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Generation of the norite-enderbite series of the Lapland Granulite Belt: implications from SIMS U-Pb-dating of zircons

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Lapland Granulite Belt (LGB) is about 400 km long and 50 to 90 km wide high grade, lower to middle crustal rock sequence. It consists of khondalitic migmatites and noritic to enderbitic S-tectonic intrusive rocks. The sedimentary rocks were deposited after 1950 Ma, were then intruded by the igneous series about 1930-1910 Ma ago and then immediately suffered granulite-grade metamorphism and migmatization. The rocks were then uplifted to upper crustal level by 1870 Ma ago. Both the deposition age and age of metamorphism and uplift was dated by combined morphological and SIMS study of zircons as well as conventional methods.

Four large enderbite or hypersthene quartz diorite intusions, a narrow quartz norite vein and a smaller garnet-biotite quartz diorite body were studied by conventional and SIMS U-Pb zircon dating. The conventional ages usually give concordant to discordant ages of about 1910 to 1925 Ma, suggesting intrusion and crystallization at about that time. Because the trace element spectrum of the igneous series is highly variable and the Sm-Nd model age varies from 2100 to 2200 Ma, it is to be considered the mantle derived parental magmas were assimilated or contaminated by older crustal material. A few old, mainly Archaean cores were found in the SIMS study of zircons of large enderbite or hypersthene quartz diorite intrusions, which suggest that the magmas were mostly affected by old Archaean crust and not the metasedimentary sequence where they finally intruded. However, the narrow vein, as well the smaller garnet-biotite quartz diorite, were affected more locally by the surrounding metasediments. It is also possible that the garnet-biotite quartz diorite mostly represent leucosome material of the migmatization process. Three of the large intrusions

also have younger rims in the zircons which were possibly grown during the crustal residence and uplift of the rocks.