Change of bottom water condition in the Oyashio region since the last glacial maximum, off Hokkaido, NW Pacific

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The Oyashio is a cold ocean current flowing along the western margin of N Pacific. Colder and less saline intermediate water formed at the exit of the Sea of Okhotsk has became the source water of the North Pacific Intermediate Water (NPIW) and flowed southward along the 1000 m water depth contour below the Oyashio. The NPIW is an important water in carbon cycle in the North Pacific. Therefore, temporal change of the NPIW behavior is an important for the regional climate.

Two sediment cores were collected from the Oyashio region off Hokkaido. Core MD01-2409 (41-33.65N, 141-52.66E, Water depth: 976m) was collected from the Hidaka Trough off Shimokita Peninsula. Another core GH02-1030 (42-13.77N, 144-12.53E, 1212m) was obtained from the slope off Tokachi. Both cores recorded the last 20 ka environmental changes. Physical properties of the sediments showed the synchronous changes. Coarser sandy sediments containing plant debris indicated higher terrigenous supply in the LGM. Higher water contents during deglaciation resulted to higher productivity of diatoms in surface water. Occurrence of well-laminated sediments in core MD01-2409 indicated the lower dissolved oxygen content in this period. No lamination found in core GH02-1030, but benthic foraminiferal assemblages indicated the lower DO level. Coarser sediments with lower diatom content were deposited during the Younger Dryas cooling event. Coarser grain size suggests the stronger bottom current condition and lower sedimentation rate. Age differences between planktonic and benthic foraminifera in late deglaciation were smaller than those in early-middle deglaciation and LGM. This suggests that the source of the bottom water is different between two periods in the Oyashio region. According to decreasing of coarser terrigenous material supply and increasing of diatom test supply, water content becomes higher in the Holocene sediments. Benthic foraminiferal assemblages and sediment lithology indicate the present oceanographic conditions have been formed after around 10 ka. Less occurrence of planktonic foraminifera in the Holocene sediments indicates the preservation potential for foraminiferal test might change between deglaciation and Holocene. Remarkable decreasing of benthic foraminifera after 3-4 ka, however, might reflect the change of bottom water properties.

Variation of alkenone sea surface temperature in the Kuroshio region of the Northwest Pacific during the last 30 kyrs

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The Kuroshio Current is a greatest and important warm surface current in the North Pacific. The Kuroshio plays a role of main heat transport from the tropical ocean to the North Pacific. Therefore, it is seemed that the historical changes of the path and intensity of the Kuroshio influenced the climate changes in the Northwest Pacific and the surrounding land area. A long sediment core (MD01-2422) was collected from off Shikoku, Japan (32º08'N, 133º51'E, water depth 2737m) to reveal the paleoceanographic changes in the Kuroshio region. Age model of the core is established by thirteen AMS ^{14}C dates (calendar ages) of planktonic foraminifera.

Alkenone sea surface temperatures (SSTs) fluctuated between 21ºC and 25ºC with amplitude of about 4ºC during the past 30 kyrs. SST value at the last glacial maximum (LGM) was 20.8ºC, which was lower than the present SST by 4ºC. Alkenone SSTs were abruptly increased at 17 kyrs B.P. at the core location. The rapid warming was corresponds to a sharp decrease of alkenone production. These results indicate that the surface water at core site was significantly influenced by the warm and nutrient-poor Kuroshio at 17 kyrs B.P. On the other hand, a rapid decrease in $\delta^{18}O$ records of planktonic foraminifera *Globigerinoides ruber* was occurred at about 15 kyrs B.P. in the northwestern Pacific. Surface water $\delta^{18}O$ was increased at the early deglaciation (15-17 kyrs B.P.) when the alkenone SSTs were already high. In addition, alkenone SSTs and planktonic $\delta^{18}O$ show an opposite variation pattern during the last glacial and deglaciation periods. This suggests that the planktonic $\delta^{18}O$ was changed with not only seawater temperature but also other parameters such as salinity and/or $\delta^{18}O$ values in surface water. Because the modern Kuroshio flow is characterized by relative warm and saline subsurface water, the increased $\delta^{18}O$ at the early deglaciation may have been influenced by the northward migration and/or enhanced intensity of the Kuroshio main flow in the Northwest Pacific. The rapid warming were also observed at approximately 13 kyrs B.P. and 8-10 kyrs B.P., suggesting that the millennial-scale fluctuation in the path and intensity of the Kuroshio were occurred in the Northwest Pacific.