

## Mooring observation aiming direct current measurement and quantitative evaluation of Meridional Circulation of Southern Ocean

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The deep Global circulation is a large-scale thermohaline circulation over the Earth and plays an important role in maintaining a stable climate.

In recent years, as rising temperature and freshening of Antarctic bottom water is being observed in various places, in order to quantitatively understand its freshening mechanism and the flow rate and change of Southern Ocean meridional circulation, We are planning to construct a large mooring observation network.

Therefore, as the first attempt, we deployed two moorings (January 2017 - January 2018) by TR/V Umitaka-maru in order to carry out direct current measurement of Meridional circulation. At the time of deployment and recovery of mooring system, we carried out CTD observation up to the sea floor along 110 °E line and off Vincennes Bay. At the northern edge of the seasonal sea ice zone, station KMN (60-56 S, 110-07 E, depth of water: 4180 m), we deployed five current meters, one ADP current meter, four MicroCat-CTDs and six RBR soloTs. At KMS (63 - 32 S, 108 - 02 E, depth: 3201 m) in the vicinity of the summer divergence zone, we deployed 10 MicroCats, 3 CTs sensors, 30 soloTs. Because the top buoy of the mooring system at KMN had come up to the sea surface, the two buoys were damaged due to the overhang of the sea ice in winter, but all the sensors were successfully recovered.

Mooring revealed that a flow field suggesting the structure of circulation and periodic fluctuations due to medium-scale eddies and seasonal fluctuations. In this report, we introduce the whole of the observation, the digestive result of the moored observation. The annual averages of current velocity [ $u, v$  (cm / s)] obtained with 5 current meters are [2.15, -1.26] at 429 db, [1.46, - 0.88] at 859 db, 0.26, -1.26 at 1918 db, [-1.32, -0.78] at 3366 db, and [-1.65, -1.77] at 4080 db. The east-west current structure shows eastward in the upper three layers and westward in the lower two layers, indicating a reasonable zonal current velocity structure. In north - south component, it is slightly larger at the lowest layer, but in other depths it shows southward flow of about 1 cm/s. The 1 cm/s agree well with the current velocity estimated from Sverdrup transport by the wind stress field in this area.

In addition, at around 400 m depth, water masses around 2 degree considered to be the Circumpolar Deep Water were distributed, and it appeared that the temperature rose synchronously with the periodic southward current. We believe that these flow velocity structures and variations are the first approximate features of the circulation of the sea area. In addition, we investigated the fluctuation of Curl of wind stress using WindSat's wind data and found periodic period fluctuations corresponding to some of current fluctuations. In this summary, only the qualitative features which are known from the preliminary report value are described, but at the time of the presentation, other mooring data will be also added and the contents which we entered into more quantitative discussion are introduced.

Keywords: Southern Ocean, Meridional Circulation, mooring observation, wind stress