

Variability and uncertainty of meridional transports in the South Atlantic as estimated from Argo and altimetry

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An analysis of the transports of the Atlantic Meridional Overturning Circulation (AMOC) in the subtropical South Atlantic is performed based on three-dimensional velocity fields derived from Argo data and AVISO sea surface heights. The approach is based on correlating the dynamic height from Argo floats with the sea surface height from AVISO. The resulting dynamic height profiles are then used to estimate the geostrophic velocity with a level of no motion at 1000 dbar. The barotropic component of the flow is derived from the subsurface drift of floats and added to the baroclinic velocity field to get a three-dimensional field of the total horizontal geostrophic velocity. Then the Ekman component of the flow is added prior to any transport estimation. The main challenges are the under-sampling of the western boundary currents by the Argo array as well as the typical profiling depth of the Argo floats, which is about 2000m. The focus will therefore be on estimating transport in the upper branch of the AMOC both directly from the velocity field in the upper 2000m as well as from full depth profiles which are obtained by padding the profiles with climatological fields below 2000m. The determination of the uncertainty of the transports derived from the observations is done by subsampling the output fields from a numerical model to match the availability of observations and using climatology in the deeper layers. A statistical analysis of the actual AMOC transports in the model with the estimated ones will result in a measure of the uncertainty associated with the used method.