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Spatial-temporal variation of heat flux in central Amundsen Sea

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Recently, the ice sheet in the coast around the Amundsen Sea has been widespread thinning due to the effect of warm circumpolar deep water (CDW) intrusions into the continental shelf. To quantitatively estimate the heat transport of CDW into the Amundsen Sea, we used 1-year mooring data and CTD and LADCP data measured by the icebreaker Araon in February 2012. In the calculation result of bottom heat transport, the time-averaged barotropic heat transport was relatively small, compared to the baroclinic heat transport during whole mooring period. The baroclinic heat transport showed the seasonal variation due to variation of heat content near the bottom. We found that the heat flux of seawater depend on the along-channel barotropic velocity. Also, the heat content of seawater showed a good correlation with the variation of sea ice concentration in Amundsen Sea. During austral summer, the freshening of surface water by sea ice melting contributed to the increase in along-channel barotropic transport to the south, whereas during austral winter, along-channel barotropic transport decreased due to increase of the sea surface salinity produced by sea ice growth. The observed baroclinic heat transport from CTD and LADCP across channel section (area: 103 km^2) was 7.5 TW in central Amundsen Sea in February 2012. In front of Dotson Ice Shelf (area: 34 km^2), the observed baroclinic heat transport was 0.6 TW.