Geophysical Research Abstracts,
Vol. 11, EGU2009-8767, 2009
EGU General Assembly 2009

Millennial-scale variations of the paleoproductivity and intermediate water oxygenation in the Okhotsk Sea during the last 130 kyr

N. V. Bubenshchikova (1) and D. Nürnberg (2)

(1) P.P. Shirshov Institute of Oceanology, Moscow, Russian Federation (bubench@mail.ru/ +7 499 1245983), (2) IFM-GEOMAR, Kiel, Germany

The Okhotsk Sea is a marginal sea of the North-Eastern Pacific. The Okhotsk Sea contributes to the ventilation of intermediate NW-Pacific via the production of the Okhotsk Sea Intermediate Water (OSIW), caused mainly by brine rejection on the northern shelves during sea ice formation in winter. In the Okhotsk Sea, an oxygen minimum zone (OMZ) is a layer with oxygen concentrations 0.3-1.5 ml l^{-1} between 750 and 1500 m water depths. The Okhotsk Sea OMZ results mainly from 1) high primary productivity; 2) predominant ventilation of the upper level (500 m) of the OSIW; 3) inflow of the lower part of warm and oxygen-depleted intermediate water mass from the North Pacific (core at 800-1200 m with oxygen concentrations of 0.6-1 ml l^{-1} of O^2).

Here, we present millennial-scale benthic foraminiferal and biogeochemical records for the upper 8.30 m (130 kyr) of sediment core MD01-2415 (53^o 57.09N 149^o 57.52E), collected on the northern continental slope of the Okhotsk Sea at water depth of 822 m. We used these data to reconstruct variations of paleoproductivity, intermediate-water ventilation, and intensity of the OMZ in the Okhotsk Sea during the last 130 kyr.

Variations of our proxy records are found to be correlated with the major climatic events identified in the GRISP2 O^{18} record over the last 130 kyr. Our data indicate that the Okhotsk Sea OMZ was weakening, perhaps disappearing, during the majority of the Dansgaard-Oeschger (D-O) stadials of the marine isotope stages (MIS) 2-4 that is likely caused by growth of sea ice cover, lowering of marine productivity and increasing of production of the OSIW during cool periods. The pronounced increase of paleoproductivity and/or strengthening of the Okhotsk Sea OMZ are reconstructed during the MIS 5.5, D-O Interstadials 16/17, 19, 21, 23, Holocene with maxima during the last deglaciation. We regard these changes during warm periods as a result of 1) sea ice cover retreat and increased marine productivity; 2) reduction of OSIW production; 3) enhanced inflow of the lower part of the oxygen-depleted intermediate water mass from the North Pacific. During the last deglaciation, two-step like supply of organic matter with terrigenous material from the submerged northern shelves is suggested to be the key factor responsible for the maxima of the paleoproductivity and strengthening of the OMZ.