



U-Pb detrital zircon analysis of pre-Timanian passive-margin successions and Caledonian nappes of North Norway

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The Neoproterozoic passive-margin successions of the pre-Timanian margin, northern Norway, include the thick, deep-marine to deltaic, basinal Barents Sea Group and a fluvial to shallow-marine platformal domain to the south. To the west, different rock successions occur in the Lower, Middle and Upper Allochthons of the Norwegian Caledonides. Many detrital investigations of circum-Arctic terranes claim to recognize a Timanian ‘fingerprint’ (c. 610-560 Ma zircon ages from subduction-related granitoids generated during Timanian orogenesis), yet the detrital zircon U-Pb age spectrum of these sediments has not been fully assessed. Provenance analysis of pre-Timanian passive-margin formations and selected Caledonian nappe rocks is used to characterize their provenance. This will allow us to evaluate to what extent (if any) these passive-margin sediments have been recycled, to recognize them in younger sedimentary formations, and to possibly correlate the now widely distributed allochthonous fragments which occur throughout the circum-Arctic.

Twelve samples were collected across four tectonic units. The principal results so far include:

1) A single sample (STP1) from the Late Ediacaran Stáhpogieddi Formation, Gaissa Nappe Complex (GNC), has a major peak at c. 550 Ma and is likely to represent deposition in the Timanian foreland basin. Another sample (BRE1) from the same region is much different with two major peaks at 2.8-2.7 Ga and 2.4 Ga whose significance remains to be determined.

2) Seven samples show classic Baltic affinity, including FUG1, GRN1 and GMS1 from parautochthonous/autochthonous formations in the Tanafjorden-Varangerfjorden Region (TVR), VEI1 and F-4 from formations lying unconformably upon in-situ Palaeoproterozoic- Archean metamorphic complexes, and LAN1 and IFJ1 from the Laksefjord Nappe Complex. Their provenance includes: i) age peaks at c. 2.8-2.7 Ga, indicating input from the northern Fennoscandian Shield which is dominated by Neoarchaean complexes; ii) age peaks at 1.95-1.8 Ga derived from Palaeoproterozoic terranes of the craton and deformed during the 1.9-1.8 Ga Svecofennian orogeny; iii) Mesoproterozoic grains mainly from the TVR on Varanger Peninsula (also found earlier in a deltaic formation in the Barents Sea Group) with a non-specific provenance including a source possibly concealed beneath the Caledonian nappes and adjacent continental shelf, or a northward extension of the Sveconorwegian/Grenvillian orogeny, or a Tonian-emplaced, sandstone-dominated thrust sheet derived from the margin of Rodinia. In addition, the three samples from the TVR define a time-sequence with older grains decreasing and younger grains increasing stratigraphically upward.

3) Samples (STY1, SF1 and KG1) collected from formations in the Barents Sea Region have similar 1.8 Ga and 2.8-2.7 Ga peaks and abundant Mesoproterozoic grains, which likely derive from the passive margin before Timanian orogenesis, as no detrital zircon grains younger than 1000 Ma are present.

The new provenance data help to confirm the interpretation of the Neoproterozoic Barents Sea Group succession as an established passive-margin depositional system with little or no coeval magmatism. The Timanian ‘fingerprint’ found in the Stáhpogieddi Formation suggests that further remnants of the Timanian foreland basin (which is represented in Russia as the Mezen Basin) may eventually be detected in the shallow-marine, platformal domain of the TVR.