Meridional Heat Transport Variability in the Atlantic Ocean

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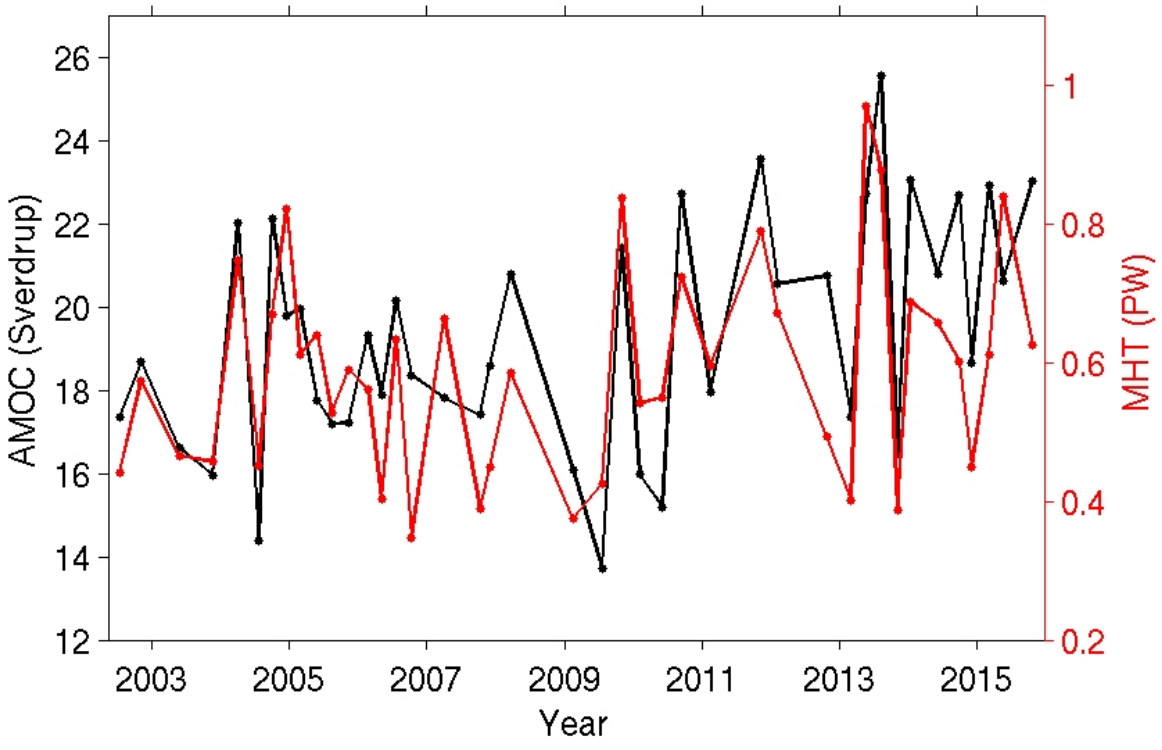
The Atlantic Ocean Heat Transport is estimated and monitored to diagnose and understand ocean circulation variability, identify changes in the Meridional Overturning Circulation (MOC) and to monitor for indications of possible abrupt climate change. The Atlantic Ocean is the major ocean basin involved in large-scale northward transports of heat typically associated with the MOC where warm upper layer water flows northwards, and is compensated for by southward flowing North Atlantic Deep Water. This large-scale circulation is responsible for the northward heat flux through the entire Atlantic Ocean.

In recent results, the variability of the Atlantic Meridional Overturning Circulation (AMOC) and its effect on the net northward meridional heat transport (MHT) in the South Atlantic are examined using a trans-basin expendable bathythermograph (XBT) High Density transect at 35°S (AX18). An update to this time series is shown in the Figure below. The mean MHT is 0.59 ± 0.15PW and no significant trend is observed from 2002 to 2011. The MOC varies from 13.7 to 25.6Sv with a mean value of 19.3 ± 2.8Sv and the maximum overturning transport is found at a depth that is deeper than that in the North Atlantic (mean depth of 1250m). Statistical analysis suggests that an increase of 1 Sv in the MOC leads to an increase of the MHT of 0.04 ± 0.01 PW.



Time series of the MHT (black) and the AMOC (red) along nominally 35°S for the time period 2002 to 2011.