



Variability in the properties of the bottom water in the Weddell Sea

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The Weddell Sea is the primary source of the coldest, densest water invading most of the world ocean, known as Antarctic Bottom Water. The formation process involves brine rejection during sea ice formation on the Antarctic continental shelf, injection of meltwater from the floating Antarctic ice shelves and mixing of the plume when spilling over the shelf edge and descending the continental slope. In the abyssal Weddell Sea, water masses of different source areas in the southern and western Weddell Sea join. Due to the decay of considerable parts of the Larsen Ice shelf significant changes in the formation process are expected. Here we present the results from observations which started in 1989 including hydrographic sections across the Weddell Sea and instruments moored on the western slope and in the Weddell Basin. We analyze longer term changes of the properties of the water masses on the western continental slope and in the Weddell basin. Whereas in the bottom water plume hugging the north-western continental slope, the temperature and salinity in the core of the plume show the tendency to decrease, the bottom water in the central Weddell basin is warming. Significant fluctuations in seasonal and interannual time scales are superimposed; their potential to simulate longer term variability by aliasing is investigated on the basis of the data from the moored instruments. We speculate that freshening of source waters on the continental shelf of Antarctica caused by an accelerated hydrological cycle, changes in sea ice formation, and/or additional melting related to the ice sheet break-up of the Larsen Ice Shelf in the late 1990s dominate the variability of the water mass properties on the northwestern slope; either direct outflow to the north or decreasing production of part of the sources in the south result in the warming of the bottom water in the basin.