



Provenance analysis and tectonic setting of the Neoproterozoic sediments within the Taoudeni Basin, Northern Mauritania

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We have dated over 800 detrital zircon grains from the Neoproterozoic sediments within the Taoudeni Basin of Mauritania on the West African craton. This sequence of sediments preserves a relatively condensed mixed continental and marine succession as well as Neoproterozoic glacial and glacially influenced deposits. The underlying Archaean and Birimian basement of the West African craton is exposed on the Reguibat shield in the north, and on the Leo shield in the south although smaller inliers occur scattered along the Bassaride and Mauritanide belts, as well as in the core of the Anti-Atlas belt. The large West African craton is totally surrounded by Pan-African fold belts. Sedimentation within the Taoudeni basin started around 1000Ma and lasted until the end of the Carboniferous. The basin is 1000–1500 km in diameter and the sedimentary pile is on average 3000 m thick.

All dated zircons in the stratigraphically lowest Char and Atar Groups are older than ~1800Ma. These groups show a strong input of 2950 and 2075Ma ages, indicating sourcing from the local underlying granitic and gneissic basement. These basal sediments also include a large input from a rare 2475Ma source. Samples from the upper Assebet El Hassiane Group contain numerous zircons of 2000-900Ma. While the Neoproterozoic Marinoan glaciogenic “Triad” Jbeliat Group and stratigraphically above formations show a large range of 3200-595Ma ages. We have also undertaken a detailed Carbon isotope profile study through the carbonates which cap the Glacial Jbeliat Group. The upper part of the Jbeliat cap carbonate displays a distinct and pronounced rise from -4.3 to $+3.8$ ‰, followed by the final demise of carbonate productivity. This positive trend is consistent with the upper part of the globally extensive Ghaub/Nantuo/Marinoan cap carbonate sequences. This world-wide sequence is characterized by composite negative-to-positive trends up section and so this isotope stratigraphy along with the zircon data helps to date this Mauritanian sequence more precisely.

The eroded sediments of the upper sections of the Neoproterozoic Taoudeni basin reflect a fundamental change in provenance up section. The majority of which show previously unreported ages for the West African craton particularly a large amount of post Craton stabilisation ages <1700 Ma and “Grenvillian-type” ages. Most zircons of 2000–900Ma were probably derived from sources outside the West-African craton.

This new data helps to further constrain the age of the Neoproterozoic sections of the Taoudeni basin and highlights changing source regions during successive stages of the Pan African orogenic cycle from initial rifting to final collisions. Sedimentary geochemistry combined with well established palaeocurrent directions and the detailed detrital zircon study give a strong indication of what areas surrounding the Taoudeni basin were being eroded during the Neoproterozoic to Early Cambrian and substantially aid palaeographic reconstructions for the historically data poor West African Craton.