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Temporal variability of the Atlantic meridional overturning circulation at 25˚N

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The Atlantic Meridional Overturning Circulation (MOC) strength and variability are calculated for a 368-day period from 29 March 2004 to 31 March 2005 by the addition of Florida Straits, Ekman and mid-ocean geostrophic transports. Daily estimates of Gulf Stream transport are made from electromagnetic cable measurements across the straits of Florida. Daily estimates of surface wind-driven Ekman transport are based on NCEP climatology. Mid-ocean geostrophic transports are estimated from the first year's RAPID-MOC time series using daily eastern and western boundary dynamic height profiles with the reference level velocity chosen so that the mid-ocean geostrophic transport balances the Florida Straits plus Ekman transports on a daily basis. The annual mean MOC and standard deviation is 18.1±5.1 Sv. The Florida Straits, Ekman and mid-ocean upper ocean transports are not significantly correlated and contribute about equally to the temporal variability in the MOC. To examine the temporal variability in baroclinic circulation we estimate layer transports for thermocline recirculation (0-800 m depth), intermediate water (800 – 1100 m), upper North Atlantic Deep Water (uNADW, 1100 – 3000 m) and lower NADW (below 3000 m). The year-long average and standard deviation for these four layers are -18.8±2.9 Sv, 1.0±0.6 Sv, -9.9±2.9 Sv and -7.3±3.3 Sv. There are around 30 independent values in the year-long timeseries of thermocline recirculation, so if future years' timeseries exhibit similar variability, we should be able to identify a real change in mid-ocean geostrophic transport over a year of about 2 Sv.