2012 Project Summary

Line W: A Sustained Measurement Program Sampling the North Atlantic Deep Western Boundary Current and Gulf Stream at 39°N

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The Line W program seeks to document interannual transport changes in the DWBC and Gulf Stream and investigate their causes and consequences for the climate system using data from a sustained moored array and repeated occupation of a hydrographic section. The program will produce a 10-year-long time series of boundary current variability that will be used together with companion programs at other latitudes in the Atlantic to characterize the Meridional Overturning Circulation in this ocean. The principal research activities carried out in 2011 included on-going processing and analysis of data obtained thus far, a reoccupation of the hydrographic section aboard R/V Oceanus (Oct472, July 15–August 2), and participation in a companion-program cruise also aboard Oceanus October 1-13 during which one of our moorings was recovered and redeployed. The mooring and cruise data sets from the 2004-2008 time period have been finalized and submitted to the OceanSites data archive and we are poised to submit data from the 2008-10 time period. Data are also available on our project web site:

Recent Results
(1) For the 4-year period beginning spring 2004, we estimate the time-averaged top-to-bottom meridional transport of the waters shoreward of the Gulf Stream to be 36.2±3.4 Sv, a bit less than Johns et al.’s reported 40±10 Sv, but note that the uncertainty bounds of the two estimates overlap.

(2) Ph.D. student, Beatriz Pena, who successfully defended her dissertation in July 2010, discovered a notable shift in intermediate water PV that appears consistent with the time history of deep convection in the Labrador Sea and an advective time scale for those signals to reach Line W.

(3) On shorter time scales we have found that a significant amount of the monthly-timescale variability can be linked to local meanders of the Gulf Stream near the mooring array with northward meanders corresponding to reduced DWBC transport.

Bibliography


