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RAPID FRESHENING OF ANTARCTIC BOTTOM WATER

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Roughly equal amounts of dense water sink in the high latitudes of both hemispheres to ventilate the deep oceans and supply the lower limb of the global thermohaline (or overturning) circulation. Climate models and studies of past climate suggest the climate system is sensitive to changes in the strength of the thermohaline circulation. Significant changes in the properties and transport of deep water formed in the North Atlantic have been observed during the past four decades. Here we show that the southern arm of the thermohaline circulation is also changing. Bottom water throughout the Australian Antarctic Basin was significantly fresher and lighter in 2005 than observed in 1995, resulting in a basin-wide shift of the deep temperature – salinity relationship. The change in salinity observed over the last decade is of the same sign, but more rapid, than a freshening observed between the late 1960s and the 1990s. The results demonstrate that both the southern and northern limbs of the global overturning circulation are responding to an increased supply of fresh water to the high latitude ocean and rapidly transmitting this climate signal to the deep ocean.