



Warm events and ice cover near Maud Rise, Weddell Sea

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Hydrographic data of Polarstern cruises collected by us during the last decade along the prime meridian in the vicinity of the seamount Maud Rise in the eastern Weddell Gyre show large variability in the magnitude and location of the warm regime Warm Deep Water that flows around the seamount. At 66°S, where the topography of Maud Rise is most dominant, the high temperature-maximum is always interrupted by a very low value characteristic for the water column over the crest and upper parts of Maud Rise. Moored data of temperature from the same position show large variation as well. During two years when the uppermost moored instrument was lying at only 91 m depth, the near freezing point temperatures characteristic for mixed layer conditions were punctuated by frequent warm events, which lasted some days. During such events, the temperature rose precipitously, sometimes to $>1^{\circ}\text{C}$. Most warm events occurred in spring, but there were also some in the dead of winter. Such high temperatures have never been observed during traditional hydrographic sampling at this location. Upward Looking Sonar data at mooring locations showed lower annual mean ice draft and ice concentrations at the "Maud Rise" location than at close adjacent moorings. This strongly suggests that these warm events, by which potentially a lot of heat can be transferred into the surface layer, play a role part in the melting of the sea ice around Maud Rise; this may occur during winter through polynya formation, but also for clearing the Maud Rise region of sea ice very early in the season. Warm events may be responsible for the halo of low ice-concentration around the Rise as reported recently. The occurrence of warm events seems to be associated with current velocity reductions of the main flow of the southern limb of the Weddell Gyre as documented by measurements of a mooring at 64°S. This may lead to displacement of the front between the warm regime and the "Maud Rise regime".