Property of eddy and AABW observed off Cape Pointset

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In recent years, attention has been focused on the acceleration of melting of the Totten ice sheet, so our research group is focusing on clarifying the mechanism that the melting of the Totten ice sheet by expanding our observation area from Vincennes to the east. According to Mizobata et al.(2020), satellite sea level records show that Pointset eddy are constantly observed in this area, but the formation mechanism of the eddy has not been clarified. This eddy may play an important role, such as supplying warm water to the continental shelf. Elucidation of the actual state and formation mechanism of the eddy is considered as a key for the promotion mechanism of ice sheet melting.

The observations by TR/V Umitaka-Maru this year were conducted from January to February 2020. Since the Pointset eddy was detected from satellite SSH data during the observation period, observation line along 64°S and 115°N were established to clarify the structure of the eddy. At each site, hydrographic observations were carried out up to 10m just above the sea floor. As a result of the observation, the eddy was also confirmed in the temperature and salinity structure. From the combined results of SSH and dynamical calculation, it was estimated that the flow due to the pointset eddy was about 6 cm/s near the sea surface and about 1 cm/s near the sea floor. In addition, it was found that high salinity Antarctic Bottom Water (AABW), which is relatively special around this area, was distributed on the bottom of the continental slope off Cape Pointset.

The relatively high-salinity AABW was distributed along a 3000 m isobath around the Cape Pointset. It is difficult to clarify the source of this high salinity AABW from the observations of Umitaka Maru alone. However, in February 2019, observations were made on the continental shelf by Shirase, and it has been found that modified Circumpolar Deep Water (mCDW) with a high salinity exceeding 34.65 has been found in the depressions on the continental shelf. Since this mCDW has a high temperature of 0.3°C, the mCDW cannot directly become the high-salinity AABW. While the high-salinity signal like observed off the Pointset also appeared at the upper part of AABW at 63.5°S, it does not be dense enough to sink to the bottom of the Australian Antarctic Basin. However, the submerging process of high-salt and low-temperature water on the slope may contribute to the excitation of cyclonic eddies, and the supply of warm water on the continental shelf may also be an important mechanism of this area. In the future, we plan to clarify formation mechanisms of eddy and the high salinity water by combining with other data.

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