Spacio-temporal variation of the increasing rate of pCO_2 in Kuroshio shelf-slope area

*Tsuneo Ono[1], Shin-ichiro Nakaoka[2], Yukihiro Nojiri[3], Masao Ishii[4]

1. Fisheries Research and Education Agency, 2. National Institute for Environmental Studies, 3. Hirosaki University, 4. Meteorological Research Institute

We investigated spacio-temporal variation of the increasing rate of pCO_2 within the summer season in the Kuroshio shelf-slope area, one of the largest transition waters between western boundary current and coast in Japan. Study area was set as 137E-140E and north of 34N (to coastline), and 4057 historical pCO_2 data observed on July, August and September from 1995 to 2015 in this area was extracted from SOCAT ver.4 database. Interannual variation of water temperature within the dataset was examined as well as salinity, and as this result, it was recognized that the following four temperature-salinity domains have been emerged constantly within the study area thought the whole study period.
LTLS: 24C<T<26C and 33.0<S<33.5
LTHS: 24C<T<26C and 34.0<S<34.5
HTLS: 26C<T<28C and 33.0<S<33.5
HTHS: 26C<T<28C and 34.0<S<34.5
Interannual variation of pCO_2 within each temperature-salinity domain was then examined. HTLS, and HTHS and LTHS showed positive linear trend of pCO_2 with the same increasing rate of +1.9±0.3ppm/y, which value was slightly higher than that observed by Ishii et al. (2014) in the time-series station of 34N, 138E. However, linear trend of pCO_2 in LTLS showed significantly higher increasing rate than other three domains, +2.8±0.5ppm/y. Detailed analysis indicated that LTHS and HTHS roughly correspond to the data observed in the offshore side of Kuroshio current in July and August, respectively, while LTLS and HTLS roughly correspond to those observed in the shelf-slope area in July and August, respectively. The observed results indicate that the increasing rate of pCO_2 in the Kuroshio shelf-slope area varies even within the summer season, reflecting wide spacio-tenporal variation of water properties caused by complex biogeochemical processes in this quasi-coastal area.

Keywords: coastal region, global warming, pCO2

