

Water masses transporting process from the Bering Sea to the Arctic Ocean revealed from multiple chemical tracers

JIANG, Kai^{1*} ; ZHANG, Jing²

¹Graduate School of Science and Engineering for Education, University of Toyama, ²Graduate School of Science and Engineering for Research, University of Toyama

The Arctic Ocean is tightly connected to the Pacific Ocean through the only oceanic gateway Bering Strait. Water, heat, nutrients, and other substances inflowing via water masses exchanges affect the marine environment in the Arctic Ocean. In recent decades, the Arctic Ocean has changed dramatically, especially the rapid reduction of sea ice. The changing of water masses through the Bering Strait is thought to be one of the main reasons. Thus, focusing on the process of water masses transporting will contribute to understanding and forecasting the marine environment in the Arctic Ocean. In this research, stable oxygen isotopes, salinity and rare earth elements (REEs) are used to reveal the water masses transporting process from Bering Sea to the Chukchi Sea, which data comes from the Oshoro-Marun C255 cruise during 14 June - 07 August 2013. 182 water samples of $\delta^{18}\text{O}$ from 31 stations were analyzed by IR-MS (Isotope Ratio Mass Spectrometry). The $\delta^{18}\text{O}$ composition and salinity are used to separate the different water sources based that river water is highly depleted in $\delta^{18}\text{O}$ relative to marine waters as well as to sea-ice. Rare earth elements in the sediments from 8 stations were also analyzed by the method of BCR sequential extraction procedure which partitions the elements in sediments among various forms. It aims to trace the material sources, reflecting the water masses transporting process indirectly. The investigations show that in the Bering Sea, $\delta^{18}\text{O}$ value is around -2 ‰ in the surface increasing to -0.8 ‰ in the bottom water, closed to the $\delta^{18}\text{O}$ value of Pacific Ocean water, indicating that the upper layer water is obviously affected by freshwater. In the Bering Strait, $\delta^{18}\text{O}$ value is similar in the whole water column, around -1.3 ‰, consistent with salinity, which means that the water is well mixed in the Bering Strait (East side of Bering Strait). In the Chukchi Sea, $\delta^{18}\text{O}$ value is also affected by sea ice melt water. REEs data shows that different fraction of sediment has different sources, most part of sediments originally come from land, after charged into ocean, they combine with particles or substance under different marine environment.

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