



Recent freshening of the antarctic bottom water in the australian-antarctic basin

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The Antarctic Ocean supplies dense, cold abyssal water -Antarctic Bottom Water (AABW) - to the world ocean. Recent surveys have revealed dramatic property changes of some of its varieties. Repeat summer hydrographic observations along 140 deg. are used to document significant changes in the properties of the Ad'elie Land Bottom Water (ALBW) between the mid-1990s and 2002-2003. Water on the 28.35 kgm⁻³ neutral density surface cooled by 0.2 deg.C and freshened by 0.03 psu between 1994 and 2002. By re-occupying the same stations in the same season, the effects of seasonal variability and spatial variability were minimized allowing the signal of water mass changes to be clearly identified. Comparison of the recent data to high quality historical observations shows that the ALBW also freshened between the late 1960s and the mid-1990s. Although there is insufficient data to construct a continuous time series, the simplest explanation of the observed changes is that there has been a long-term (> 30 year) and continuing freshening of the source waters supplying bottom water to the Australian-Antarctic basin. Recent hydrographic observations also show that Ross Sea Bottom Water (RSBW) was warmed and freshened for the recent decade. Limited evidence suggests the freshening of these bottom waters can be traced to a decline in salinity of the shelf water component. The cause of the decline in shelf water salinity is not yet clear, although an increase in melt of glacial ice, increased precipitation and reduced sea ice production have been identified as possible contributors. Given the near-global influence of Antarctic Bottom Water on the properties of the abyssal ocean, continued monitoring of changes in bottom water properties and identification of the mechanisms driving variability in the source waters are high priorities for future research.