



Temporal and spatial distribution of surface pCO₂ in the Ulleung Basin of the East Sea/Sea of Japan

Sang-Hwa Choi (1), Dongseon Kim (2), Kyung-Hee Kim (3), and JeongHee Shim (4)

(1) Korea Ocean Research and Development Institute, Ansan, Republic of Korea(choish@kordi.re.kr), (2) Korea Ocean Research and Development Institute, Ansan, Republic of Korea(dkim@kordi.re.kr), (3) Korea Ocean Research and Development Institute, Ansan, Republic of Korea(khkim@kordi.re.kr), (4) National Fisheries Research and Development Institute, Busan, Republic of Korea(jhshim@nfrdi.go.kr)

To clarify the temporal and spatial distribution of partial pressure of CO₂ (pCO₂) in surface seawater and its major controlling factors in the Ulleung Basin of the East Sea/Sea of Japan, we measured surface pCO₂, sea surface temperature (SST) and sea surface salinity (SSS) by underway measurement system and nutrients, alkalinity and chlorophyll-a of surface seawater by hydrocasting in spring (April 2006), summer (August 2007), autumn (October 2008) and winter (February 2008). SST showed a typical seasonal variation as a mid-latitude temperate ocean in the northern hemisphere with high in summer and low in winter, while SSS showed an opposite seasonal trend with SST due to the concentrated rainfall in summer by seasonal monsoon. Temporal distribution of surface pCO₂ showed a similar tendency with SST variations, but its magnitude of change was less than the estimate by thermal effect due to the SST changes. In summer, the lower surface pCO₂, which was less than expected by the SST, probably arose from the dilution effect of less saline, low pCO₂ surface water by increased seasonal rainfall and river discharges. In winter, the higher surface pCO₂ was likely due to the strong vertical mixing derived by the deep surface mixed layer. Surface waters were spatially divided into several waters, such as western coastal water, eastern Ulleung Basin water and middle water, based on hydrographic characteristics not only SST and SSS but also surface pCO₂. The Ulleung Basin of the East Sea acted as a CO₂ sink, except summer when it acted as a weak CO₂ source.