Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

ACG38-P12 Room:Convention Hall Time:May 21 18:15-19:30

Freshwater and nutrient distribution of the western Arctic Ocean

Shoko Hirayama[1*], Jing Zhang[1], Hisashi Narita[2], Shigeto Nishino[3], Michiyo Yamamoto-Kawai[4], Takashi Kikuchi[3], Koji Shimada[4]

[1]University of Toyama, [2]Tokai University, [3]Japan Agency for Marine-Earth Science and Technology, [4]Tokyo University of Marine Science and Technology

In recent years, reduction of sea ice extent in the Arctic Ocean is remarkable and updated the smallest record in 2012. A marine environmental big change is concerned because heat and material become active after sea ice disappears. It is important to understand marine environment in summer as it influences sea ice formation in winter.

In this study, we investigated fresh water distribution which controls the sea ice formation/melting. We also investigated the nutrients distribution to evaluate the contribution of nutrient from porewater to the water column. Hydrographic observations and sampling were carried out in the western Arctic Ocean in 2000 and 2012 for sediment samples and 2004 and 2012 for water samples during R/V Mirai Cruise. Water temperature, salinity, dissolved oxygen, nitrients and oxygen isotope ratios (precision: 0.04 permille) were used as chemical tracers.

Water temperature was 2 degC higher in 2012 than that in 2004 whereas the difference of salinity was not obvious. Pycnocline by the low salinity water were found on the shelf between Bering Strait and Canada basin of the longtitude 168 degree west section . It was remarkable in September in 2012. As a result of calculation of mixing ratio of freshwater and Pacific water in shallower than pycnocline, 15˜30% and 10% of river water flew into the Chukchi Sea through Bering Strait in September and October, 2012 but less than 10 % in 2004. Low dissolved oxygen water was found near the bottom in 2012. It suggests that this low DO water were formed by the pycnocline with the large freshwater input in 2012.

The dissolved nitrogen to phosphate (DIN DIP ratio), salinity less than 33 and DIP $<$ 1umol/kg, increased 11.8 to 14.2 from the Bering Strait to the basin. It suggests that the water flowing from the Bering Strait should mix with nitrogen rich water as moving toward the north. In 2012, 29.3-1241umol/kg of DIN and 0.9-7.17umol/kg DIP were observed in porewater of the surface sediment. They were obviously higher than 16.1-49umol/kg of DIN and 1.04-3.3umol/kg of the bottom water (1m from the seafloor). These results indicate that addition of DIN is likely from the sediment on the continental shelf in Chukchi Sea.

Keywords: Western Arctic Ocean, freshwater distribution, nutrient, oxygen isotope ratio