfjället, Södra Storfjället and Krutfjellet lenses. In the Norra Storfjället Lens, the upper KNC Krutfjellet Nappe consists of amphibolite facies schists with numerous igneous intrusions (Stephens et al., 1985), in particular the syn-collisional Artfjället gabbro (434 ± 5 Ma; Senior & Andreiessen 1990), which cuts through an older volcano-sedimentary sequence.

In order to understand the processes leading to the formation and accretion of new continental crust during the Laurentia-Baltica collision we carried out series of geochemical and geochronological studies of meta-igneous rocks of the Krutfjellet Nappe in the Norra Storfjället Lens.

Our geochemical studies confirmed the presence of at least two suites of igneous rocks in the Krutfjellet Nappe, that predate the emplacement of the Artfjället gabbro, i.e., the Miesket and the Upper Volcanic Formation. The Miesket Fm. contains meta-igneous rocks of island arc affinity, with geochemical indicators reflecting different stages of formation and existence of the arc. U-Pb zircon ages indicate the existence of the island arc within Iapetus around 466–469 Ma. On the other hand, the rocks of the Upper Volcanic Formation are alkaline and show within-plate affinity. Both levels, containing volcanic and sub-volcanic rocks, were subsequently metamorphosed in amphibolite facies conditions c. 428 Ma and intruded by large gabbroic bodies around 435–440 Ma (Senior & Andreiessen 1990; Saalman et al. 2021), just before the final nappe emplacement.

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