



The West Ny-Friesland Terrane of Svalbard – a counterpart to Northeast Greenland

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Precambrian rocks of the Atomfjella Complex (AC) and the Mosselhalvøya Group (MG) belonging to Svalbard's Eastern Basement Province crop out in northern West Ny-Friesland (Svalbard). The Atomfjella Complex is built of four thrust-sheets, each composed of orthogneiss basement and metasedimentary cover, and overlain by metasedimentary rocks of MG. Felsic metaigneous rocks of AC were previously dated to be ca. 1750 Ma using conventional U-Pb zircon dating techniques. These felsic rocks, together with their metasedimentary cover, are cut by numerous amphibolite and metagabbro dykes of unknown age.

We performed U-Pb SIMS zircon dating of metaigneous rocks and U-Pb LA-ICP-MS detrital zircon dating of metasedimentary rocks. Sample of metagranite and metatuff yielded ages of 1742 ± 3 Ma to 1760 ± 3 Ma, respectively. A metagabbro dyke cutting orthogneiss yielded an age of 1373 ± 4 Ma. Unexpectedly, some of the metaigneous rocks occurring in the Polhem unit (the lowermost thrust sheet of AC) yielded ages of 2002 ± 4 Ma and 2004 ± 3 Ma.

Metasedimentary rocks of the Sørbreen and Vassfaret units of AC define prominent peaks at ca. 1740, 1970 and 2650-2750 Ma and lesser peaks at 2400-2500, 2900-3000, and 3100-3300 Ma. The Polhem and Banguhuk units of AC show prominent peaks at ca. 1900-2000 Ma and 2650-2750 Ma and lesser peak at ca. 1740 Ma. A similar distribution is observed in the Smutsbreen unit of AC, but additional peaks are observed at 1230 and 1460 Ma. Metasediments of the Flåen and Vildaldalen formations of MG, as well as the Rittervatnet unit of AC, display prominent peaks at 1450-1500, 1640 and 1780 Ma, a broad spectrum of lesser peaks at 1050-1200 and 1350 Ma, and minor peaks at 2600-2750 Ma.

Both, AC and MG seem to be metamorphosed during the Caledonian Orogeny. Preliminary Th-U-total Pb monazite dating of MG and the Rittervatnet unit (part of AC) exhibited two groups of metamorphic ages: ca. 460-440 Ma and ca. 420-400 Ma. The older age is interpreted as to reflect peak metamorphism, whereas the younger age is tentatively correlated either with imbrication of nappes or displacement on major strike-slip fault well exposed in the study area.

The observed ages of metaigneous suites ca. 1370 Ma, ca. 1760-1740 Ma and ca. 2000 Ma are not known from other Svalbard's Basement Provinces. However, similar ages have been reported from northernmost East Greenland Caledonides. The detrital zircon signatures of AC and MG sediments are also similar to that observed in Northeast Greenland. Therefore, we conclude a close link between rocks of the West Ny-Friesland and those of Northeast Greenland. Also, we propose that they were dismembered by major late-to-post Caledonian strike-slip movements.

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