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FRONTS AND TRANSPORT VARIABILITY OF THE ANTARCTIC CIRCUMPOLAR CURRENT SOUTH OF NEW ZEALAND

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Twenty one XBT sections across the Antarctic Circumpolar Current (ACC) between New Zealand and Antarctica, collected in the frame of the Italian CLIMA project (1994-2006), are used to study the upper ocean thermal structure and to infer the baroclinic transport. The Subantarctic Front (SAF) regularly bifurcates into two distinct branches in this region. The northern branch closely follows the edge of the Campbell Plateau; the southern one is often found over the abyssal plain of the Southwest Pacific Basin. Frequently eddies or meanders of the SAF dominate the thermal structure north of 58°S and may contribute to the meridional fluxes of heat and other properties. The Polar Front (PF) is found in a more stable position than the SAF, although occasional cold-core meanders or rings originating from the PF are observed north of the front. The Southern ACC Front is consistently found over the northern flank of the mid-ocean ridge.

The baroclinic transport has been estimated by using an empirical relationship between the upper ocean temperature and the baroclinic transport stream function using CTD data acquired in this region. This method has been applied already with satisfactory results in different regions of the Southern Ocean; cross validation shows this relationship provides the baroclinic transport (above and relative to a depth of 2000 m) with an error of few per cent. The tight relationship found between the temperature (averaged in the layer 600-700 m) and the stream function south of New Zealand suggest baroclinic transports can be inferred from XBT data with high accuracy providing a cost-effective tool for monitoring variability of the ACC in this area.