



Interannual and decadal variability of the Subpolar Gyre and the Meridional Overturning Circulation in the North Atlantic

Ismael Nunez-Riboni (1), Helmuth Haak (1), Manfred Bersch (2), and Johann Jungclaus (1)

(1) Max Planck Institut für Meteorologie, Hamburg, Germany, (2) Institut für Meereskunde, Universität Hamburg, Germany

Significant changes of the hydrographic properties of the water masses involved in the Meridional Overturning Circulation (MOC) have been observed in the last 60 years. Model studies point out the importance of the mutual interactions between MOC, Subpolar Gyre (SPG) of the North Atlantic and formation of Labrador Sea Water (LSW). On the other hand, circulation and water mass changes of the SPG are apparently closely related to the North Atlantic Oscillation (NAO). However, the relation between water mass changes, the MOC and SPG circulations under the influence of the NAO are still unclear. In this study, a comprehensive dataset of temperature and salinity observations between 1950 and 2007 (including WOD05, HydroBase2, ICES, ARGO, WOCE and CLIVAR), as well as numerical simulations with the global ocean circulation model MPIOM are analysed. Realistic atmospheric data from the National Centers for Environmental Prediction (NCEP) are used to force the model and yield a hindcast of the SPG circulation and hydrography in the last 60 years. This modelled interannual and decadal variability is validated with the observations and quantifies the MOC and SPG changes and their interactions with LSW and with heat and freshwater transports from the subtropics.