The development of ice-free monthly absolute dynamic ocean topography in the Southern Ocean

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Recently, the bottom melting of ice sheet and the supression of Anntarctic bottom water (AABW) formationn have been reported [e.g., Williams *et al*., 2016; Kusahara and Hasumi, 2013]. The key driver of both phennomena is thought to be the warm and salty Circumpolar Deep Water (CDW) which is always found at depths of more than 300m. The timing and vlome of CDW flowing onto the shelf region needs to be elucidated for investigating the fate of ice sheet and modification of AABW. CDW circulation in the shelf is being revealed. The details (such as the variability and its causes), however, are still unknown due to heavy sea-ice and lack of *in-situ* observation. In this study, we developed "Ice-free Monthly Absolute Dynamic Topography (ADT)" using the measurements of satellite altimeters, CryoSat-2(CS-2)/SIRAL (Geophysical Data Record, BASELINE-C) and Jason-2 (AVISO/CorSSH products), based on the methods described in Mizobata *et al*. [2016] and the interpolation method with a topographic constraint scheme proposed by Shimada *et al*. [2017]. The Developed ADT datasets well captured the general circulation field (Weddell Gyre and Ross Sea Gyre) and also the recirculation field near shelf-slope area in the Australian-Antarctic Basin (AA Basin) through a year. The recirculation fields in the AA Basin are similar with or would be same as the eddy, which was discussed by Wakatsuchi *et al*. [1994]. As Wakatsuchi *et al*. described, those recirculation field occurs every year but its size is variable, and also those locations coincide with northward-extending ridge form the continental shelf. The recirculation fields are variable even on a monthly basis. The variability of the recirculation field in the AA Basin during winter is not corresponding to that of ice-stress field estimated by sea ice drift dataset based on GCOM-W1/AMSR2 brightness temperatures [Kimura *et al*., 2013; Arctic Data archive System https://ads.nipr.ac.jp/portal], indicating that the existence of other mechanisms account for short-term fluctuations in the recirculation field, which is the carrier of CDW to shelf region.

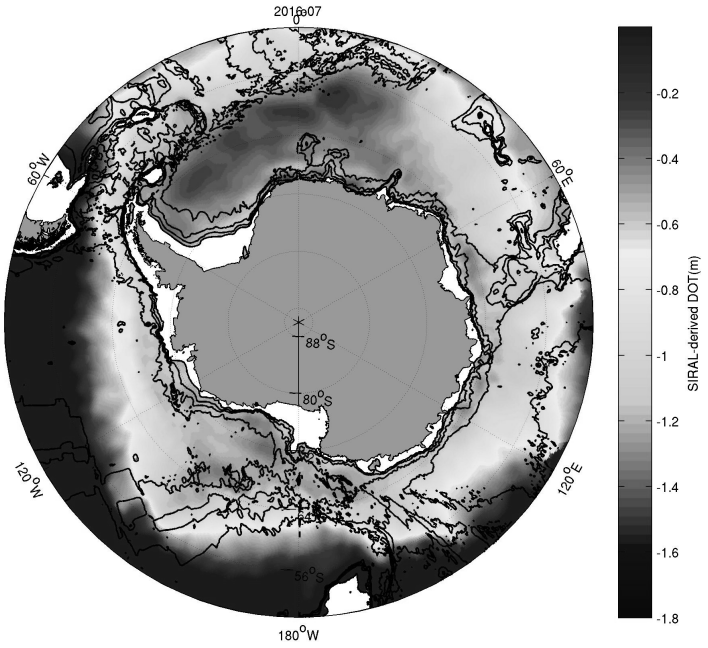

Figure 1. ADT (July, 2016) using CS-2/SIRAL and Jason-2 measurements

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