

Interannual Climate Variability in the Amundsen Sea Embayment in Ocean Re-analysis Data

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Outlet glaciers of the Amundsen Sea Embayment (ASE), West Antarctica, have thinned over recent decades. Circumpolar Deep Water (CDW) originated from Antarctic Circumpolar Current is responsible for the thinning by basal melting beneath ice shelves in the ASE. Observations during the past decade have revealed that behaviors of CDW in the ASE have year-to-year variations. In the present study, Mercator-Ocean re-analysis (1993 – 2015) and monthly ERA-Interim re-analysis data are analyzed to investigate interannual variability of the CDW in relation with climate variability. We find that sea level pressure over the ASE responds to the ENSO phase asymmetrically. Bottom water in the ASE tends to be warmer in El Nino years than ENSO neutral years and La Nina years. The positive anomalies of bottom temperature cover most of ASE at a lag of 6-9 months after El Nino mature phase. We confirm that this warming is attributed to zonal component wind, thereby CDW delivering more heat into the ASE. The re-analysis data can be useful to investigate CDW intrusion and associated atmospheric forcing in both regional and global perspective. However, the re-analysis ocean data needs to be used with care because the horizontal resolution is not fine enough to resolve key bathymetric features in the ASE and does not have ocean circulation under ice shelf. Future study based on a model that allows glaciers/ocean interaction could help to explore cause and impact of glacier melting in the ASE on multiple timescales.