Ocean climate shift derived from Northwest Atlantic Regional Climatology

[1,2]Mishonov, A., [1]Seidov, D., [1,2]Reagan, J., [1]Boyer, T., [1]Parsons, A., [1]Cross, S.

[1]National Centers for Environmental Information, NOAA/NESDIS, MD, USA
[2]ESSIC/CICS-MD, University of Maryland, MD, USA

Abstract

National Centers for Environmental Information has recently updated the Northwest Atlantic Regional Climatology (NWARC) by adding monthly decadal temperature and salinity fields with 0.1°x0.1° degree resolution. This resolution matches the resolution employed in present-day eddy-resolving numerical ocean models and thus allows comparison between observed and modeled monthly climatologies. To verify this contention, we compared the NWARC to modeled ocean climates obtained in NEMO (Nucleus for European Modelling of the Ocean) eddy-resolving simulations.

There is a consensus among geoscientists that the NWA is one of the key regions of the World Ocean where ocean climate change may be critical for the Atlantic Meridional Overturning Circulation (AMOC) and therefore additional effort is required to assess thermohaline structure and variability in this region. Using the six NWA decadal climatologies, we computed the heat content of the upper 700 m and derived two NWA 30-year climates – the climate of the years between 1955 and 1984, and between 1985 and 2012. Comparison of the two climates showed substantial warming of the water south of the Gulf Stream and in the Labrador Sea. However, there are some areas with noticeable decreases in ocean heat content, although distinct overall warming in the NWA region is evident. In support of the heat content analysis, the 30- and 60-year trends of upper ocean temperature was computed using pentadal sliding averages, which confirmed the results of the climatic shift found in ocean heat content compiled using the updated NWARC.