# 氷室地球と温室地球の遷移期における地球軌道要素が表層環境に与えた影響

# Orbital-scale changes in redox condition and biogenic silica/detrital fluxes of the Jurassic Radiolarite: Possible link with glaciation?

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Orbital forcing has been shown to be a fundamental driver of climate change through both icehouse and greenhouse periods. To reveal the impact of orbital-forcing on the oceanic environment through a greenhouse-icehouse transition, we established ~ 4 Myr-long cyclostratigraphy of the Bajocian-Callovian (Middle Jurassic; ~ 160 Ma) Basal Radiolarites at the Torre De Busi and Corre Di Sogno sections in the Lombardian Basin, N-Italy. Stratigraphic changes in chertabundance (chert/shale thickness ratio) and color (darkness) of Radiolarites show hierarchal periodicities of 8 cm, 16 cm, 40 cm, 160 cm, and ~ 4 m, corresponding to ~ 20 kyr, 40 kyr, 100 kyr, 400 kyr, and ~ 1 Myr cycles based on the biostratigraphic age model. Black cherts in intervals with high chert abundance might reflect oxygen-depleted conditions due to orbital-scale high productivity. On the other hand, black cherts in intervals with low chert abundance (high detrital input) might reflect oxygen-depleted conditions, probably due to orbital-scale sea-level drop and stratification. On 40 kyr and 100 kyr cycles, the anoxic condition occurred in low chert abundance intervals across ~ 8 m above (~ 2 Myr after) the base of the Radiolarites. These results imply that the formation of the restricted basin resulted from tectonic and/or eustatic sea-level drop, which is consistent with increased black chert deposition and redox-sensitive elements abundances (Mo/TOC, Mo/U). Their out-of-phase relationships on the 405 kyr cycle throughout the sequence (~ 4 Myr-long) with increasing amplitude above −8 M level would be caused possibly by tectonic activity, or more likely by glacio-eustatic sea-level changes reported from sequence stratigraphy, similar to those of the Oligocene to Pliocene glacial cycles, but probably with less amplitude.

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