Late Cenozoic sea-ice history around the Lomonosov Ridge in the central Arctic Ocean: Results from the IODP Expedition 302 ACEX

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Arctic Ocean is a part of cryosphere that has great role on the Earth climate system. Sea-ice cover, ice sheet, and land snow in the cryosphere has a positive feedback effect on the climatic system by its high albedo. In the Arctic Ocean, especially, there is no landmass around the North Pole, large sea-ice has a significant influence on thermohaline circulation since dense and saline water (brain water) forms temporally with the sea-ice. The dense outflow of the Arctic water mass is though to have a great impact to the formation of the North Atlantic Deep Water and a cause for Northern Hemisphere Glaciation. The ice in the Arctic Ocean also has inhibitive effect on heat transportation between the atmosphere and ocean. Ice rafted debris (IRD), a series of terrigenous grains, is transported by floating ice in the sea such as sea-ice and iceberg. It is one of many useful paleoceanographic proxies to reconstruct ice history from marine sediments. Terrigenous clastic grains are incorporated into sea-ice and icebergs through fluvial supply, coastal suspension freezing, cliff-fall and so on.

In order to reconstruct and reveal the ice history in the central Arctic Ocean, we conducted new non-destructive sediment core scanning techniques, the TATSCANs, that is a code name of developing original instruments for non-destructive sediment scanning and imaging in range of millimeter and micrometer scale. Sediment cores (200 m, ˜18Ma) from the central Arctic Ocean obtained by IODP expedition 302 (ACEX) were analyzed with high spatial resolution by non-destructive transparent X-ray, spectroscopic, XRF imaging scanners, TATSCANs. In this presentation, we reported results of non-destructive measurements of TATSCANs for the upper 200m cores obtained by the ACEX on the data, we discussed about a history of sea-ice and related ocean circulation including ocean circulation and river-runoff from the land during 18 Ma.