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Pan-Africa/Pan-Brazilian detrital zircons in Lower Palaeozoic schists of SW Norway – enigmatic detrital zircon U-Pb ages

Udo Zimmermann (1), Maren Bjørheim (1,2), and Chris Clark (3)

(1) Stavanger, Petroleum Engineering, Stavanger, Norway (udo.zimmermann@uis.no), (2) Oljedirektoratet, Stavanger, Norway, (3) Curtin University, Department of Applied Geology, Perth, Australia

We present Sensitive High Resolution Ion Microprobe (SHRIMP) U-Pb zircon age data from metasedimentary rocks (schists and quartzites) located in the town of Stavanger (SW Norway). The metasedimentary sequence is composed of schists, medium grained quartz-rich metawackes and quartzites. Quartzites and meta-quartz-wackes exhibit a mylonitic fabric with newly grown fine-grained muscovite defining the fabric. Accessory minerals are zircon, allanite, detrital apatite, monazite, ilmenite, rutile and zircon. The schists are dark and dominated by quartz and feldspar in a fine chloritic and silica-rich matrix and represent the dominant lithology of the region. While quartzites and metawackes show typical geochemical characteristics for strongly reworked rocks, the schists have very low Zr/Sc and Th/Sc ratios below 0.9 and point together with other trace element ratios (La/Sc, Ti/Zr) to the strong influence of less fractionated, mafic, sources in the detritus, possibly arc derived.
U-Pb ages of detrital zircon from quartzites range between 740 to 1800 Ma. There is a defined population at 1135 and 1010 Ma tentatively correlated with the Sveconorwegian orogeny. A second population at $\sim$1450 Ma that can be related to a tectono-magmatic event during the Earliest Mesoproterozoic, also recorded in Oslo, southern Sweden and Bornholm, mapped along the proposed southern margin of Baltica. Other detrital zircons record ages between 1586 - 1664 Ma that are not related to the latter event. The oldest U-Pb detrital zircon grain age was 1796 Ma and is potentially associated with the terminal phase of the Svecofennian orogeny.
Detrital zircons from the associated schists do show a similar abundance of main age clusters but the oldest found zircons dates to 2013 Ma while the maximum depositional age could be determined by grains of Cambrian to even Ordovician ages with a large 1 sigma error, as such that we rather propose a Cambrian maximum depositional age. It is possible to speculate that the black schists are an equivalent of the Alum shale successions, which is exposed in the Oslo region, southern Sweden and Bornholm (Denmark) and would be then belong to the margin of Baltica. However, detrital zircons with Ediacaran to Lower Palaeozoic ages are exotic to Baltica, and especially unexpected for the proposed passive margin. Magmatic events in SW Baltica of such an age are yet unknown, besides the intrusion of mafic dykes which cannot account for this large number of detrital zircons in the schists.
Hence, there are several possibilities to explain this population:
1. The source area was not in Baltica and this sliver of schists is exotic to Baltica and was accreted during the Caledonian orogeny as the rocks show Caledonian deformation and metamorphism.
2. The depositional area had been in Baltica but the source area has drifted away and the schists are younger than Middle Cambrian, possibly Caledonian.
3. The schists are one of the few relicts which reflect magmatic events of Ediacaran and Lower Paleozoic ages (pre-Caledonian) in Baltica, which we have not been aware of so far and for which we have no geodynamic explanation (as the current opinion interprets a passive margin at the western boundary of Baltica) and might indicate unexpectedly young rift magmatism.
If possibility (1) is taken into account then the candidates for the origin are somewhat restricted to Gondwana as on the eastern margin of Laurentia massive magmatism of Ediacaran to Lower Paleozoic ages is as well not well constrained.