

U-Pb Geochronology of the Lofoten-Vesteraalen AMCG Suite, Northern Norway

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The Lofoten-Vesteraalen magmatic suite is a Proterozoic Anorthosite-Mangerite-Charnockite-Granite (AMCG) complex intruding Archean and Paleoproterozoic crust in northern Norway. Previous mapping and petrological work indicates that the suite was emplaced in the mid crust stemming largely from mantle derived mafic magmas. The suite is situated at a major boundary between Archean craton and Paleoproterozoic crust, an analogous position to that of other major AMCG massifs. Extensive previous radiometric dating, mainly using the Rb-Sr and Pb-Pb methods, had indicated a range of ages mainly between 1900 and 1700 Ma. A new U-Pb dating project has now been initiated to improve the age resolution and establish a precise chronology for the intrusive activity, particularly in order to elucidate the relations between these magmatic events and the tectonic processes associated with the formation of the Svecofennian orogen. The oldest pluton investigated so far is the Lodingen granite, which yields a zircon and titanite age of about 1870 Ma. This age is significantly older than previous dates determined by the Rb-Sr whole-rock method; these dates were presumably rejuvenated by metamorphic overprints during the Caledonian orogeny. A somewhat younger zircon age of about 1860 Ma was obtained for the Hopen charnockite-mangerite intrusion on Austvaagoy. These two ages contrast

with those of all the other units dated so far that are constrained at between 1800 and 1790Ma. This coeval suite includes norite and mangerite units on Flakstadoy, mangerite on Vestvaagoy, anorthosite, monzonite and a granite on Langoy, and the Raftsund mangerite on Austvaagoy. Monazite in the Torset granite defines a spread of post-magmatic ages of about 1780 to 1760Ma indicative of some metamorphic overprint. Similarly, titanite in the Eidsfjord monzonite provides an age of about 1760Ma which probably reflects the time of retrogression of its mangeritic protolith. This unit and the Lodingen granite also contain Caledonian, low-U titanite, locally appearing in the form of diffuse clear rims on the Proterozoic titanite. The Caledonian event is also recorded by metamorphic zircon growth at about 410-430Ma in amphibolite facies schists of the Leknes group. Zircon in a granitic pegmatite from Moskenesoy yield an age around 410Ma. The main period of Proterozoic magmatic activity of the Lofoten suite overlaps that of widespread felsic magmatism and high temperature metamorphism observed in other regions of the northern Baltic Shield. Existing models link these processes to magmatic underplating related to extensional crustal thinning and mantle upwelling that developed following crustal overthickening during the Svecofennian orogeny.