



Implications for cyclicity-based stratigraphic dating from the selective compaction and cementation of a halysitid coral from the Silurian of Gotland (Sweden)

Theresa Nohl and Axel Munnecke

Friedrich-Alexander University Erlangen-Nuremberg, Geozentrum Nordbayern, Palaeobiology, Erlangen, Germany
(theresa.nohl@fau.de)

Many stratigraphic datings are based on the rhythmicity of successions. Prerequisite for such an approach is a constant duration of the different cycle orders. Limestone-marl alternations with their rhythmical appearance and their disparity in rock properties are often used as reliable witnesses for cyclic changes in the depositional environment. For the deposition of a limestone-marl couplet time spans between thousands of years (millennial cycles) and the Milankovitch frequencies (e.g. 20 or 40 ka) are assumed. We will present an example indicating a much shorter timespan: A halysitid coral (chain coral) from a calm platform slope from the Silurian of Gotland is cross-cutting several layers of its circumambient limestone-marl alternation. By analysing thin sections, micro-CT scans and cathodoluminescence we document the spatial extent of the coral, limestone and marl, and investigate the chronological order of sedimentation and diagenetic processes. Our results and conclusions are: (1) the coral is fragmented in the marl due to the typical compaction by differential diagenesis, while it is well preserved in the limestone, (2) the corallum's interspaces were infilled by sediment while the coral was still alive, (3) the thickness of marl and limestone layers do not change between the sediment-baffling coral colony and the surrounding limestone-marl alternation, (4) the timespan documented within a limestone-marl couplet inside the coral is lower than the lifespan of the halysitid coral (probably few 10s of years), whereas (5) it is probably much longer in the surrounding sediments. If this is correct, it would indicate a diachronous nature of the limestone layers and would render a dating of this succession using the cyclicity impossible.