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Caledonian terrane amalgamation in Svalbard: Detrital zircon provenance of Mesoproterozoic to Carboniferous strata from Oscar II Land, western Spitsbergen

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The role and place of the different pre-Devonian terranes of Svalbard during the Caledonian collision and subsequent disintegration have been a matter of debate since the pioneering work of Harland (1971, 1985). Harland (1971, 1985) suggested that Svalbard consists of a series of far-travelled terranes, which were assembled by long-distance movements along large-scale sinistral strike-slip faults during the Devonian. The recognition of remarkable similarities between north-eastern Svalbard (Nordaustlandet), north-western Svalbard (Albert I Land) and Eastern Greenland subsequently led to models deriving these parts of Svalbard mainly from the Laurentian margin slightly (e.g. Gee and Tebenkov, 2004) or considerably (e.g. Andresen 2001, Petterson et al. 2010) to the south of their current positions.

In contrast, the origin of western and south-western Svalbard is less well known: An enigmatic Ordovician blueschist unit has been linked to similar rocks occurring on Pearya in Arctic Canada (e.g. Harland, 1985), whereas the recognition of ca. 650 Ma metamorphism and a related unconformity led others to link south-western Svalbard with the Timanide orogen of northern Baltica (e.g. Mazur et al. 2009).

In order to better characterize the Proterozoic to Carboniferous strata under- and overlying the enigmatic blueschist unit in western Svalbard we analysed detrital zircons from six samples covering the entire stratigraphic section of this area. The oldest three samples (maximum depositional ages of 1016±13 Ma, 948±65 Ma, 713±7 Ma) are dominated by latest Paleo- to Mesoproterozoic detritus similar to other sedimentary successions of these ages in the North Atlantic region. These samples probably formed part of the vast latest Meso- to Neoproterozoic sediments deposited on top of/close to the Grenvillian orogen within or at the border of Rodinia (e.g. Cawood et al., 2010). The Ordovician sample directly overlying the blueschists is characterized by very similar latest Paleo- to Mesoproterozoic detritus which probably represents recycling of the older sediments. The Silurian sample is dominated by a major peak (80% of all analyses) ranging from 940-1120 Ma and a minor peak (10%) ranging from 640-760 Ma, indicating a major Grenvillian source with some unknown Neoproterozoic input. The Carboniferous sample is characterized by a wide zircon age spectrum from 360 Ma to 2600 Ma. Surprisingly, there are no typical Scandian ages of 400-430 Ma but a significant Archean population, suggesting that western Svalbard was located far from the main Caledonian suture zone during the Carboniferous in the vicinity of an Archean craton. Based on these data we discuss a potential tectonic model for western Svalbard from the Mesoproterozoic to the Carboniferous.

References:

Andresen, A. (2001) Terrane amalgamation and structural trends in the North Atlantic-Barents Sea Region. Geonytt 2001, 26-27.

Cawood, P.A., Strachan, R., Cutts, K., Kinny, P.D., Hand, M., Pisarevsky, S. (2010) Neoproterozoic orogeny along the margin of Rodinia: Valhalla orogen, North Atlantic. Geology, 38, 99-102.

Gee, D.G., Tebenkov, A.M. (2004) Svalbard: a fragment of the Laurentian margin, Geological Society of London Memoirs 30, 191-206.

Harland, W.B. (1971) Tectonic transpression in Caledonian Spitsbergen, Geological Magazine, 108, 27-

Harland, W.B. (1985) Caledonide Svalbard, in: Gee, D.G., Sturt, B.A. (eds) The Caledonide orogen – Scandinavia and related areas, 999-1015.

Mazur, S., Czerny, J., Majka, J., Manecki, M., Holm, D., Smyrak, A., Wypych, A. (2009) A strike-slip terrane boundary in Wedel Jarlsberg Land, Svalbard, and its bearing on correlations of SW Spitsbergen with the Pearya terrane and Timanide belt, Journal of the Geological Society of London, 166, 529-544.

Petterson, C.H., Pease, V., Frei, D. (2010) Detrital zircon U-Pb ages of Silurian-Devonian sediments from NW-Svalbard: a fragment of Avalonia and Laurentia? Journal of the Geological Society of London 167, 1019-1032.