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Recent widespread cooling of the subtropical Atlantic caused by slowing of the Atlantic overturning circulation

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Beginning in 2010 the subtropical Atlantic cooled from the surface to at least 2 km depth. The decrease in ocean heat content (OHC) associated with this cooling appears to be the most abrupt and vertically coherent change in the past 62 years. Here we diagnose the causes of this cooling by examining the changes in energy fluxes to the subtropical gyre. For the ocean mixed layer atmospheric forcing (during the extreme negative NAO winter of 2009/10) and ocean heat fluxes are important in the reduction in OHC, suggesting an active role for the ocean in the generation of upper ocean OHC anomalies on seasonal timescales comparable to those from atmospheric forcing. The deep OHC anomalies are explained by a 30% reduction in the Atlantic Meridional Overturning Circulation and the associated heat flux from 2009 as measured by the purposeful RAPID-MOCHA array at 26.5°N.