Fluctuation of alkenone temperature in the southwestern Okhotsk Sea during the past 120kyr.

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The sediment was collected at the Kuril Basin (PC-04, 49N, 153E, WD 1,821m) in the Okhotsk Sea and the southeastern site in the Pacific side of the Kulzenshutana Strait (PC-01, 46N, 152E, water depth 2,800m), during the MR00-K03 cruise from May 9 to June 10 in 2,000, as an investigation of a JAMSTEC project on Biogeochemical Change of the Past Northern North Pacific and its Adjacent Seas. The main objective was to understand the past environmental change such as sea surface temperature, productivity and deep water circulation in the northwestern North Pacific and the Okhotsk Sea throughout the late Quaternary period (ca 150,000 yr). In addition, we used a sediment core collected at Off Shari in the southwestern Okhotsk Sea (MD01-2412, 44.31N, 145E, WD1,225m) as an investigation of IMAGES.

We show alkenone flux and alkenone temperature by using Prahl et al. (1988), (UK'37=0.034T(C) + 0.039) were reconstructed for PC-01, PC-04 during the past 20kyr and for MD01-2412 during the past 120kyr.

Alkenone was detected ranging from 0.05 to 1.5 micro g/g through the geological time except for during the last glacial maximum (LGM). After the LGM, alkenone was firstly detected at 17.5kyrBP for PC-01 and at 16kyrBP for PC-04 and MD01-2412 and its concentration rapidly increased within 200-300yr after the first occurrence. Alkenone producer is difficult to survive where sea ice covers. Therefore, it seems that an area of the Kuril Basin and the southwestern Okhotsk Sea and the southeastern site in the Pacific side of the Kulzenshutana Strait was perennially or seasonally of almost entire year covered by sea ice from about 24kyrBP until 16kyrBP and 17.5yrBP, respectively, and the sea ice melted within only several hundreds year after the LGM.

Alkenone temperature of each core top was 7, 9 and 13 degree C at PC-04, PC-01 and MD01-2412, respectively and corresponded to the SST from modern Jul. to Sep. in this area. Although alkenone concentration was under detection limit during the LGM at PC-04 and PC-01, some of samples indicated very slightly higher alkenone concentration than the detection limit at only MD01-2412 during the LGM. Furthermore, those alkenone temperatures corresponded to the modern SST and were high for the SST during the LGM. In order to explain such high alkenone temperatures, we have to consider warm water mass coming to the southwestern Okhotsk Sea during the LGM.

Reference

Prahl F. G., et al. (1988) Further evaluation of long-chain alkenones as indicators of paleoceanographic conditions. Geochim. Cosmochim. Acta 52, 2303-2310.