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Circulation of warm deep water on the central Amundsen Shelf

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The thinning and retreat of Antarctic ice shelves show a strong regional variability, with the most rapid melting occurring in the Amundsen Sea sector, West Antarctica. It has been claimed that the rapid retreat of the glaciers (or ice sheets) is primarily related to the intrusion of warm Circumpolar Deep Water (CDW) which acts as an oceanic heat source. Due to the very limited in-situ data, the spatial and temporal variability in the oceanic warmth is still poorly understood, and the main pathways of the warm dense water are basically unknown. Here the velocity, temperature and salinity from 4 moored stations are combined with ship-borne data across a deep trough on the Amundsen Shelf to show that the warm deep water makes a clockwise circulation on the bottom. Warm and salty water enters the shelf, flow southward parallel to the bathymetry and into the ice shelf cavity where it is cooled and freshened by subsurface melt processes. The product water is more buoyant than the source water, but a significant portion of it is still denser than the cold Antarctic surface water and flow northward on the bottom, following the western side of the bathymetric trough, guided by the Coriolis force. During the presentation, data analysis and results archived since 2010 will be presented in terms of CDW intrusion and its circulation on the Amundsen shelf.