Improvements to the method used to calculate the MOC using data from the 26ºN array

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There are four fundamental components in the calculation of the MOC using the RAPID/MOCHA/WBTS array at 26.5ºN: 1) The Gulf Stream transport through the Florida Straits, 2) the basinwide Ekman transport, 3) directly measured transport between the westernmost deep mooring and the Bahaman island of Abaco (western boundary wedge) and 4) the geostrophic, mid-ocean flow between the westernmost deep mooring and the African coast, south of the Canary Islands. Improvements have been made to the calculation of the geostrophic transport component of the mid-ocean flow and will be presented.

The vertical profiles of density at the western and eastern boundaries and on the flanks of the mid Atlantic ridge are used to compute the relative geostophic transports. This calculation requires continuous vertical and temporal measurements of temperature (T) and salinity (S) profiles from the moorings. A monthly climatology of regionally dependent background dT/dz and dS/dz replaces the annual climatology used in previous calculations for vertical interpolation. The method used to extrapolate from the shallowest measurement (rarely shallower than 100 m) to the surface has been improved to resolve the seasonal thermocline. Finally, the new Equation of state for seawater (TEOS-10) is now used in the calculation.

Results show that 1) the utilisation of a seasonal climatology makes little difference to the overall transports, 2) a realistic seasonal cycle in the upper 100m reduces the strength of the MOC by 0.5 Sv on average in August, with consequent heat transport changes and 3) the use of the TEOS-10 toolbox reduces the mean strength of the MOC by 0.5 Sv.