

## Sea surface environment during warming periods in the Sea of Okhotsk

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We are facing a big problem of global warming in the near future. Prediction of environmental change for global warming based on observation and on modeling is necessary. A record of climate change of the past interglacial periods would be archive data for the prediction. It is known that there was several warming stages of the interglacial periods in the past. It is important to understand how the past environments of interglacial periods are different from the present state. The Sea of Okhotsk is a southern limit of seasonal sea ice area of the Northern Hemisphere, that response to a global warming sensitively. In this study, sea surface temperature (SST) during the past interglacial periods (Holocene, MIS 5e, and 11) in the central Sea of Okhotsk will be reconstructed by Mg/Ca ratio of planktonic foraminifera in the marine sediments core. In this study, a sediment core YK0712-PC3B is used that was taken by the YK07-12 cruise of JAMSTEC on 2007 (14.09m-long, 1048m water depth) in the central Okhotsk Sea. The core YK0712-PC3B was composed of olive grey massive diatomaceous clay and silty clay. After measurements of magnetic susceptibility, wet bulk density, non-destructive XRF scanning of the sediment core, sediment sample was subdivided in the 5 mm interval in depth. Aliquot samples were freeze-dried, dispersed by pure water. Particles after 63micro-meter diameter-sieving, planktonic and benthic foraminifera were hand-picked under stereo micro scope. Oxygen isotope ratio and Mg/Ca ratio were measured for planktonic foraminifer whereas oxygen isotope ratio was measured for benthic foraminifer. In this study, cleaning procedure of foraminifer before measurement was developed originally. Paleo-temperature and salinity were reconstructed by Mg/Ca ratio and oxtgen isotope ratio of planktonic foraminifer. Oxygen isotope ratio of benthic foraminifer was used for oxygen isotope stratigraphy of the sediment core. As it has not been reported the equation in the Okhotsk Sea, the equation of Nurnberg (1995) is used in this study, which is constructed for same *N. pachyderma* (sin.) in the Norwegian Sea. It is reported that *N. pachyderma* (sin.) has blooming peaks in spring and autumn at the depth below pycnocline in the present northern Pacific Ocean. Therefore, the temperature recorded in this taxa is regarded as the temperature of sea water in spring and autumn below the depth of pycnocline. The estimated temperature of the top part of sediment core using Nurnberg (1995) equation in this study is about 5 ? 6 degree Cercius. This is consistent with the present temperature in the depth of 30-40 m in autumn in the central Okhotsk Sea. Therefore, temperature reconstruction in this study is reliable. For the past interglacial periods, reconstructed average SST is 6 degree Cercius in Holocene, 4 to 6 degree Cercius in MIS 5e, 1 to 4 degree Cercius in MIS 11. The result of lower SST in MIS 11 than MIS 5e is consistent with the most recent integrated standard stack oxygen isotope curve of LR04 (Lisiecki and Raymo , 2005) , with hydrogen isotope curve of the ice core from EPICA dome in Antarctica. The results suggest a possibility of climatic link of SST in the Okhotsk Sea with global climatic change.

Keywords: Okhotks Sea, Warming periods, Foraminifer, Oxygen isotope ratio, Mg/Ca ratio, Sea surface temperature