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# Constraints of $PO_4$* on the change in Antarctic Bottom Water production over the last 8 centuries.

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The processes of Antarctic Bottom Water (AABW) formation are not well understood and estimates of its production rate vary widely between 2 and 15 Sverdrups (Sv), depending on the method of estimation. Estimates using the quasi-conservative chemical tracer $PO_4$* have given a figure of 15 Sv (Broecker *et al*., Science, 1999) whereas decreased estimates are given using physical tracers such as potential temperature and salinity. To take account of these differences, Broecker *et al*. have suggested that the AABW production rate may have been decreasing over the last 800 years.

An inverse box model of the Weddell Sea, using both physical and chemical quantities such as $PO_4$*, has been developed. This method will determine whether a consistent production rate can be achieved using both types of constraints. The box is bounded by the hydrographic transects of the ALBATROSS, WOCE A23 and SR4 cruises and the coast of Antarctica. Lowered Acoustic Doppler Current Profiler and mooring measurements are used to create initial reference velocities for geostrophic shear. A variety of constraints such as volume conservation are applied. The impact of adding $PO_4$* to the inversion will be discussed.