Sea-ice history in the central Okhotsk Sea based on diatom assemblages during the Middle Pleistocene Transition

Araki Eisuke[1], *Yusuke Okazaki[1], Lo Li[2]

1. Department of Earth and Planetary Sciences, Graduate School of Science, Kyushu University, 2. Department of Geosciences, National Taiwan University

The Okhotsk Sea is the second largest marginal sea in Pacific Ocean. One of the most notable features of the Okhotsk Sea is the seasonal sea-ice cover from late autumn to early spring, constituting the southernmost sea-ice covered area in the northern hemisphere. Recent climate changes have significantly impact in the sea-ice covered area in Okhotsk Sea, however, geological timescale sea-ice evolution histories is still unknown in this region due to the lack of long paleoclimatic records. During the period between 1.25 and 0.75 Ma known as the Mid-Pleistocene Transition (MPT), the glacial/interglacial (G/IG) cycles has modulated from 41-kyr to 100-kyr. The first deep glaciation appeared in the Marine Isotope Stage (MIS) 16, between 0.68 and 0.62 Ma. To reveal sea-ice history in the Okhotsk Sea during the MPT period, diatom floral assemblages in a giant piston core obtained from the central Okhotsk Sea (MD01-2414; 53°11.77’ N; 149°34.80’ E; water depth 1123 m) were investigated. Age model of MD01-2414 was established based on magneto-stratigraphy as well as orbital-tunings of element concentrations and sediment color, yielding the bottom age as ~1.6 Ma. Diatom abundance (No. valves g-1 dry sediment) between 1.2 and 0.6 Ma showed cyclic patterns along with G/IG cycles: increased (decreased) abundances by 1 or 2 orders of magnitude during cold (warm) periods, vice versa. A total of 18 genus 21 species were identified in MD01-2414 core. Main diatom species were Actinocyclus curvatulus, Paralia marina/sulcata, Rhizosolenia hebetata forma hiemalis, Shionodiscus trifultus, and S. oestrupii. Sea-ice related species such as Bacterosira bathyomphala, Fragilariopsis cylindrus, F. oceanica were less than 10% throughout the MPT except for MIS 26, 18, and 16. The MIS 26 peak was temporal whereas the MIS 18 to MIS 16 peaks continued for tens of thousands years. This suggests that the onset of major sea-ice cover was since MIS 18, ~0.75 Ma in the central Okhotsk Sea.

Keywords: Okhotsk Sea, Sea-ice, Diatom assemblages, Middle Pleistocene Transition

