Late Ordovician beachrock as far-field indicator for glacial meltwater pulse

Qijian Li*[1], Lin Na[1], Shenyang Yu , Oliver Lehnert[2], Axel Munnecke[2], and Yue Li[1]

[1]State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology – China
[2]Universität Erlangen-Nürnberg – Germany

Abstract

Understanding ancient climate changes is hampered by the inability to disentangle trends in continental ice volume from records of relative sea-level change. As an unique coastal deposit in tropical and subtropical regions, beachrock has been proved to be reliable for constraining the glacial meltwater signal and, thus, the total volume of land-based ice in Quaternary. However, beachrock is rarely recognized in the fossil record due to (a) the 2-dimensional distribution of beach deposits, as opposed, for example, to extended platform sediments, and (b) the fact that specific environmental conditions are required in order to lithify sediments directly on the beach. By combining the stratigraphic architecture with petrography of characteristic cements, we demonstrate the first known Ordovician beachrock from the Tarim Block, northwestern China. According to biostratigraphy, a lower Katian (Upper Ordovician) palaeokarst surface is capped by a carbonate conglomerate beachrock, indicating a significant relative sea-level rise in late Katian. These beachrocks can be correlated with widespread subaerial exposure surfaces and a pronounced stratigraphical gap within the Katian in northwestern Tarim. We suggest that the beachrock 'fingerprinted' a strong melt-water pulse in high latitudes after a short-lived Katian glaciation, which has not received much attention in scientific papers so far.

Keywords: glaciation, palaeokarst, Katian, Tarim Block, northwestern China

*Speaker