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Variability of the circulation and heat transport from six occupations of the A25 Greenland-Portugal OVIDE section between 1997 and 2010

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Six oceanic surveys carried out between the south-east tip of Greenland and Portugal, from 1997 to 2010, revealed remarkable changes in the large scale circulation. The observations showed changes in the whole water column and evidenced large variations (up to 50% of the lowest value) in the Meridional Overturning Circulation (MOC) intensity, computed in density coordinates across the Greenland-Portugal OVIDE section. A significant correlation is found between the MOC intensity, the North Atlantic Current transport and the net heat flux across the OVIDE section. The time scales of the MOC variability are further evaluated using satellite altimetry and Argo. This is made possible since the North Atlantic Current, which conveys subtropical water northward, is the major current contributing to the MOC upper limb. The results are further analysed in the context of the weakening of the sea-surface circulation in the subpolar gyre observed since the mid-1990's in response to changes in atmospheric forcing linked to the North Atlantic Oscillation.