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日本海における過去 1.8 万年間の高解像度水温復元
High-resolution SST reconstruction in the Japan Sea for the past 18 ka

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Ishiwatari et al. (2001) reconstructed sea-surface temperatures (SSTs) in the Japan Sea during the past 36 ka based on alkenone unsaturation ratio, but the low-saline conditions during the early deglacial periods make the accuracy of alkenone-based SST estimates uncertain (Harada et al., 2008; Fujine et al., 2006). By contrast, during the Holocene, timing of intrusion and pulses of Tsushima Current were well investigated by assemblages of diatom and foraminifera (e.g., Koizumi et al., 2006; Domistu and Oda, 2008), but high-resolution SST reconstruction has not yet been conducted. These situations limit our understanding of the SST evolution in the Japan Sea from the LGM to the Holocene and of the driving force that determines the SST evolution in the Japan Sea. Here, we present planktic foraminiferal Mg/Ca-derived SST record in the Sea of Japan.

The studied sediment core (YK10-7-PC09) was taken from 738 m water depth off Niigata. The thick lamina layer was observed in a section from 420 cm to 750 cm core depth, which corresponds to the sediments during Heinrich 1 and glacial periods. We have analyzed the sediment samples above 450 cm core depth (i.e., back to 18 ka). The age model for the core was based on 8 AMS ^{14}C data of planktic foraminifera. We have used Marin09 and delta R of 0+/-100yr to convert the conventional ^{14}C ages to the calibrated ages. delta-^{13}C and delta-^{18}O of benthic (*Uvigerina* spp.) and planktic foraminifera (*N.incompta*, *N.pachyderma*(s), *G.bulloides*) were measured by MAT 253 (CMCR, Kochi University), whereas trace metal/Ca ratio of planktic foraminifera were measured by Thermo Fisher Element II (Toyama University). Precision (1sigma) of Mg/Ca ratios obtained by the SF-ICP-MS in our laboratory was 0.69%.

The delta-^{18}O records from planktic foraminifera were almost same as the records from L-3 core (Oba and Murayama, 1995), and one of striking features of the delta-^{18}O records was a significant increase in delta-^{18}O values from 0.6 per mil to 3.4 per mil during the early deglaciation (18 - 15 ka). Further, we found that the Mg/Ca-derived SSTs (from *G.bulloides*, Mashiotta et al., 1999) showed a slight increase from 5 to 8 degrees during 18 - 7 ka and presented an increase in ˜3 degrees during the B/A period. Importantly, the SST evolution in the Japan Sea exhibited a close similarity with the SST variation reconstructed off Tokachi, which was under the influence of Oyashio Current (Sagawa and Ikehara, 2008), with ˜1 degrees offset, corroborating that the Japan Sea was influenced by Oyashio Current at the time. During last 7 ka, Mg/Ca-derived SSTs (*N.incompta*, Anand et al., 2003) were correlated with delta-^{18}O variations, indicating delta-^{18}O variations primarily reflect changes in SSTs. The significant cooling of the SSTs were observed at ˜2 ka and 4 - 5.8 ka, whereas the highest SSTs were observed during 2.5 - 3.4 ka. The SST evolution during the mid to the early Holocene was almost consistent with the relative abundance of *F.doliolus*, that is an indicative of Tsushima Current pulses (Koizumi et al., 2006) and the SST evolution off Kashima (Isono et al, 2009). The SST changes in the Japan Sea may have been related to intensification of Tsushima Current that might be associated with the East Asia winter monsoon system.

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