Overturning of the Antarctic Slope Front and ice shelf melting along the coast of Dronning Maud Land

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Out of 19 elephant seals that were equipped with CTD data loggers on the Bouvet Island in January 2008, eight reached the Antarctic coast. These eight seals collected hydrographic data from the Dronning Maud Land coastal zone between 25W and 45E covering the period from February through October 2008. During this period the seals collected more that 2000 profiles of temperature and salinity within the coastal zone, which we define as the area with bottom depth less than 2000m. The hydrographic data has been used to explore the properties of the water masses south of the Antarctic slope front. These water masses are directly interacting with ice shelves, and temperature and circulation of these water masses determine the ice shelf melting in the region. The data suggests that the Antarctic Slope Front is an effective barrier preventing the Warm Deep Water (WDW) to flow directly on to the continental shelf, as the warmest temperatures observed south of the ASF is about -1.6 °C. However, WDW is still the most important heat source of the shelf water masses. The low temperatures observed is a result of strong mixing with shelf water as WDW crosses the ASF. From February to October the water masses south of the ASF are gradually getting more saline. The salinity increase cannot be explained by sea ice formation alone. Overturning of the ASF with accompanied inflow of modified WDW onto the continental shelf is an important process leading to the salinity increase. ISW is observed flowing out from the main sill between the Fimbul Ice Shelf cavity and the open ocean. No other locations of ISW outflow is observed, suggesting that the Fimbul outflow is unique for the region. We will discuss estimates on ice shelf melting based on the observed salinity increase and inflow of WDW.