

Ocean and material circulation in the southern part of the Australian Antarctic Basin in 2018/2019 summer - preliminary results from Kaiyomaru KY18-04 cruise

*Katsuro Katsumata¹, Daisuke Hirano², Daiki Nomura², Kaihe Yamazaki², Yoichiro Koh², Masaaki Kiuchi², Shigeru Aoki², Hiroto Murase³

1. JAMSTEC, 2. Hokkaido Univ., 3. NRI-FSF

The Australian Antarctic Basin collects dense shelf water from the Ross Sea and off Adelie Coast along the westward-flowing Antarctic Slope Current and modifies its property through mixing before initiating the bottom branch of the meridional overturning circulations in the Indian and Pacific oceans. It is necessary to monitor the current status of the near-bottom circulation in the basin in order to understand how the recently-reported volume decrease of the Antarctic Bottom Water and changes in the atmosphere-ocean and cryosphere-ocean interactions are related. It is established that the Southern Ocean, particularly at the north of the Antarctic Circumpolar Current (ACC), acts as a sink of anthropogenic carbon through its low surface pCO₂ and mode and intermediate watermass production. Then, is the south of the ACC source or sink of anthropogenic carbon with its dense shelf water production in the face of upwelling of carbon-rich deep water masses? How do these changes in the environment affect the biosphere and ecosystem in the Southern Ocean?

With these questions in mind, R/V Kaiyomaru, Japan Fishery Agency, conducted a research cruise in the basin, in proximity of its seasonal ice edge, from December 2018 to March 2019. This part of the basin has been observed by an Australian team in 1996. At the time of writing, more than 40 stations have been occupied for CTD and LADCP observations and bottle sampling, more than 80 XCTD probes have been deployed. Preliminary analysis shows the changes in the bottom water masses. The Figure below shows the CTD/LADCP/sampling stations (black dots) and XCTD deployments (crosses) for Leg1 (5 Dec 2018 to 16 Jan 2019) with AMSR2 derived ice concentration, which is a combination of west of 90E (observed on 17 Dec 2018), between 90E and 107E (24 Dec 2018) and east of 107E (31 Dec 2018). In the talk, the latest results and its outlook will be discussed.

Keywords: Shelf circulation, Bottom water formation, carbon circulation

Leg 1

