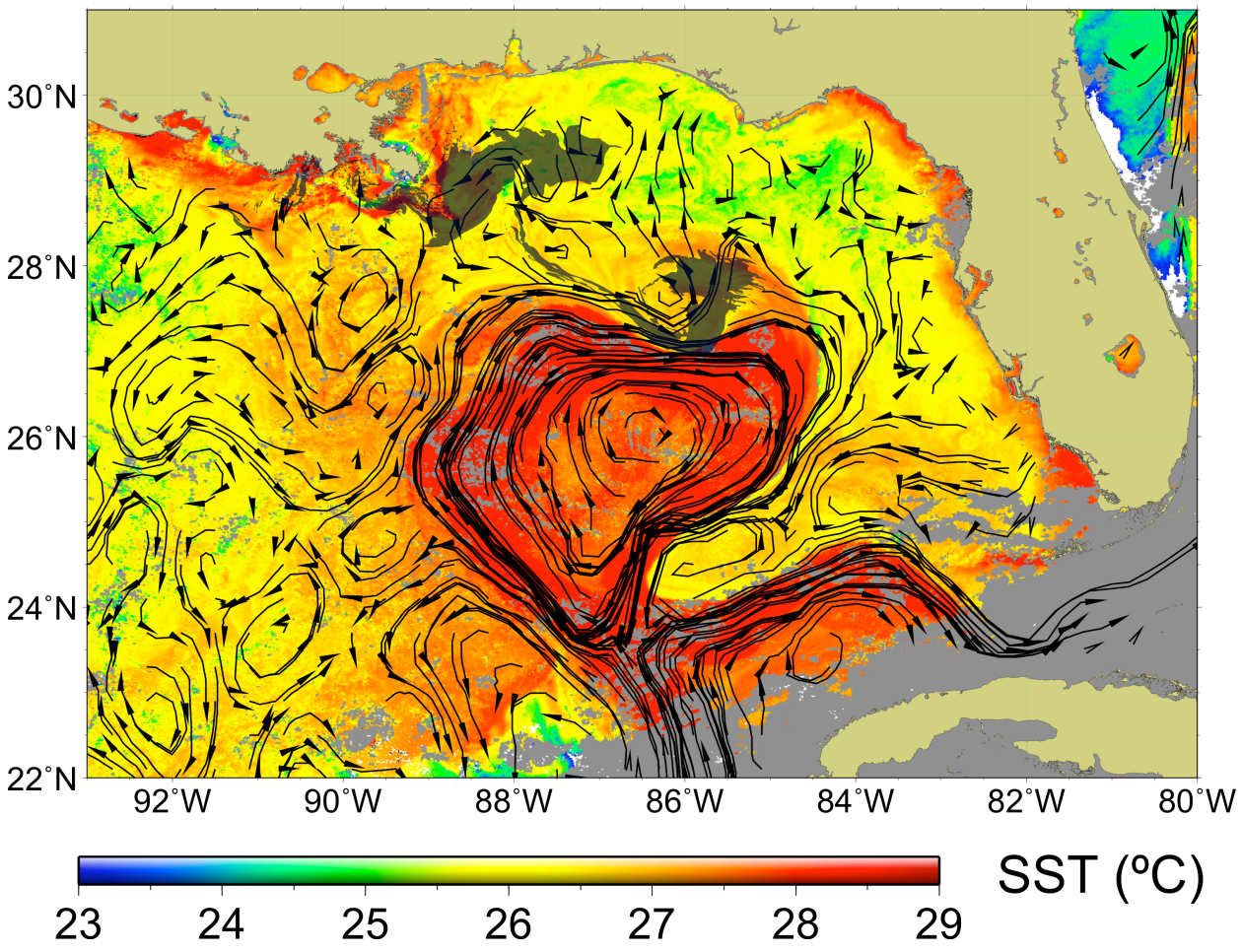

Figure 1. Sea surface temperature (SST) composite for May 20, 2010. The detailed SST features can be used as a proxy for inferring surface circulation and to complement the altimetry-derived surface current fields. The main feature observed here are the anticyclonic Loop Current and the soon to be detached Loop Current ring, which have higher SST than their surrounding waters. The arrows correspond to coincident geostrophic current velocity field computed using 11 days of satellite altimeter data centered on May 15, 2010. The surface oil extent, the two large linked areas shown in dark green and centered at 29°N and 27°N, corresponds to May 20-21, 2010,and it is bounded to the south by the circulation of a Loop Current ring and retroflects to the north following the edge of a cyclonic eddy.

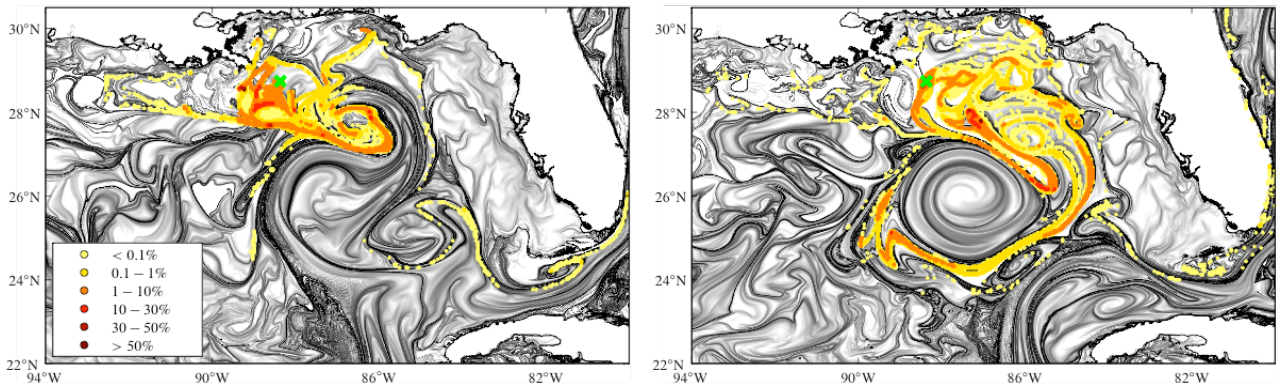

Figure 2. Finite Time Lyapunov Exponents fields used to evaluate the path of particles at the surface for the ocean surface conditions on (left) May 20 and (right) June 2, 2010. Convoluted bands of most intense black tones indicate attracting Lagrangian Coherent Structures, which delineate the pathways of the particles. In a numerical experiment, 10,000 water particles were released daily near the location of the Deepwater Horizon oil well starting in April 20, 2010, and finishing when?. The water particle density denoted by colors yellows (low values) to oranges (higher values) is expressed as percentage of the daily discharge in 1/25 x 1/25 bins. No particles where found to enter the West Florida Shelf and only a minimal fraction entered into the Loop Current and Florida Current systems.

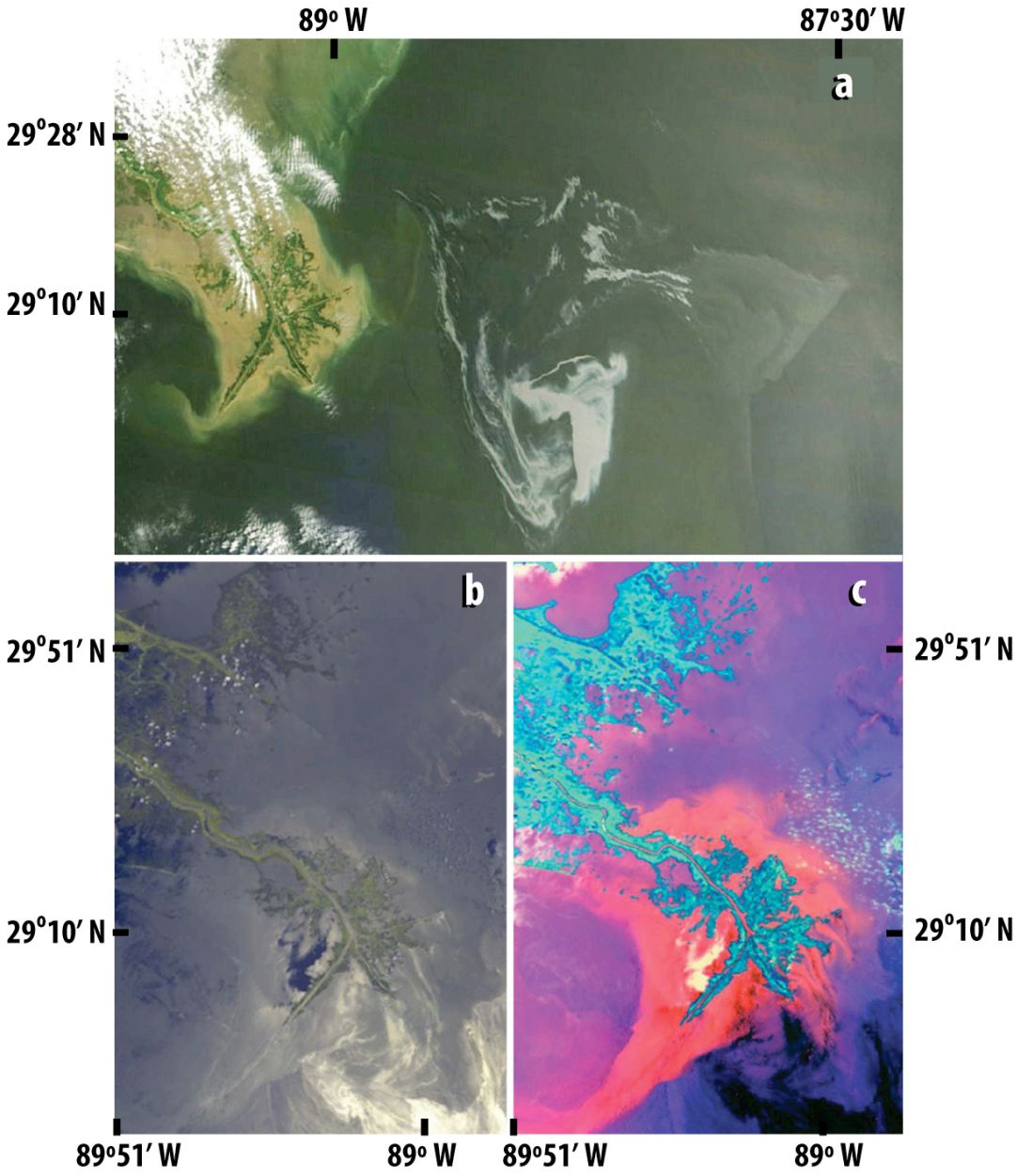

Figure 3. (a) Oil slick as seen in a Terra MODIS visible-near IR image, distinguishable because of its a pale swirl in the darker seawater of the Gulf of Mexico just south of the Mississippi Delta on May 1, 2010, (b) MISR true color image for May 17, 2010; (c) MISR multi-angle composite acquired on the same date that separates the oil spill (black and dark blue) from specular reflections.

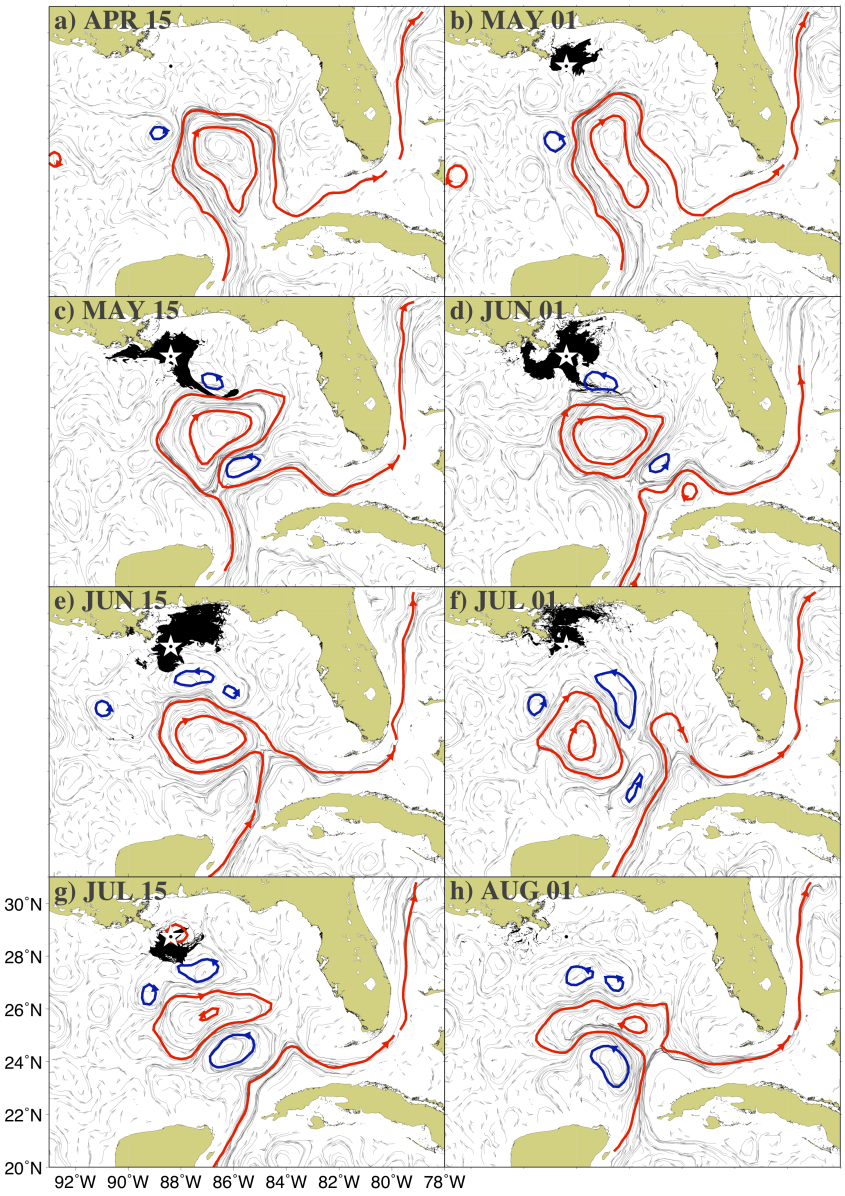

Figure 4. Maps showing surface oil coverage (regions in black) for eight selected days in 2010 as obtained from five-day (centered on the referenced day) product superimposed on the altimetry-derived surface currents (grey arrows), showing selected sea height contours that are associated with the main mesoscale cyclonic and anticyclonic features (blue and red lines, respectively). The star placed at 88.36°W, 28.73°N, shows the location of the Deepwater Horizon oil spill site.

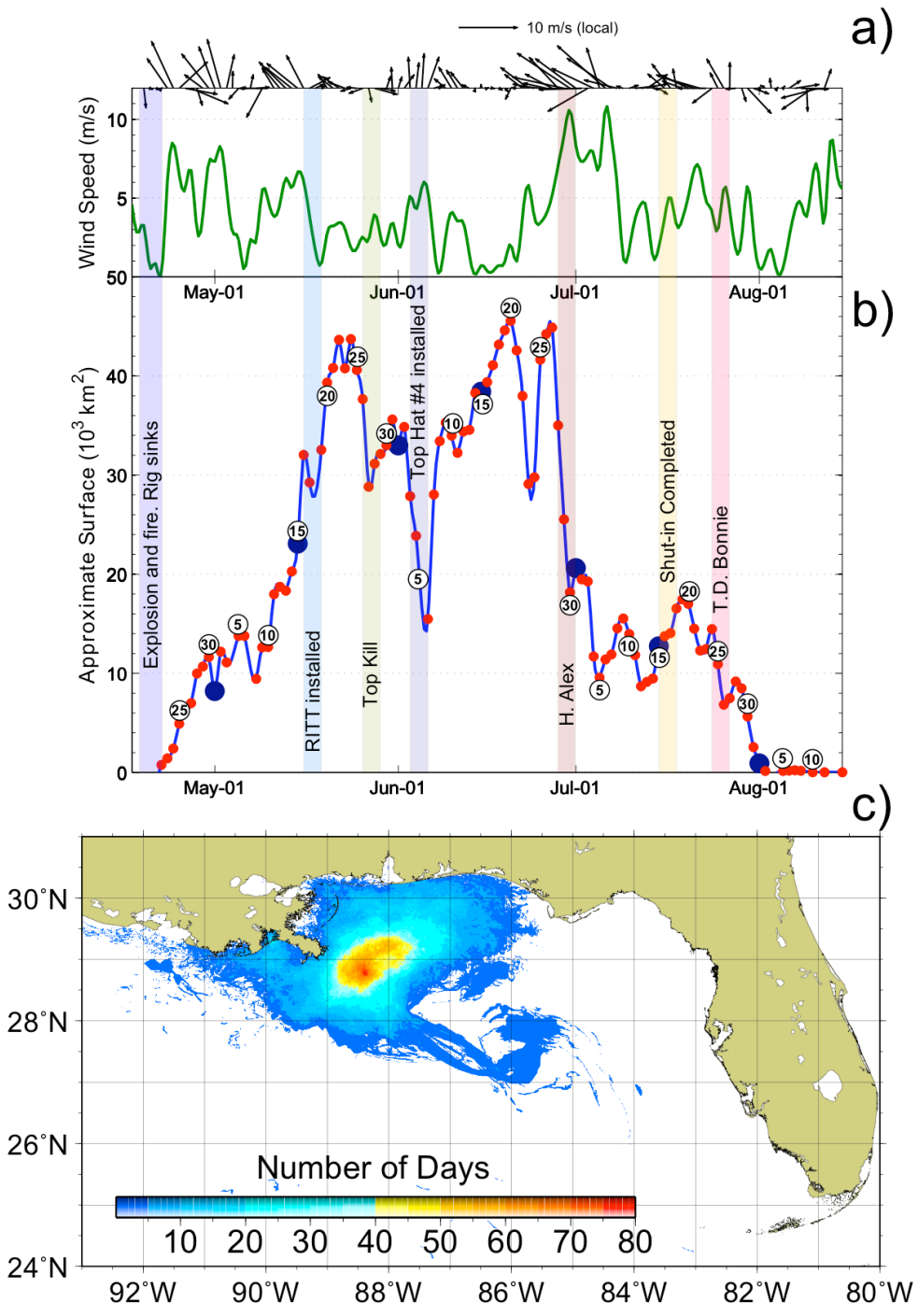

Figure 5. (a) Time series of the wind direction and intensity (b) Time series of the daily area (in $10^3 km^2$) covered by surface oil as obtained from the MPSRs. A three-day running test on the presence of oil was applied to minimize the impact of partial satellite coverage. Red circles denote the estimated values, while the blue line shows the results of a cubic spline fit to these values. The numbers in the white circles indicate the day of the month.

The blue circles indicate the dates in which maps of surface currents and surface oil spill extent are shown in Figure 4. Vertical color bars correspond to the times when selected recovery efforts were carried out and of Hurricane Alex and Tropical Depression Bonnie. (c) Cumulative oil area during April-August, 2010. Colors indicate the number of days the oil slick was present in the daily MPSRs.

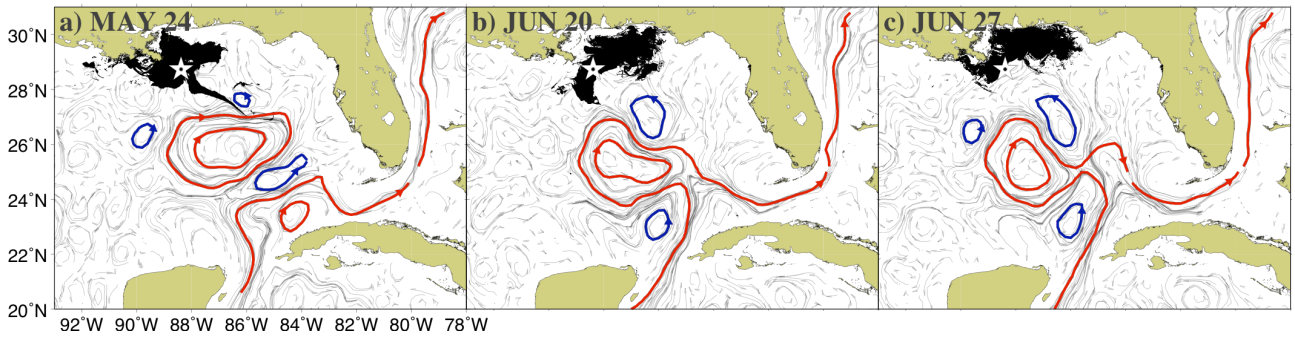

Figure 6. Maps showing the areal extent of surface oil (regions in black) for three different dates (May 20, June 20, and June 27, 2010), as obtained from 5- day (centered on the referenced day) the experimental Marine Pollution Surveillance Reports (MPSR) product. These areas are superimposed to the altimetry-derived surface currents (grey arrows), showing selected sea height contours that are associated to the main mesoscale cyclonic and anticyclonic features (blue and red lines, respectively). The star placed at 88.36°W 28.73°N, shows the location of the Deepwater Horizon oil spill site.

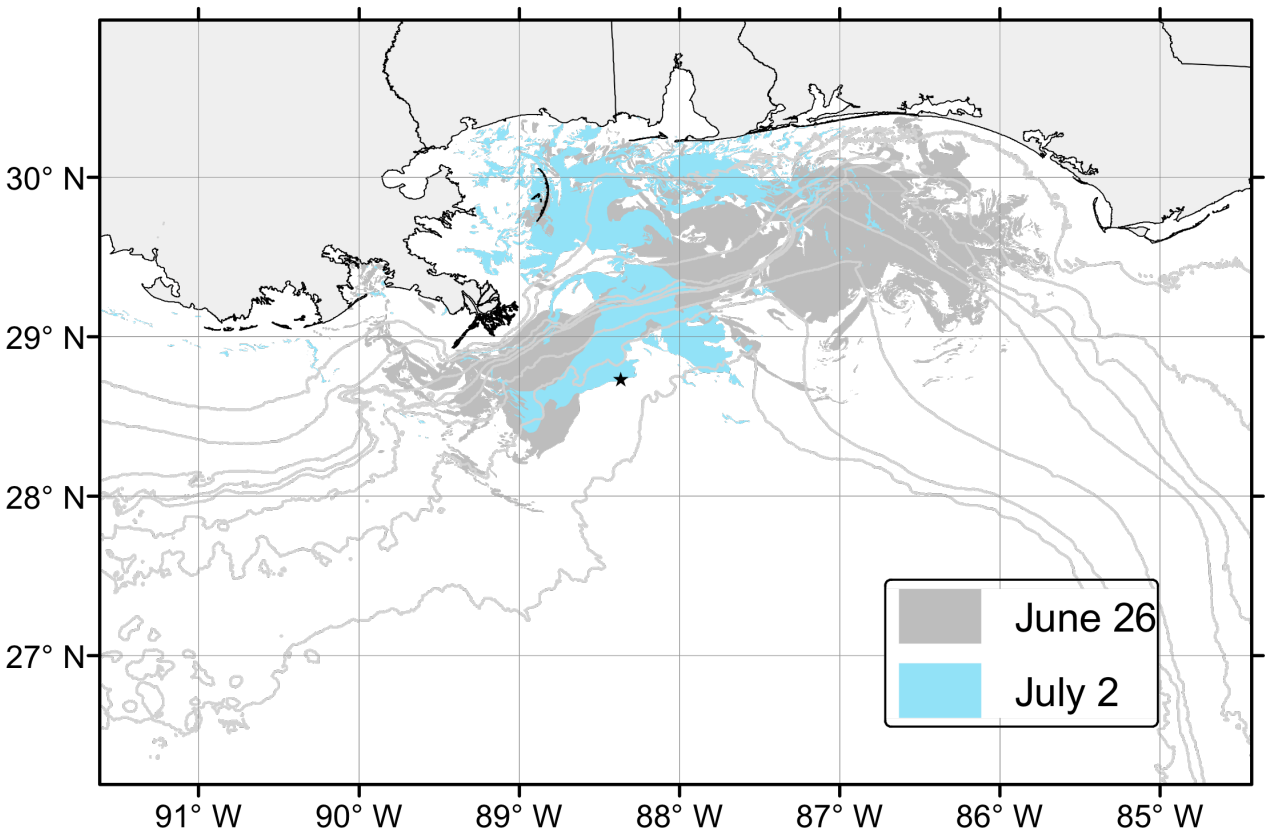

Figure 7. Map showing two areas of extent of the surface oil obtained from the NOAA National Environmental Data and Information Services experimental Marine Pollution Surveillance Reports (MPSR) products. These maps correspond to pre- (June 26, 2010, in dark gray) and post- (July 2, 2010, light blue) Hurricane Alex. Average surface SE winds of 7.4 m/s during this time period contributed to the reduction of the surface oil extent. Gray contours indicate bathymetry contours (contour interval?).

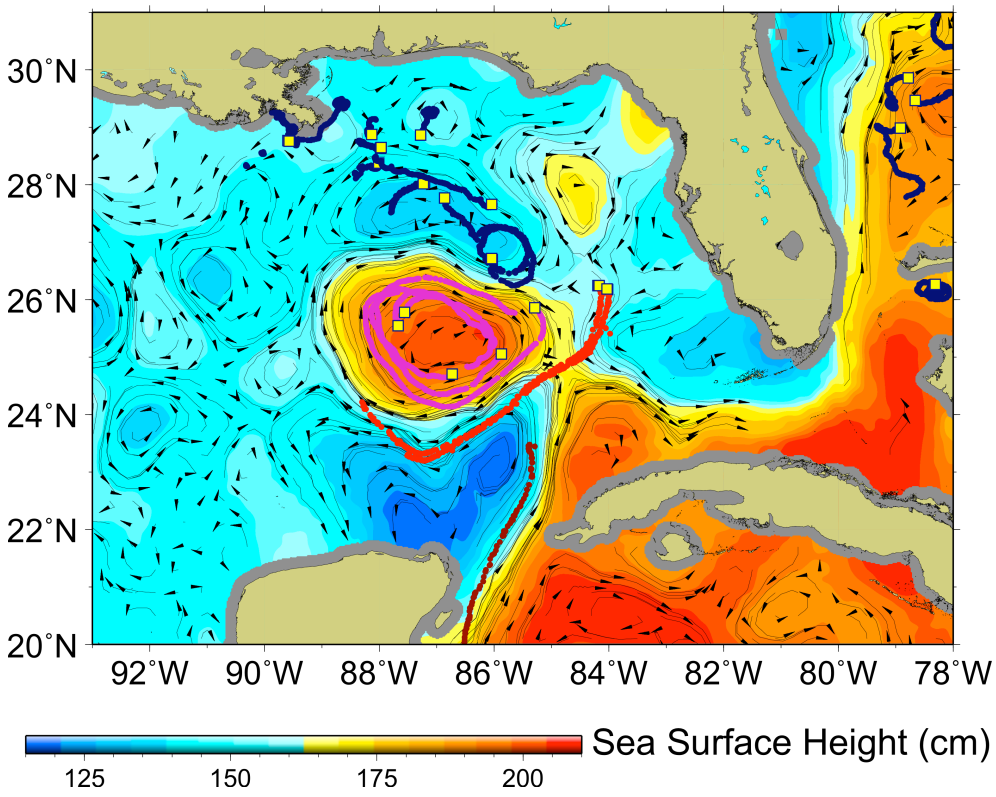

Figure 8. Surface drifter trajectories (color lines) of drifters deployed, mostly in support of the surface current monitoring efforts, during the months of April through July, 2010. Red lines correspond to four drifters deployed during the Walton Smith research cruise (Smith et al 2013) that served to assess the connectivity between the Loop Current and the Loop Current ring. Purple lines correspond to drifters that were used to monitor the circulation in the interior of the Loop Current eddy. Black lines correspond to drifters that served to monitor the ocean circulation to the northeast of the Loop Current ring. The background colors correspond to the altimetry-derived sea surface height while the arrows represent current vectors computed from the sea height field for June 13, 2010.