



# GOM Surface Dynamics Reports

## 08/29/2005 Report

[NOAA Home](#) [AOML Home](#) [PhOD Home](#) [Altimetry Products Home](#) [Reports Home](#)

### GOM Surface Dynamics

[Introduction to GOM reports](#)

### Reports

[GOM Surface Dynamics \(Internal\)](#)

### Products

[Global Geostrophic Currents](#)

[Tropical Cyclone Heat Potential](#)

[Surface Currents](#)

[Upper Ocean Heat Storage](#)

### Contact

[Contact Information](#)

### Report for August 29th, 2005

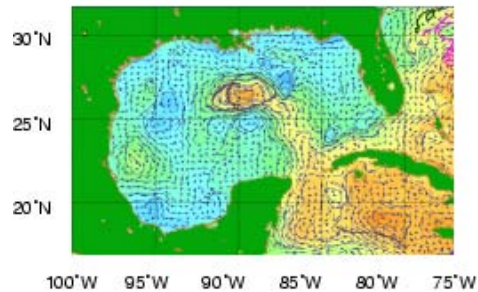
This weekly report is produced at NOAA/AOML and shows the average present conditions of the upper ocean thermal structure and the surface dynamics in the Gulf of Mexico (GOM), estimated using satellite observations and climatological fields. For more details about these products please refer to [www.aoml.noaa.gov/phod/cyclone/data/](http://www.aoml.noaa.gov/phod/cyclone/data/).

Warm anticyclonic features, such as the Loop Current (LC) and its associated rings, are characterized by large values of sea height, the deepening of their isotherms towards their centers and by large values of heat content.

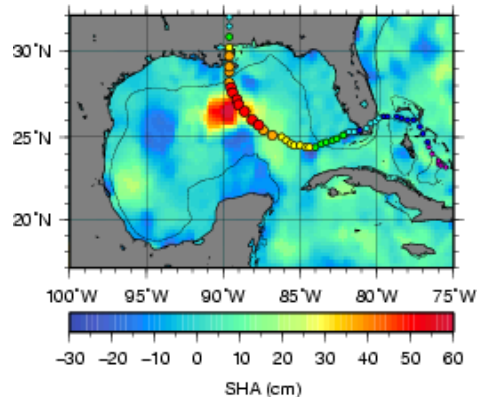
The altimetry-derived **geostrophic velocity fields** indicate that warm anticyclonic ring R05-1 and the Loop Current dominate the surface dynamics of the eastern part of The Gulf of Mexico between 85°W and 90°W. The trajectory of a surface drifter indicating an anticyclonic motion is consistent with the geostrophic velocity field. Two smaller anticyclonic eddies are detected in the western region of the GOM. No major mesoscale feature is observed in the western shelf of Florida.

The surface (geostrophic) current field indicate that the center of R05-1 has slightly translated westward and that is approximately located at 90°W 27°N. This ring is characterized by altimetry-derived sea height anomaly (SHA) values larger than 60cm in its center. The SHA values average 35cm over the whole ring. The zonal and meridional diameters of this ring are approximately 300km. The LC, which extends from the Yucatan Straits to approximately 26°N, averages SHA values of 25cm.

Two cyclonic eddies, characterized by SHA values of less than -30cm, are located north and south of ring R05-1. The warm eddy located at 96.5°W; 22°N has remained in that position since our last weekly report. Its zonal and meridional diameters are approximately 300km. Maximum SHA values of 30cm and average of 10cm are detected for this eddy. Another anticyclonic eddy of lower (less than 10cm) SHA values is detected at 93°W 24°N. One major cyclonic eddy, characterized by SHA values of -20cm, is observed near 94°W 26°N.



Satellite altimetry-derived surface currents in the Gulf of Mexico on August 28, 2005. The colors indicate the dynamic height (sea surface height) estimated from altimetry. A surface drifter trajectory is superimposed to this field and confirms the exact location of the anticyclonic ring R05-1.



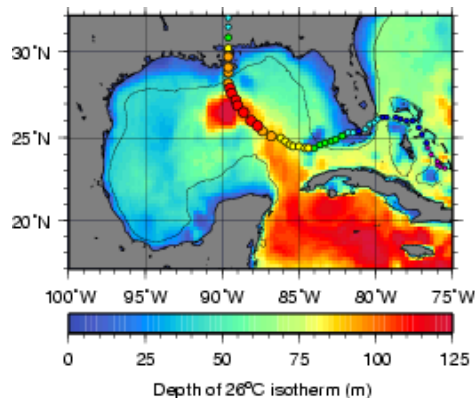
Satellite altimetry-derived field of sea height anomaly (SHA) on August 28, 2005, in the Gulf of Mexico. The large values (red) of SHA in the center of the Gulf are indicative of the presence of a warm anticyclonic ring. The circles of different colors indicate the track and intensity of Hurricane Katrina. The isobath of 200m is superimposed.

The altimetry-derived depth of the 26°C isotherm reaches maximum values of approximately 125m in the center of the anticyclonic ring R05-1, with an average value of 90m over most of the ring. Similar values of the depth of the 26°C isotherm are also found in the LC. The depth of this isotherm in the common waters of the eastern GOM ranges from 20m to 70m, while in the western GOM averages 50m.

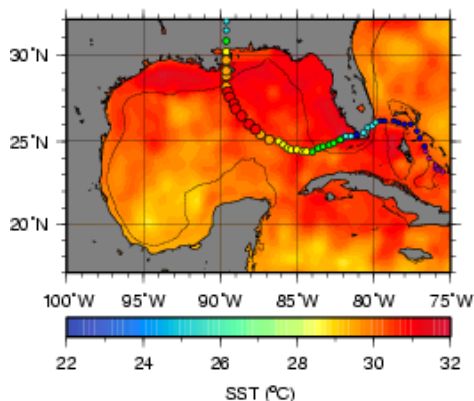
The satellite-derived sea surface temperature (SST) field exhibits large values, warmer than 29°C, over most of the GOM. The lowest sea surface temperatures values, but still above 29°C, are observed in the SW GOM. It is noticeable that the Loop Current and the large anticyclonic warm ring cannot be identified from the sea surface temperature field. These features are masked by the very thin, warm and stable upper layer formed in the GOM during the summer months. Large values of sea surface temperature and of the depth of the 26°C isotherm are correlated to large values of upper ocean heat content.

The amount of heat stored in the upper ocean can be quantified in terms of the Tropical Cyclone Heat Potential (TCHP), which is a parameter proportional to the integrated vertical temperature from the sea surface to the depth of the 26°C isotherm. The altimetry-derived TCHP field in the Gulf of Mexico has maximum values of 120 kJ cm<sup>-2</sup> for the warm anticyclonic ring R05-1. The LC averages TCHP values of 90 kJ cm<sup>-2</sup>.

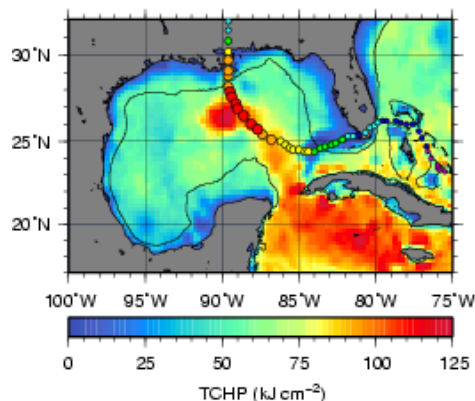
Average estimates of TCHP over the eastern GOM are of 70 kJ cm<sup>-2</sup> for areas deeper than 100m, and over the western GOM of 60 kJ cm<sup>-2</sup>.



Estimated field of the depth of the 26°C isotherm using satellite altimetry in the Gulf of Mexico for August 28, 2005. The Loop Current and large warm anticyclonic ring are characterized by large values of this parameter. The circles of different colors indicate the track and intensity of Hurricane Katrina. The isobath of 200m is superimposed.



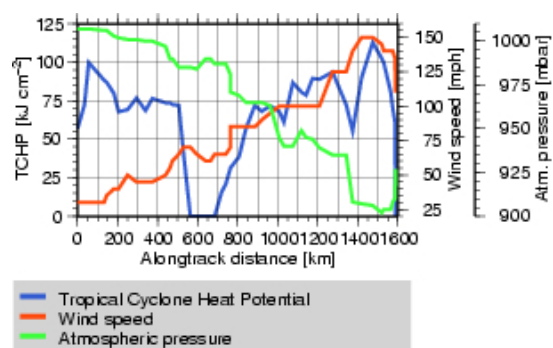
Satellite-derived sea surface temperature (SST) in the Gulf of Mexico on August 28, 2005. The circles of different colors indicate the track and intensity of Hurricane Katrina. The isobath of 200m is superimposed.



Altimeter-derived estimates of Tropical Cyclone Heat Potential (TCHP) for August 28, 2005. The Loop Current and a large warm anticyclonic ring have the largest amount of heat stored in the region. The circles of different colors indicate the track and intensity of Hurricane Katrina. The isobath of 200m is superimposed.

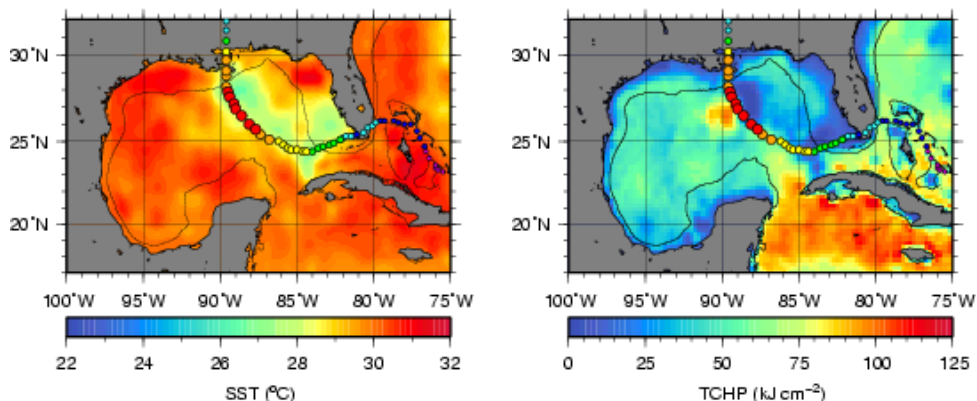
### Surface ocean conditions during the passage of Hurricane Katrina in the Gulf of Mexico

The figure to the right shows the values of Tropical Cyclone Heat Potential (TCHP), wind speed and atmospheric pressure extracted along the track of hurricane Katrina for August 25, 2005, one day previous to the passage of this cyclone in the Gulf of Mexico. The horizontal axis is the alongtrack distance measured from 75.50°W 23.20°N, and the vertical axis show the Tropical Cyclone Heat Potential, winds speed, and atmospheric pressure along the track of the cyclone.



## Surface ocean conditions after the passage of Hurricane Katrina in the Gulf of Mexico

The cooling of the surface waters in the GOM is observed by the decrease of the sea surface temperature values under the storm. This cooling is more pronounced to the right of the track, where winds are usually stronger. The passage of the cyclone produces a strong mixing of surface waters and upwelling of deeper and cooler waters. This can be observed in the reduction of the values of the TCHP field under the cyclone, which is more evident to the right of the track when the cyclone was more intense.



Sea surface temperature (SST) and Tropical Cyclone Heat Potential (TCHP) in the Gulf of Mexico on August 31, 2005. The cooling of the surface waters is observed in both maps. The circles of different colors indicate the track and intensity of Hurricane Katrina. The isobath of 200m is superimposed.

This work is supported by the National Oceanic and Atmospheric Administration

### Please direct your questions to:

Gustavo Goni (Gustavo.Goni@noaa.gov, <http://www.aoml.noaa.gov/phod/people/goni/>) or  
Joaquin Trinanés (Joaquin.Trinanes@noaa.gov).