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Age of the Pacific Winter Water in the Canada Basin estimated from SF6

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In the Pacific sector of the Arctic Ocean, Pacific Winter Water (PWW) distributes between 100m and 200m depths. Because the PWW has high nutrient concentrations and low pH, its spreading pathway has implications on primary production and ocean acidification in the Arctic Ocean. In this study, we have observed distribution of SF6, a transient tracer alternative to CFCs, in order to trace newly formed PWW into the Canada Basin.

Sampling was carried out in summer of 2013 on the CCGS Louis S. St-Laurent. Seawater at the core of PWW (salinity = 33.1) were collected in Niskin bottles and then transferred into custom-made glass bottles. Samples were kept at low temperature and brought back to Japan. Concentrations of SF_6 in seawater samples were determined by an ECD-GC following the method described in Bullister and Wisegarver (2008).

Results show that younger PWW distributes at the periphery of the Beaufort Gyre, a major anticyclonic circulation in Canada Basin. The age of PWW estimated from SF_6 was 13∼15 years in the center of the gyre, whereas age was 6∼9 years around the gyre. From the distributions of SF_6 age, dissolved oxygen and nutrients, it is suggested that there is a pathway of PWW from the Siberian shelves or slopes into the northeastern Canada Basin.

Keywords: arctic ocean, time transit tracer, SF6, ocean circulation