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Modification and formation of mode and intermediate water in the Brazil-Malvinas confluence diagnosed by a box inverse model

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The Brazil-Malvinas Confluence (BMC), in the Southwestern Atlantic, plays a key role in the ventilation of the subtropical Mode and Intermediate water. Cold and fresh sub-Antarctic water flows northward with the Malvinas current and renews the warmer and more saline intermediate water circulated in the subtropical gyre, while the sub-Antarctic water gains heat and salt. Clear evidence of these modifications is found in the θ-S properties of the numerous cruises made in the region. Analysis of pre-WOCE and WOCE θ-S properties shows three different salinity minima illustrating the drastic changes in properties in the Antarctic Intermediate Water (AAIW) density range in the BMC. Despite being acknowledged as a key region for the formation and renewal of intermediate waters, few studies have focused on giving estimates of the mixing in the BMC.

We present the results of an inversion of WOCE hydrographic sections surrounding the BMC. We quantify the mixing and determine the dominant mixing processes in the BMC. The inverse model diagnoses an inflow of 109 Sv between South Georgia and the Malvinas Islands falling within one standard deviation of the LADCP transport (129$\pm$21 Sv) and a Brazil current of 27 Sv that agrees with previous estimates. The results of the inversion show formation of 6.5 Sv of AAIW but no significant diapycnal convergence of volume in the AAIW probably indicating a dominance of isopycnal mixing. We find an upwelling of SAMW into the thermocline water. Significant convergence of heat and salt into the SAMW and AAIW from the overlying thermocline water and the underlying NADW is also diagnosed, explaining the water

mass modifications shown on the θ-S diagrams.