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Observed mixing at the flanks of Maud Rise in the Weddell Sea

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Maud Rise is a seamount in the eastern Weddell Sea and the location of the Maud Rise halo of reduced sea ice and polynyas. In this region, we present novel in situ data from two profiling floats with up to daily-resolved hydrographic profiles. Over Maud Rise, the mixed layer is especially deep during winter (150-200 m), leaving a thick layer of winter water after re-stratification that persists throughout the year and increases the rate of autumn mixed layer deepening. In contrast, the halo around Maud Rise is characterized by a shallow mixed layer depth and only a thin layer of winter water. Below the mixed layer, the water properties in the Maud Rise region are significantly correlated with bathymetric depth; thus, the Maud Rise flank defines the fronts between the Warm Deep Water of the abyssal ocean and the colder, less stratified Maud Rise Deep Water characteristic of the Taylor cap over Maud Rise. We analyse the curvature of spiciness in density space to quantify observed interleaving, which is substantially higher over and along the flanks of Maud Rise than in the surrounding deeper waters. These intrusions are indicative of enhanced lateral and vertical mixing along heavily sloping isopycnals, creating favorable conditions for thermobaric and double diffusive convection that facilitate the Maud Rise halo and may contribute to the formation of polynyas.