Transport in the Upper Branch of the South Atlantic Meridional Overturning Circulation

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This proposal is focused on computing transport indexes for monitoring the Meridional Overturning Circulation (MOC) in the South Atlantic Ocean at selected latitudes from Argo observations complemented with satellite observations and model fields. To accomplish this, a method for deriving three-dimensional fields of absolute velocity in the upper 2000 m of the ocean developed by the PI for the estimation of the climatological flow field will be employed to calculate seasonal estimates of the flow field during the Argo period. The method is based on *in situ* observations from Argo that are complemented with sea surface height from satellite altimetry (AVISO). The plan is to use these fields in conjunction with fields of the Ekman transport to derive seasonal estimates of the volume transport in the upper branch of the MOC across selected latitudes, starting in 2000. The methodology will be evaluated by comparing the estimated transports with transport estimates from independent observations: (1) the estimates based on the expendable bathythermograph (XBT) transects along 35°S that were derived four to five times a year since 2002; (2) transports across 34.5°S that are estimated from data collected by the South Atlantic Meridional Overturning Circulation (SAMOC) project; (3) transports across 26.5°N that are estimated from data collected by the Rapid Climate Change-Meridional Overturning Circulation and Heatflux Array (RAPID/MOCHA). Two ocean model products produced by other groups will be analyzed to validate the realism of, and also to augment the scientific analysis of, the observation-based products.

This three-year project began in August 2014. Preliminary results show that the MOC transports at 35°S derived from Argo and altimetry compare well with those derived from the AX18 XBT line. When comparing monthly climatological estimates of the volume and heat transports, the values from the new estimates are about 15 to 27 Sv and 0.3 to 1.0 PW, respectively. For the XBT-based estimates, the value ranges are about 16 to 22 Sv and 0.4 to 0.9 PW, respectively. The new estimates have also been used to derive a preliminary time series of monthly estimates for the years 2000 to 2013 that reveals a significant seasonal to interannual variability of the transports.