Sedimentary records of the highest sea level of the Paleozoic: from the perspective of the middle–late Ordovician carbonates in South China and Sibumasu

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ABSTRACT

The Middle to Late Ordovician transition is a key period that helps to reveal the evolutionary history of the Ordovician environment changes which records the highest sea level of the Paleozoic. We studied the lithofacies, conodont biostratigraphy and carbon isotope chemostratigraphy of Middle to Upper Ordovician limestone successions in the Kanchanaburi area of western Thailand and South China. The conodonts biostratigraphy and carbon isotopes from Wat Mong Kratae section indicate its spanning of Dapingian to early Darriwilian. The Tha Manao Formation of this section is characterized by bioclastic packstone and grainstone, cross-laminated calcisiltite, bioturbated calcisiltite and wackestone, indicating an open, high-energy and shallow-water environment. The 'Tha Manao Formation' of the Nautiloid Site Geopark yields conodont Baltoniodus alobatus? and spans the Middle and lower Upper Ordovician. The lower part of this formation consists of laminated and bioturbated lime mudstone and bioclastic grainstone and packstone. The upper part is characterized by nautiloid-abundant, bioclastic wackestone with polygonal networks and possibly microbialites. The different lithologies, and faunas between the lower and upper parts of the 'Tha Manao Formation' indicate disparate lithostratigraphic units, which are best determined as, in ascending order, the Tha Manao Formation and the Pa Kae Formation. Lithological and paleontological variations from the Tha Manao to the Pa Kae formations, as well as from the Kuniutan to Pagoda formations (Yangtze Platform) and Ningkuo to Yenwashan formations (Jiangnan Slope), show a significant paleoenvironmental shift during the Middle and Late Ordovician transition similar to that seen elsewhere in peri-Gondwana terranes. It is likely that these remarkable changes from Middle to Late Ordovician were controlled by the changes in oceanic circulation and also possibly by plate movements.