The Meridional Overturning Circulation north of the AR7W and A25-Ovide lines in recent decades

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A time-mean 2002-2010 full-depth circulation along the AR7W (Canada-Greenland) and A25-Ovide (Greenland-Portugal) sections in the North Atlantic subpolar gyre is estimated from repeated hydrographic surveys, altimetry data, and inverse calculations. It enables to quantify the basin scale state of the climate-relevant Meridional Overturning Circulation in density space (MOCσ). The basin-scale MOCσ reaches 18 Sv in the 2000’s. It is largely induced by the light-to-dense conversion of Atlantic waters in the eastern subpolar gyre and in the Nordic Seas, the actual formation of Labrador Sea Water (LSW) contributing to 17% of the total value. However, further examination of the preceding decade strongly suggests that the Labrador Sea is involved in the MOC variability as the MOCσ across the AR7W section decreased by 3 Sv from the early-mid 1990’s to the 2000’s, reflecting the well documented changes in deep convection and LSW properties between these two periods.