

Interannual variation of cyclonic eddy in the Amundsen Sea Polynya, Antarctica

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The Amundsen Sea has recently attracted particular interest because it is the most rapidly warming in the Western Antarctic (WA). Many studies reported that the relatively warm Circumpolar Deep Water (CDW) and its seasonal variation of intrusion are associated with the regional warming. However, few studies have examined why the intrusion varies seasonally. The strong seasonal cyclonic eddy in the Amundsen Sea Polynya was found from shipborne measurement LADCP data during the 2010/2011 and 2011/2012 IBRV Araon expeditions. Also this ocean surface circulation was reconfirmed from the OSCAR (Ocean Surface Current Analysis) what calculated from quasi-linear and steady flow momentum equations using sea surface height, surface vector wind and sea surface temperature obtained from satellites. A polynya larger than 200 km in diameter formed effect of wind and ocean currents in front of the DIS (Dotson Ice Shelf) during the austral summer season. The strong upwelling induced by latitudinal varying of westward wind velocities and sea-ice concentration at the northern boundary of the polynya. Such upwelling generates the cyclonic eddy that maximum current speed is larger than 10 cm s^{-1} . However, during austral winter, the polynya was almost closed, so upwelling is reduced compared to the summer season and disappear the cyclonic eddy in front of the DIS. This seasonal variation in the strong ocean surface circulation may be influence on oceanic heat transport to ice selves.