



A balance of Southern Ocean fluxes determined from a sub-basin scale Inverse Model

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Inverse models are a useful method in examining mean ocean circulations from sets of hydrographic data and have provided insight into the mean flux balance of the world's oceans. A data-set of hydrographic sections occupied in the Southern Ocean between 1987 and 2003 is examined in an Inverse Study focusing on the mean fluxes and the transformations of the major water masses around the Southern Ocean. Air-sea interactions are explicitly included by solving for corrections to forcing fields derived from the NOC climatology. The model includes a northern boundary at 30°S, and a southern boundary of stations close to Antarctica. The model has nine circumpolar boxes, providing solutions with a sub-basin scale resolution in the Atlantic, Indian and Pacific sectors. Different mixing schemes are examined in the model to obtain 3D representations of the mean circulation patterns around the whole of the Southern Ocean. Output from the BRIOS model was used to adapt the southern boundary to include a consistent initial flow field that had reasonable rates of bottom water formation and that takes account of the large barotropic currents observed in the continental waters. We will present results and analysis from this model study, focusing on the three-dimensional picture of the overturning circulation around the Southern Ocean and the transports into the other ocean basins.