

Upper Ocean Dynamics Laboratory:

Flight Summary: NOAA WP-3D

28 May 2010

RSMAS/MPO, University of Miami (Brewster, Jaimes, Meyers, Shay)

4600 Rickenbacker Causeway, Miami, FL 33149, USA

Phone: 305.421.4075 - Fax: 305.421.4696 - Cell: 305.205.0305

Email: nshay@rsmas.miami.edu - Internet: <http://isotherm.rsmas.miami.edu/~nick/>

Tasking: On Friday, 28 May 2010, a fourth flight on the NOAA P-3 aircraft was tasked to the Deepwater Horizon oil spill area of the Gulf of Mexico. The overall objective is to provide data over a large scale to measure the possible shedding of a warm core eddy from the Loop Current (LC), which has a surface current speed of 3 knots. As part of the tasking, the flight focused on currents, temperatures and salinity in an approximate geographical location from 24.5 to 27.25°N and 85 to 89°W (essentially the same pattern as 21 May) except that the first transect was moved from 24°N to 24.5°N to capture more of the oceanic variability in the cold core eddy that's responsible for the eddy shedding.. Such measurements provide the important data to correlate to surface images and data from satellite measurements as well as provide initial subsurface structural conditions for predictive ocean models. These data will be useful in improving our understanding of the eddy shedding process.

Flight Tracks: Takeoff time was ~0900 EST 21 May from MacDill United States Air Force Base and the flight duration was ~9.5 hours. During the entire mission, the aircraft was flown between 5500 feet at an indicated air speed of 180 to 185 knots. No significant weather was encountered that disrupted the flight pattern. More oil slicks were observed in the cold core eddy located at 25°N 85.5°W and an oil sheen was observed at 24°N, 85°W as well as along the northern part of the domain from the aircraft (two upper most legs) along the northwest part of the grid-south of the well site. Prior to flying over the final transect, the aircraft dropped to 3500 feet and proceeded northeastward to fly over the well site to essentially calibrate the Stepped Frequency Microwave Radiometer (SMFR) over brown oil, rainbow and dull sheens as well as the silver sheens where wind rows of red/orange emulsion surround the site as reported by USCG HC-144 maps.

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 18 May flight, four of the six legs of the grid were spaced at 1° intervals in latitude (~110 km) from 24.5 to 27°N and spanned from 89°W to 85°W at 0.5° resolution in longitude. In total, sixty-five airborne profilers were deployed of which there were fifty-four profiles (~83%) acquired. Seven of the eleven failures were associated with the AXCPs. While the AXCPs are turning on, the probes inside the canister are not releasing to profile the upper ocean. *Shay is discussing this problem with the engineers at Lockheed Martin/Sippican to try to understand and resolve this problem given the import of the currents and the fact these are relatively new proilers. (Note that success rates for AXCPs have been greater than 90% under weak winds such as EPIC, and greater than 80% in hurricane so this is indeed anomalous behavior).* 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. Both AXCTDs provided signals to the aircraft. First-look AXBT profiles are now on the PhOD website (courtesy of Dr. Eric Uhlhorn at NOAA's Hurricane Research Division), and we are still resolving a software glitch in processing the current and salinity profilers using Mark21 and Mark 10A software. All data are stored on digital analog tapes for subsequent playback and detailed processing and analyses.

In addition, the 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. With the new calibration data north of the grid near the well site, these measurements will hopefully allow us to

distinguish between the oil slick/sheen and the surrounding sea water. We are requesting these remote sensing data be carefully processed over the cold core eddy/frontal eddy from all three flights ~1.5 hr of data per flight.

Next Flight: The next flight is tentatively scheduled of Thursday 3 June to assess weekly differences in the structure as the LC changes as the eddy shedding process continues and help vector ships into areas of anomalous variability. This is of equal importance for the upcoming hurricane season.