Cyclo-stratigraphy of the Middle Miocene interval at Site U1430 and its paleoceanographic reconstruction using XRF core scanner

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The Middle Miocene is characterized by the east Antarctic ice sheet expansion and orbitally driven ice volume changes that affected the climatic changes during this interval [Zachos et al., 2001, Holbourn et al., 2005]. Recently, high-resolution Middle Miocene paleoclimatic and paleoceanographic changes are reconstructed based on orbitally-tuned oxygen isotope records and XRF core scanner data obtained from marine sediment cores. The results revealed close linkage between the paleoclimatic and paleoceanographic changes and changes in orbital parameters [e.g., Holbourn et al., 2013; Westerhold et al., 2005]. However, an orbitally-tuned high-resolution age model has not yet been established in the North Pacific because calcareous microfossils are nearly absent in its sediments
The Japan Sea was a semi-closed marginal sea during the Middle Miocene [Iijima et al., 1988]. Consequently, paleoceanographic condition in the sea changed in association with orbitally-paced sea-level changes and the fluctuations in the position of oxygen minimum zone. These variabilities were reflected in lithological changes in the Japan Sea sediments [Tada, 1994]. Therefore, establishment of the precise age model and reconstruction of lithological change pattern using the sediment cores recovered from the sea is essential to better understand sea-level and ocean circulation changes in the Pacific associated with waxing and waning of east Antarctic ice sheet. In this study, we utilize Integrated Ocean Drilling Program (IODP) cores recovered from Site 1430 in the Ulleung Basin to establish high-resolution cyclo-stratigraphy covering the Middle Miocene. We reconstructed a perfectly continuous sedimentary column using shipboard data and core photos. Based on this revised composite column (revised splices), physical property data such as GRA and NGR were re-edited. We constructed a tentative age model based on biostratigraphy, and extracted the 400, 100, 40-kyr cyclicities from the time-series data to correlate with orbital parameters. Based on this orbitally-tuned age model, we examined temporal changes in elemental composition of the sediments analyzed by XRF core scanner to explore its paleoceanographic implications.
In the presentation, we will discuss the establishment of orbitally-tuned age model, the variability of elemental composition in the Japan Sea sediment and its possible causes.

Keywords: Middle Miocene, Cyclo-stratigraphy, XRF core scanner, IODP Exp.346

