



Mechanisms for the dominant large-scale changes in upper ocean salinity and temperature in the mid and high latitude North Atlantic over recent decades

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Two major changes in large-scale upper ocean heat and freshwater content are evident in the mid to high latitude North Atlantic over recent decades: freshening during the mid 1970s and warming since the mid 1980s. The freshening episode, investigated with reanalysis datasets and in situ observations, is explained as the consequence of a change in the surface freshwater flux associated with changes in two modes of atmospheric variability: the East Atlantic Pattern and the North Atlantic Oscillation (NAO). Recent warming in mid-latitudes, investigated with two independent SST datasets and an eddy-permitting model simulation of the period 1985-2003, is largely explained as a consequence of changes in horizontal heat transport. Satellite data available in real time reveal surface warming of over 1 deg C in both the Labrador Sea and the Greenland Sea over the last five years. This is quite unlike previous anti-phase warming and cooling of these two regions, related to the NAO.