

Possibility of AABW source originating from middle size of Polynya along the coast of Australian-Antarctic Basin

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Antarctic Bottom Water (AABW) originating from Vincennes Polynya (VP) was discovered recently (Kitade et al. 2014). The fact that middle size of Polynya also produces AABW suggests the possibility that the unknown formation area still exists along the coast of Australian-Antarctic Basin (AA basin). From the viewpoint of sea ice production, the amount of sea ice production of Sackleton Polynya (SP) in the west of VP is about 1.4 times that of VP (Tamura et al. 2016), implying that SP is a possible candidate for AABW formation area.

A deep float, called "Deep NINJA" which is able to observe temperature and salinity at depths up to 4,000 m, was developed by Japan Agency for Marine-Earth Science and Technology and Tsurumi-Seiki Co. (Kobayashi et al., 2015). Five deep floats were deployed along 110°E in Jan. 2014. One of them drifted westward almost along the continental rise and had been observing 40 profiles within two years. However, no signal of newly formed AABW was observed except off VP, and such property is consistent with The Baseline Research on Oceanography, Krill and the Environment (BROKE) survey. Therefore, as a result of investigating the salinity of Dense Shelf Water (DSW) on the shelf in the elephant seal bio-logging data, it was found that the salinity of DSW's core in offshore SP is 0.1 or lower than that in offshore VP. Although this cannot be explained by sea ice production difference, it can be explained by considering AVISO absolute dynamic topography data, ocean climatology data and sea ice melting amount. Moreover, it was thought that AABW was not formed offshore of the SP's shelf because the salt content of DSW was insufficient for AABW formation. Although these facts do not completely negate the additional formation of AABW originating from middle size of polynya located at west of VP, their formation volume of AABW is suggested to be much smaller than that off VP. As a result of investigating the possibility of AABW formation in other medium size polynya using the same algorithm, Dibble Polynya was considered as the most influential unconfirmed candidate in the polynya facing the AA basin.

Keywords: Antarctic Bottom Water, Dense Shelf Water, Australian-Antarctic Basin, Formation process of shelf water, Vincennes Polynya, Sackleton Polynya