**Upper Ocean Dynamics Laboratory:**
**Flight Summary: NOAA WP-3D**
**3-4 June 2010**

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**Tasking:** On Thursday 3 June and Friday 4 June 2010, a fifth (and sixth) flight on the NOAA P-3 aircraft was tasked to the Deepwater Horizon oil spill area and the Loop Current (LC) in the Gulf of Mexico. That evening, the NOAA aircraft landed in Baton Rouge to meet Dr. Jane Lubchenco on 4 June for a short flight over the spill site and deploy three profilers along the northern transect (28$^o$N) of the ocean grid. After a two-hour flight, the aircraft landed in Pascagoula, MS, refueled and then returned to the last transect to deploy six remaining profilers to complete the grid then return to MacDill after about a ~2-hr flight.

**Objective:** The experimental objective is to provide data over a large scale to measure the possible shedding of a warm core eddy from the LC and provide oceanic structural data for predictive ocean models at the NAVOCEANO (this has been successful). The flight focused on temperatures, currents and salinity in an approximate geographical location essentially the same pattern as 28 May. These flights are sampling the same grid points to provide the evolving oceanic variability of the LC and the potential warm core eddy shedding. In addition, these measurements provide the important data to correlate to surface images and data from satellite measurements. From a scientific perspective, these data will be useful in improving our understanding of the complex eddy shedding processes.

**Flight Tracks:** Takeoff time was ~0915 EST 3 June from MacDill United States Air Force Base and the flight duration was ~8.3 hours. During the mission, the aircraft was flown between 5500 feet at an indicated air speed of 180 to 185 knots. On 4 June mission (leg 1), the aircraft flew above 3000 feet to allow Dr. Lubchenco and her entourage an opportunity to see ground zero. We climbed to 5500 feet to deploy two AXBTs and a GPS sonde along the northern transect prior to returning to Pascagoula, MS. The aircraft subsequently returned to the northern transect and deployed six remaining ocean profilers then returned to MacDill landing at 1824 EST on 4 June 2010.

**Measurements**: Atmospheric dropsondes (for surface winds) and airborne ocean profilers sampling to as deep as 1500 m (from expendable current profilers) were deployed in a lawnmower style. As on the 28 May flight, four of the six legs of the grid were spaced at 1$^o$ intervals in latitude (~110 km) from 24.5 to 27$^o$N and spanned from 89$^o$W to 85$^o$W at 0.5$^o$ resolution in longitude. The last two transects were at 27.5 and 28$^o$N with similar spatial resolution. In total, sixty-nine airborne profilers were deployed of which there were fifty-eight profiles (~84%) that acquired data. Eight of the eleven failures were associated with the AXCPs. In this case, six of the eight AXCPs did not turn on suggestive of a battery problem. The other AXCP failures were that the probes did not release from the airborne canister. In addition to the software problems, the unusually high failure rate is a major concern that has been raised with Lockheed Martin/Sippican. As part of the plan we are also deploying AXBTs at some of the same points to compare T(z) profiles in the upper 350 m. All six AXCTDs provided signals to the aircraft. While the first-look AXBT profiles are now on the PhOD website (courtesy of Dr. Eric Uhlhorn at NOAA's Hurricane Research Division), the software glitch in processing the current and salinity profilers using Mark21 and Mark 10A software remains unresolved. We have been assured that the vendor is working on the problem. All data are stored on digital analog tapes for subsequent playback and detailed processing and analyses.

Stepped Frequency Microwave Radiometer (SMFR) and the downward looking Infrared Radiometer Thermometer (IRT) acquired data on sea surface properties such as Sea Surface Temperatures (SST) and Brightness Temperatures from the multiple channels from the SFMR as previously noted. Based on analyses from the previous SFMR flight data over the oil slick on 28 May, it was found that the brightness temperatures did not change across the thick oil slick and the sheen. This is good news for the hurricane flights that will allow the surface winds to be mapped even over oil slicks during strong winds.

**Next Flight:** The next flight is tentatively scheduled of Friday 11 June 2010 to assess weekly differences in the structure as the LC changes as the eddy shedding process and help vector ships into areas of anomalous variability. These measurements are of equal importance for the upcoming hurricane season for calibration of the radar altimeter-derived oceanic heat content variability using in the Statistical Hurricane Intensity Prediction Scheme for intensity forecasting.