Orbital-scale paleoceanographic changes around the Pacific side of Japan in Early Pleistocene based on calcareous nannofossil records

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The Mid-Pleistocene Transition (MPT) is the well-known interval that the dominant periodicity of earth's climate cycles shifted from 41 to 100 ky rhythms (e.g., Elderfield et al., 2012). This study will discuss paleoceanographic changes during the Early Pleistocene before the MPT around the central part of the Pacific side of Japan based on calcareous nannofossil assemblages. We studied the Kiwada Formation in the Kazusa Group, distributed the Boso Peninsula. Two different counting techniques were used to clarify biostratigraphic and paleoceanographic events based on calcareous nannofossils. The age model for this section was proposed by Kuwano et al. (2019a, b). Investigaed ages is Marine Isotope Stage (MIS) 41 to 36. Spectral analyses using the PAST3 software were also applied in order to extract paleocanographic signals from nannofossils.
At least 13 species and 13 genera of calcareous nannofossils were identified in the examined section. *Umbilicosphaera sibogae*(Kuroshio water index) increased at the glacial-interglacial boundaries, *Florisphaera profunda* (stratified, warm offshore water index) and *Helicosphaera* spp. (freshwater inflow index) increased in the interglacial period. On the other hand, *Calcidiscus leptoporus* (cool offshore water index) and very small *Gephyrocapsa* spp. (eutrophic freshwater index) increased during the glacial period. In particular, *Coccolithus pelagicus* (eutrophic cool water index) abundant at the end of the glacial period. The power spectra of *F. profunda*, *U. sibogae*, very small *Gephyrocapsa* spp., and *C. leptoporus* show 55-57 kyr periodicity, which also appeared in benthic foraminiferal $\delta^{18}O$. The periodicity of 22-23 kyr was recognized from relative abundances of *F. profunda*, *U. sibogae*, and *Helicosphaera* spp. Those sequential fluctuations of nannofossils indicate that northward/southward of the Kuroshio and Subarctic Front around the Pacific side of Japan. It can be presumed that oceanic front movements linked East Asian monsoon variations because paleoceanographic records in this study corresponded with Chinese loess-paleosol records (Sun et al., 2010).

[Reference]
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