Calcareous nannofossil changes in reddish-brown sediments in the abyssal South China Sea during the Oligocene–Miocene

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Oceanic red beds are unique pelagic sediments in the global ocean, providing excellent archives for understanding chemical weathering and relevant climate change in their source areas. During International Ocean Discovery Program (IODP) Expedition 367/368/368X, a series of boreholes were drilled in the northern South China Sea (SCS). At the abyssal Site U1499 (3758 m below sea level), successive core sections were recovered from 792 to 929 m below seafloor. The most remarkable features in these cores are the consecutive occurrences of reddish-brown sediments. Although calcareous microfossils were relatively sparse in some intervals due to poor preservation or low recovery, some key species, which were well preserved and present in most of the samples, were useful for age determinations. Fifteen calcareous nannofossil datums were recognized through the studied interval, revealing a generally continuous succession dated from the early Oligocene to the Late Miocene. By combining calcareous nannofossil and foraminiferal biostratigraphic data, the development and evolution of the oceanic red beds in the northern SCS could be reconstructed. The changes in nannofossil abundance and assemblage composition were mainly influenced by global sea level changes, environmental factors, and regional tectonic events. These results imply that formation of the oceanic red beds probably resulted from the extent of deepwater ventilation in the abyssal SCS. During the Middle Miocene, a short hiatus between 13.6 and 12.0 Ma correlated with an intensive sedimentation rate increase, which was the main reason that oceanic red bed deposition ended.