Geophysical Research Abstracts,
Vol. 11, EGU2009-5309, 2009
EGU General Assembly 2009

Response of the Eastern North Atlantic to the North Atlantic Oscillation

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The changes in temperature and salinity in the subpolar gyre in response to the NAO are studied in idealized numerical experiments using a regional coupled sea-ice ocean model. Anomalies of similar amplitude as those observed during the 1995-1996 shift of the NAO are found in the eastern North Atlantic. These T-S changes are mainly driven by the local response to the wind stress, through the set-up of an “intergyre” gyre. This anticyclonic gyre advects fresh and cold water from the western subpolar gyre to the eastern North Atlantic and damps the advection of the warm and saline water from the subtropical gyre into the eastern subpolar gyre. In contrast to previous studies, these changes, even if they are concomitant with the acceleration of the subpolar gyre, are not linked with it. The anomalies formed in the eastern North Atlantic between 300 and 900 m then propagate into the Labrador Sea.