



## Seasonal variation in inorganic carbon parameters in the southwestern Yellow Sea

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To better understand carbon cycles in coastal and marginal seas, time-series monitoring is essential because of large temporal variabilities. In this regard, we conducted monthly field researches from April 2017 to May 2019 at the Socheongcho (SCC) Ocean Research Site (37°N, 124°E) in the Yellow Sea located between Korea and China. At each survey, we collected surface seawater samples during approximately 7 days with a sampling interval of two hours (except for spring 2017). Total alkalinity (TA) and dissolved inorganic carbon (DIC) were analyzed by using VINDTA 3C system, Apollo SciTech DIC analyzer and Apollo SciTech Alkalinity Titrator. In addition, a pH sensor (SeapHOx) was installed at the surface layer from September 2018 to June 2019 which is also capable of measuring salinity, temperature and oxygen. Based on the observations, we estimated a partial pressure of carbon dioxide ( $p\text{CO}_2$ ) and aragonite saturation state. As expected, seasonal variations in TA and DIC were strongly associated with those of salinity. We also detected a sudden increase in DIC in October when vertical mixing was greatly enhanced. Despite a large outgassing during the fall season, annual mean air-sea influx of  $\text{CO}_2$  was  $0.61 \text{ mol} \cdot \text{m}^{-2} \cdot \text{year}^{-1}$ , suggesting that the study area was a weak sink for atmospheric  $\text{CO}_2$ . Aragonite was generally reduced during winter ( $\Omega < 1.5$ ). However, no undersaturation event was found during the whole investigation.

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