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Western Boundary of the North Atlantic Subtropical Gyre: Decadal Change

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The A20 is a meridional hydrographic section located at 52°W on the western North Atlantic Subtropical Gyre that encloses the path of the water masses of the Atlantic Meridional Overturning Circulation (AMOC). Using data from three A20 hydrographic cruises carried out in 1997, 2003 and 2012 together with LADCP-SADCP data and the velocities from an inverse box model, the circulation of the western North Atlantic Subtropical Gyre is estimated. The main poleward current of the AMOC is the Gulf Stream (GS) which carries 129.0 ± 10.5 Sv in 2003 and 110.4 ± 12.2 Sv in 2012. Due to the seasonality, the GS position is shifted southward in 2012 - relative to that of 2003 - as both cruises took place in different seasons. In opposite direction, the Deep Western Boundary Current (DWBC) crosses the section twice, first at 39.3-43.2°N (-34.9 ± 7.5 Sv in 2003 and -25.3 ± 9.4 Sv in 2012) and then at 7.0-11.7°N (42.0 ± 8.0 Sv in 2003 and 48.0 ± 8.1 Sv in 2012). Additionally, two zonal currents contribute with westward transport below 20°N: the North Equatorial Current and the North Brazil Current; with a net value of -28.0 ± 4.1 Sv in 2003 and -36.7 ± 3.6 Sv in 2012.