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What controls the warming of the Antarctic Bottom Water supply to the Atlantic Ocean?

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Antarctic Bottom Water has experienced a marked contraction and warming, particularly in the Atlantic sector, in the past three decades. Much of the global abyssal waters are composed of this bottom water and these changes have seen concomitant ocean heating and global sea level rise via thermal expansion. This warming has been linked to a contraction in export of the densest classes of bottom water from the Weddell Gyre due to processes that are not well determined but potentially including changes in wind forcing or source water formation. With regard to wind forcing, several mechanisms have been suggested, however their relative scale and whether they occur concurrently remains unclear. Using two mooring sites within the Weddell Sea, we estimate lag times between temperature anomalies at 3000m depth finding changes in the strength of the boundary current connecting the two sites. These changes in flow speed are synchronous with changes in wind forcing and bottom water transport. In particular, bottom water temperatures increased in response to anomalously strong wind forcing in 2015 and to a lesser extent in 2018 over a period of six months, indicating a contraction in export of the most dense water classes from the Antarctic. These findings reaffirm the importance of wind forcing in driving changes in the export of dense water to the lower limb of the Atlantic overturning circulation, with potential consequences for long-period climate evolution.