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Variability of water properties, heat and salt fluxes in the Agulhas Current system during the Agulhas Undercurrent Experiment.

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The Agulhas Undercurrent experiment (AUCE) took place from February to March 2003 off the east coast of South Africa, with the objective of improving our knowledge of the Agulhas Current System. The survey consisted of 112 $CTDO_2$/LADCP stations distributed among four high resolution cross stream sections and an offshore section enclosing the region into three boxes. An Inverse Model is implemented over the region in order to quantify the mass, salt and heat fluxes of the Agulhas Current system. Two experiments were performed, the first consists of hydrographic data only, with a reference level given by the neutral surface separating AAIW and NADW. The second incorporates direct velocities where the reference level velocities at 3000 m are given by LADCP.

In both experiments, the total mass flow increases from the northern most section (30ºS) to the southern one (36ºS), reflecting the fact that the Agulhas current becomes faster and deeper. The current grows from about 40.0 ± 9.1 Sv to 145.0 ± 11.1 Sv, entraining both thermocline and deep waters. By including LADCP velocities, we find a better agreement between the inverse model and transport values from previous observations along the historic WOCE section at 32ºS. Results further show that entrainment/detrainment in the region appears to be dominated by mesoscale variability. Preliminary figures show that vertical mixing of NADW is greatest in the southern box, contrary to our expectations that shoaling topography in the north would facilitate mixing.