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The Thorkelsenfjellet-Jørgenfjellet shear zone dividing the Southwestern Basement Province of Svalbard in Oscar II Land – evidence of Caledonian ductile dextral strike-slip?

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The Southwestern Basement Province of Svalbard is divided by multiple Caledonian, Ellesmerian and Eurekan strike-slip faults which juxtapose units of variable metamorphic grade. Here, we investigate the lower amphibolite grade Mesoproterozoic (?) to Neoproterozoic metasedimentary rocks of the Müllerneset Formation, part of the Mesoproterozoic (?) to Neoproterozoic Kongsvegen Group, that are exposed along the western coast of St. Jonsfjorden (Ague & Morris, 1985). Field mapping and structural measurements reveal that the Müllerneset Formation is separated from the HP and greenschist facies units of Oscar II Land by a major NNW-SSE trending ductile shear zone , herein termed the Thorkelsenfjellet-Jørgenfjellet shear zone. Moderately to steeply dipping, NW-striking mylonitic foliation and mainly dextral kinematic indicators are observed. In a few locations, we see evidence for brittle reactivation, suggesting that these observed features may have been reoriented during Eurekan (?) deformation.

LA-ICPMS U-Pb geochronology of detrital zircon grains from the Müllerneset Formation reveal mainly late Paleoproterozoic to Mesoproterozoic age populations, with a major peak at ca. 1650 Ma and minor Archean grains. The results are similar to previously published data (Gasser & Andresen 2013), suggesting uniform provenance across the Müllerneset Formation. In contrast, detrital zircon spectra from the Mesoproterozoic(?) to Neoproterozoic St. Jonsfjorden Group, exposed east of the shear zone, have bimodal age peaks at ca. 3000-2600 Ma and ca. 1850 Ma, and only a few Mesoproterozoic grains. The maximum depositional age constrained by the youngest grain is 1006 $\pm$ 17Ma.

The difference in provenance and metamorphic grade between units juxtaposed along the Thorkelsenfjellet-Jørgenfjellet shear zone suggests it may have regional significance. The detrital zircon spectra of the lower amphibolite facies Müllerneset Formation bear similarities with spectra of the Isbjørnhamna Group of Wedel Jarlsberg Land and coeval metasediments on Albert I Land and in Ny Friesland, which are of similar or higher metamorphic grade. On the other hand, the St. Jonsfjorden Group consists of strata characterized by similar metamorphic grade and detrital zircon spectra as the syn- to post-Marinoan Sofiebogen Group of Wedel Jarlsberg Land. These results highlight the complexity of the Southwestern Basement Province's assembly and provide new data for Mesoproterozoic-Neoproterozoic correlations across the Arctic.

In several samples of metapelites from the Müllerneset Formation metamorphic monazite has been identified. Result of the Th-U-total Pb dating will be also presented. This work is partially funded by NCN research project no. 2015/17/B/ST10/03114, AGH statutory funds 11.11.140.158, AGH research grant 15.11.140.274 and RCN Arctic Field Grant no.282546.

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