Late Quaternary Sea Ice History in the Chukchi Sea, Arctic Ocean

Saiko Sugisaki[1]; Koichi Iijima[2]; Tatsuhiko Sakamoto[2]

[1] Ocean Science.,Tokai Univ; [2] IFREE, JAMSTEC

Sea ice and ice sheet of both polar areas have been largely concerned to global climate change. In the Chukchi and Beaufort Seas, located in the western Arctic Ocean, a clockwise sea surface circulation in the western Arctic Ocean called the Beaufort gyre has great influence for sea ice and sediment transportation. The water column of the area is composed of three water masses: Arctic Surface Water (ASW), Arctic Intermediate Water (AIW), and Canadian Basin Deep Water (CBDW). Change at the masses should relate global climate and thermohaline circulation through time. Objective of our research is to reconstruct sea ice history and related sedimentary regimes in the western Arctic sea, recorded in sediment core MR00K05-PC1 in Chukchi Sea by analyzing sedimentary cycle and ice-rafted debris (IRD) and Beaufort Sea.

Surface sediment samples from 34m to 2907m water depth in the Chukchi and Beaufort Seas are rich in terrigenous and poor in biogenic components (58 wt%SiO_2 , 17wt%Al_2O_3, 8 wt%Fe_2O_3, 5wt %Na_2O, 3.6wt %MgO, 3wt% K_2O, 3wt %$CaCO_3$, 0.6wt%MnO in average), comparing with surface sediments which sampled from near the Bearing strait. The similarity in composition of surface sediments represents same sedimentary regime under the Beaufort gyre.

Core top sample of MR00K05-PC1 from in Chukchi Sea, which is interglacial sediment, is bioturbated and containing remarkable IRD. On the other hand, glacial sediments in the core are clearly laminated with less IRD and rich in terrigenious particles. The obvious sedimentary cycle of IRD-bearing bioturbated clayey silt layer and laminated clayey silt layer are recognized in downcore. The cycle is related to be glacial-interglacial Arctic Sea changes. The history of sea ice and changes of ocean circulation is reconstructed by analyzing these sedimentation cycle records. During glacial, increased sea ice coverage led weak ocean circulation and low surface productivity. Consequently, laminated layers deposited in stagnant bottom water. Meanwhile, during interglacial, sea ice has often melted and created IRD. Opening of the sea surface resulted in enhanced ocean circulation and surface productivity. In the oxygenated bottom environment, sediment has been bioturbated. We try to make clear Arctic glacial-interglacial cycle decoding in this sediment core.