Spatial characterization of $\Delta O_2/Ar$ and net community production in the surface waters of the East Sea, the Northwest Pacific, and the Bering Sea

함도식[1], 이태식[1], 박경아[1], 박기홍[1], 장찬주[2]

[1]한국해양학기술원부설 극지연구소
[2]한국해양과학기술원

Saturation anomaly of dissolved oxygen (O_2) in surface waters of the ocean is, in general, associated with physical and biological processes. Given that argon (Ar) have similar solubility and diffusivity in seawater to those of O_2, Ar measurement can be used to isolate the O_2 saturation anomaly related to physical processes such as the changes of seawater temperature and atmospheric pressure, and bubble injections among the various processes. Remaining biological O_2 anomaly, $\Delta O_2/Ar$ ($=[O_2/Ar]_{sample}/[O_2/Ar]_{saturation}-1$), reflects the difference between photosynthetic production and respirational consumption of O_2, corresponding to net community production (NCP). To investigate the variability of biological productivity and its possible connection to atmospheric chemistry, we surveyed $\Delta O_2/Ar$ in the surface waters along Araon cruise track from Incheon to Nome, Alaska (July 13 – 29, 2012), using an equilibrator inlet mass spectrometer. We divided the cruise track into four regions: Yellow Sea and South Sea of Korea (YS), East Sea (ES), Northwest Pacific (NP), and Bering Sea (BS). Each of the region showed distinctive oceanographic parameters including $\Delta O_2/Ar$. YS had $\Delta O_2/Ar$ in the range of 0 – 8% and largest average of 4.3%. To the contrary, ES is the least productivity region, with average $\Delta O_2/Ar$ of 1.5%. NP showd modest spatial variability of $\Delta O_2/Ar$ with average of 2.8%. BS was the most dynamic region; $\Delta O_2/Ar$ showed large variability from −10 to 10% in a very confined area. We will discuss the correlation of $\Delta O_2/Ar$ with other physicochemical properties and NCP estimates in the presentation.