Fluctuation in alkenone-sea surface temperature (SST) in the northwestern North Pacific during the Holocene

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Previous investigations suggest that a climate during the Holocene has been very stable, especially judging from no marked fluctuations of oxygen isotopes and methane concentrations in Greenland ice cores. In contrast, Bond et al. (1997, 2001) shows that increased hematite abundance in sediments in the subpolar North Atlantic, a proxy for ice rafting, fluctuated with a cycle in 1500 years, which suggests that the cycles have responded to the variations in solar output. These events observed in the North Atlantic correspond to the weak Asian monsoon events recorded in marine sediments from the Arabian Sea (Gupta et al., 2003) and in stalagmite from the southern China (Wang et al., 2005).

Here, we analyzed an unsaturation ratio of C37 alkenone (alkenone-SST) in piston core PC-6 (2,215 m water depth) on the continental margin off Sanriku (40N, 143E) in order to estimate SST changes in the northwestern North Pacific during the Holocene. The temporal resolution for alkenone-SST was 33.5 years on average. Alkenone-SST at the surface sediment was 14.5 degree C, which is comparable to the modern SST in June, when the phytoplankton blooming occurs. The results suggest that the sediments recorded paleo-SST in this area. The alkenone-SST during the Holocene fluctuated from 2 to 3 degree C with minima at 0.5, 1.8, 2.7, 3.4, 4.2, 5.0, 6.0 and 6.9 kyr B.P. These cooling events may be attributed to the weak Asian monsoon events from d18O data of the Dongge Cave stalagmite DA. Especially, the minima between 3 kyr B.P. and the present were well consistent with the weak Asian monsoon events and ice rafting events in the North Atlantic. It means that SST in the northwestern North Pacific would link to the regional to global variation of climate from the Asian continent and North Atlantic by the atmosphere.