Reconstruction of sea-surface temperature change during the late Pliocene to early Pleistocene using Garda Drift sediment in the North Atlantic Ocean

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In order to reveal the relationship between sea-surface temperature (SST) of high latitude in North Atlantic Ocean and current strength of North Atlantic Deep Water (NADW) associated with Atlantic Meridional Overturning Circulation (AMOC), which is considered responsible for 1/3 of global northward heat transport, a high-resolution reconstruction of SST has been performed using the core samples obtained at IODP Site U1314 in the Gardar Drift (56°21.9'N, 27°53.3’ W in a water depth of 2820 m). We analyzed long-chain alkenones for reconstruction of SST in the subsamples of the age span from 2.74 to 2.42 Ma (late Pliocene to early Pleistocene). The mean sedimentation rate of the Gardar drift is considered very high (about 10 cm/kyr), therefore, the sediment obtained from there is expected to reconstruct paleoclimatic and paleoceanographic changes relevant to variation in strength of AMOC at a high-resolution.
As a result, the amplitude of SST variations were enhanced after the boundary between Pliocene and Pleistocene, and the spike-like falls of SST were detected at 2.62Ma, 2.52Ma, and 2.43Ma, corresponding to MIS104, MIS100, and MIS 96, respectively. Compared the SST variations with the numbers of ice rafted debris (IRD) and variations in strength of deep water current (those data will be presented by Hayashi et al. in this meeting) and global ice volume (LR04), the amplitudes were different each other, but the timings of changes were in agreement with each other. On the other hand, some changes appeared in both SST and the strength of deep water current were not appeared in LR04, suggesting that SST variation observed at U1314 Site was influenced by the variation in strength of NADW, that is the strength of AMOC.

Keywords: Atlantic Meridional Overturning Circulation, Sea-surface temperature, Pliocene-Pleistocene boundary

