



Causes of changes in the subpolar North Atlantic gyre transport

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Analyses of sea surface height (SSH) records based on satellite altimeter data and hydrographic properties have suggested a considerable weakening of the North Atlantic subpolar gyre during the 1990s. Hindcast simulations with high-resolution models confirm a close correspondence of the SSH changes with the volume transport of the boundary current system in the Labrador Sea. The 1990s-decline, exceeding 5 Sv or 10 % of the long-term mean, can be understood as part of a decadal variability of the subpolar gyre driven by both the local air-sea heat fluxes and wind stresses associated with the North Atlantic Oscillation (NAO). Changes in the gyre transport are reflected in the strength of the meridional overturning circulation (MOC) in the mid-latitude North Atlantic, suggesting the potential of a SSH-based gyre index as an element of a MOC monitoring system.