Geophysical Research Abstracts
Vol. 13, EGU2011-548-1, 2011
EGU General Assembly 2011

The subtropical signal of Labrador Sea Water variability and the leakiness of the Deep Western Boundary Current

Erik van Sebille (1), Molly O. Baringer (2), William E. Johns (1), Christopher S. Meinen (2), Lisa M. Beal (1), M. Femke de Jong (3), and Hendrik M. van Aken (3)

(1) University of Miami, Rosenstiel School of Marine and Atmospheric Sciences, Miami, United States (evansebille@rsmas.miami.edu), (2) Atlantic Oceanographic and Meteorological Laboratory, Miami, Florida, USA, (3) Royal Netherlands Institute for Sea Research, Den Burg, Netherlands

Classical Labrador Sea Water (cLSW) can be found at depths below 1000 m throughout most of the Atlantic basin. Despite numerous studies over the past few decades, the pathways and time scales associated with the spreading of cLSW from its region of formation are not yet clearly resolved. Historically the Deep Western Boundary Current (DWBC) was considered the major advective pathway south, but recent studies have suggested that the DWBC is rather leaky and that much of the southward advection of cLSW occurs in the eddy-filled interior basin. Such an eddy-driven path has been suggested to lead to a multitude of pathways involving diversions through the interior, each with its own time scale and hence a suppressed variability downstream in the subtropical Atlantic.
Here, we study the advection of cLSW by relating the variability near the Bahamas to that in the Labrador Sea. A direct comparison of hydrographic time series reveals a correlation between the two locations with a lag of nine years. The time series reveal that the magnitude of the watermass anomaly has decreased by a factor two once the water arrives at the Bahamas. A similar lag and reduction of amplitude is found in the high-resolution OfES model, in which salinity anomalies can be observed propagating with constant speed through the Deep Western Boundary Current. Using hydrography, climatologies, and high-resolution numerical models, we present an Eulerian framework of the relation between the Deep Western Boundary Current in the Labrador Sea and at the Bahamas. This framework can aid in understanding how cLSW spreads through the North Atlantic basin.