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The mixed layer over the Antarctic continental shelf

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The temperature of waters above the shelf seabed in the Amundsen and Bellingshausen (AB) seas, Antarctica, is seen to be several degrees warmer than in the Weddell and Ross (WR) shelf seas. In the AB seas, unmodified Circumpolar Deep Water from the Antarctic Circumpolar Current floods the continental shelf all year round, whilst in the WR seas, the cold wintertime mixed layer is thought to reach the seabed, de-stratifying the entire water column. In this study, we want to understand to what extent the difference in shelf water properties can be explained by differences in the atmospheric forcing between the two regions. To do this we have developed a simple sea ice-mixed layer model to study the sensitivity of the wintertime mixed layer depth to a variation in surface fluxes. The study is also looking at the impact of the summertime water column stratification, the sea ice export rate,the initial summertime mixed layer conditions and several other model parameters. We shall later incorporate this mixed layer model into CICE to more accurately represent the buoyancy fluxes to the mixed layer from sea ice growth and melt during the annual sea ice cycle.