季節海氷域における有機炭素深層隔離の季節変動と ドライバー解明を目指した係留観測

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Observing seasonality and driver of carbon sequestration in seasonal ice zone

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Carbon sequestration is primarily influenced by the primary production and efficiency of the biological carbon pump. In the Southern Ocean, it is thought that ice edge phytoplankton bloom is one of the most important events to regulate primary production, which is strongly related with the seasonal prevalence of the sea ice. Thus, relationship between sea ice dynamics and biological activity is a critical factor for understanding not only ecosystem structure and its dynamics but also carbon sequestration. A full year observation using mooring arrays with time-sequential sediment traps is a possible solution to reveal the relationship in Polar regions. We designed a mooring observation, which will be conducted for one year from January 2019 along the 110°E transect off Wilkes Land, East Antarctica, during the two cruises by the training vessel *Umitaka-maru*, Tokyo University of Marine Science and Technology.

We organized to deploy three mooring arrays at 61°S (ice edge area during winter-spring), 63.5°S (upwelling area around Southern Boundary of Antarctic Circumpolar Current) and 65°S (ice edge area in January) along the 110°E. Each array is equipped with two sediment traps at 500 m and bottom−500 m (500 m above the sea floor) depths. The shallow and deep traps aim at determining the export flux from winter mixed layer and sinking particles just before reaching the sea floor, respectively. Buffered formalin is used to preserve all sediment trap samples. Furthermore, we apply neutral Lugol solution for half of sample series from the twin traps at 500 m depth for DNA and microzooplankton analyses. At 63.5°S, a long-ranger ADCP is deployed just above the shallow trap to quantify the biomass and vertical distribution of macrozooplankton and fish, which is likely main contributors for vertical fluxes.

Additionally, we try to establish the sea ice proxy for determining the past sea ice distribution. A previous paper reported that the morphological characteristic of a diatom species was different between those in sea ice and water column. Our colleagues also found similar phenomena in two diatom species from our target area. In order to discover the sea ice-form of the diatom, samples in the deeper traps during ice melting season is applied for microscopic analyses. Observing the sea ice-form in deeper traps could contribute to accurate reconstruction of paleoenvironment.