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Observation of Subtropical Mode Water in the South Atlantic from Argo data

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Subtropical mode waters in the South Atlantic ocean are detected using temperature (T) and salinity (S) profiles obtained by Argo floats. Mode waters are characterized as a large volume of water with a very narrow TS variation. Marked by low stratification within its extent, these water masses can be identified by highly homogeneous TS values, both horizontally and vertically. A potential vorticity minimum is generally used to track the mode water because it is a conservative property. Variations in the rate of formation of mode waters are connected to fluctuations in the air-sea interaction processes, including heat and moisture fluxes but also changes in the subtropical gyre circulation.

Net heat flux, evaporation and precipitation rates are estimated from a combination of satellite data to correlate them with the regions of ventilation processes. The moisture flux (E-P) estimated from satellite data shows increasing (decreasing) trends right over the regions where the salinity increases (decreases) in the western South Atlantic between 2003 and 2012. The analysis of Argo data profiles and reanalysis models (GODAS and SODA) allows us to investigate the variability of the parameters in the ocean interior. Reanalysis models show more frequent and intense southward excursions of the Brazil Current towards the Brazil-Malvinas Confluence region from 1985 to 2012, contributing to increase the rate of Subtropical Mode Water formation.