2012 Project Summary

The Oleander Project: Sustained Observations of Ocean Currents in the NW Atlantic between New York and Bermuda

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Since late 1992, high-horizontal resolution upper-ocean velocity has been sampled by an acoustic Doppler current profiler (ADCP) mounted in the hull of the container vessel CMV Oleander, which operates on a weekly schedule between New Jersey and Bermuda. In addition to velocity, the Oleander Project includes a monthly XBT sections. The XBT program, operated by the National Marine Fisheries Service has been in continuous operation since 1977

Our goal is to provide a framework for the development and testing of new concepts afforded by the systematic and sustained measurements of ocean currents across four distinct regions: the continental shelf, slope sea, Gulf Stream, and northwestern Sargasso Sea. Specifically, our objectives include:
(1) to continue the Oleander velocity program to elucidate long-term climatological variability;
(2) to enhance the existing program with an expanded XTB temperature measurement program in collaboration with NOAA/NMFSC;
(3) to provide near-real-time processed data distribution to enable broad community participation in scientific analysis; and (4) to investigate the linkages between these oceanographic regimes and their connections to large-scale forcing fields.

Recent Results
(1) Rossby et al. 2010 provides an updated overview of the longest time scales of variability in the Gulf Stream off the U.S. east coast using seventeen years of directly measured upper-ocean currents. Annually averaged transport variations suggest a correlation between the North Atlantic Oscillation (NAO) and both the Gulf Stream and the Sargasso Sea such that they both show a stronger component of flow to the west when the NAO is in a positive phase. These results, together with previous studies suggest that most of the observed variability in the GS itself can be accounted for in terms of time-varying winds over the North Atlantic. This would mean that the upper branch of the MOC, the other component of GS transport, has been quite stable over the last 80 years.

(2) Worst, 2011 compared surface fluxes between Oleander velocity and satellite sea surface height. Through geostrophy, surface fluxes are calculated from altimeter sea surface height and compared to the Oleander in-situ velocity measurements. Comparing regional fluxes proved challenging due to both rapid shifts in Gulf Stream position and a mismatch between the horizontal scales resolved by altimeter and the ADCP-measured velocities. By defining fixed regions across the Oleander line where variability in sea surface height is minimal, surface-flux estimates produced strikingly similar results between the two systems with correlations greater than 0.85 for the Gulf Stream region and greater than 0.94 and in the slope and Sargasso Seas.

Bibliography

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