

## **A 20th-Century reanalysis-forced ocean model: Trends and variability in the North Atlantic**

Wolfgang Mueller<sup>†</sup>; Daniela Matej; Manfred Bersch; Johann Jungclaus; Helmuth Haak; Ismael Nunez-Riboni; Katja Lohmann; Jochem Marotzke

<sup>†</sup> Max Planck Institute for Meteorology, Germany

Leading author: [wolfgang.mueller@zmaw.de](mailto:wolfgang.mueller@zmaw.de)

We force the MPI ocean model MPIOM with the NOAA 20th-century reanalysis to examine North Atlantic climate variability during the period 1870-2007. For the later period (1950-2007, NCEP-period hereafter) we evaluate ocean temperature and salinity against a gridded observational data base constructed by the Hamburg Cluster of Excellence CliSAP; moreover we compare against previous MPIOM experiments forced by the NCEP reanalysis. For the earlier period (1870-1949, preNCEP-period) we relate ocean quantities to the forcing fields and compare against selected reconstructions. For the NCEP period the decadal to multi-decadal variability of temperature and salinity is close to observations in the Labrador Sea and the subpolar gyre. The variability of the Atlantic meridional overturning circulation (AMOC) is similar compared to the MPIOM experiments forced with the NCEP reanalysis. The AMOC at 26°N exhibits a time-mean maximum of ~17 Sv, which is slightly lower than, but within the current uncertainty range of, the RAPID observations. During the first decades of the preNCEP-period, however, we find a large drop of the AMOC. Examination of the forcing fields yields a pronounced trend in the summer NAO and a large precipitation increase over the Labrador Sea, not found in single-station data. We explore the sensitivity of the model to the early-period precipitation rate over the Labrador Sea.