Spacial distribution of dissolved methane in the western Arctic Ocean

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Sea-ice decreases in the Arctic Ocean especially in summer due to recent global warming. This provides heat, light and freshwater in this area, which accelarates primary production and seafloor sediment degradation. These phenomena affect methane (CH_4) budget in the Arctic Ocean via processes of CH_4 release from subsea sediments, aerobic CH_4 production by zoo-/phyto- plankton, and CH_4 emission to the atmophere, and CH_4 oxydation. However, dynamics of CH_4 dissolved in the Arctic Ocean area still uncertain.

We collected sea water samples in the western Arctic Ocean, the area close to Bering Sea and Alaska, in the summer of 2012 and 2013 during MR12-E03 and MR13-06 cruises of R/V Mirai (JAMSTEC).

We have determined the concentration and stable carbon isotope ratio ($\delta^{13}C$ value) of dissolved CH_4 using a gas chromatograph equipped with a flame ionization detector (GC-FID) and a gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS), respectively.

In both years, the surface seawater was always supersaturated with CH_4 in comparison with equilibrated water with air. Especially, higher CH_4 concentration was found in the coastal area. On the other hand, in the off shore area, maxima of CH_4 concentration were obsearved at the depths of 10–50 m and 100–200 m, while maxima of DO concentration were obsearved only at the depth of 10–50 m. Higher $\delta^{13}C$ value (-30–-10‰VPDB) was found around at 200 m depth than those (-50–-35‰VPDB) found in the depth of 10–50 m. These results suggest that maxima of CH_4 at 10–50 m and 100–200 m are mainly produced by plankton and the horizontal advection of shelf water from coastal area, respectively.