

Post Storm Data Acquisition – Hurricane Rita Peak Wind Gust Analysis and Storm Surge Data

November 14, 2005

Overview

Hurricane Rita was the second Category 5 hurricane of the 2005 Atlantic hurricane season. Rita's minimum central pressure dropped to 897 millibars (mb) on September 21, 2005, making it the strongest hurricane ever observed in the Gulf of Mexico. Rita was the third most intense hurricane ever in the Atlantic Basin behind Hurricane Gilbert in 1988 and the 1935 Labor Day Hurricane (Note: Hurricane Wilma became the strongest hurricane ever observed in the Gulf of Mexico and Atlantic Basin on October 19, 2005, moving Rita to second and fourth respectively). Rita's maximum sustained winds peaked near 175 mph. It weakened to a category 2 hurricane with maximum sustained winds of 100 mph before making landfall between Sabine Pass, Texas, and Johnson's Bayou, Louisiana, at 02:38 CDT (07:38 UTC) on September 24, 2005 (**Figure 1**).

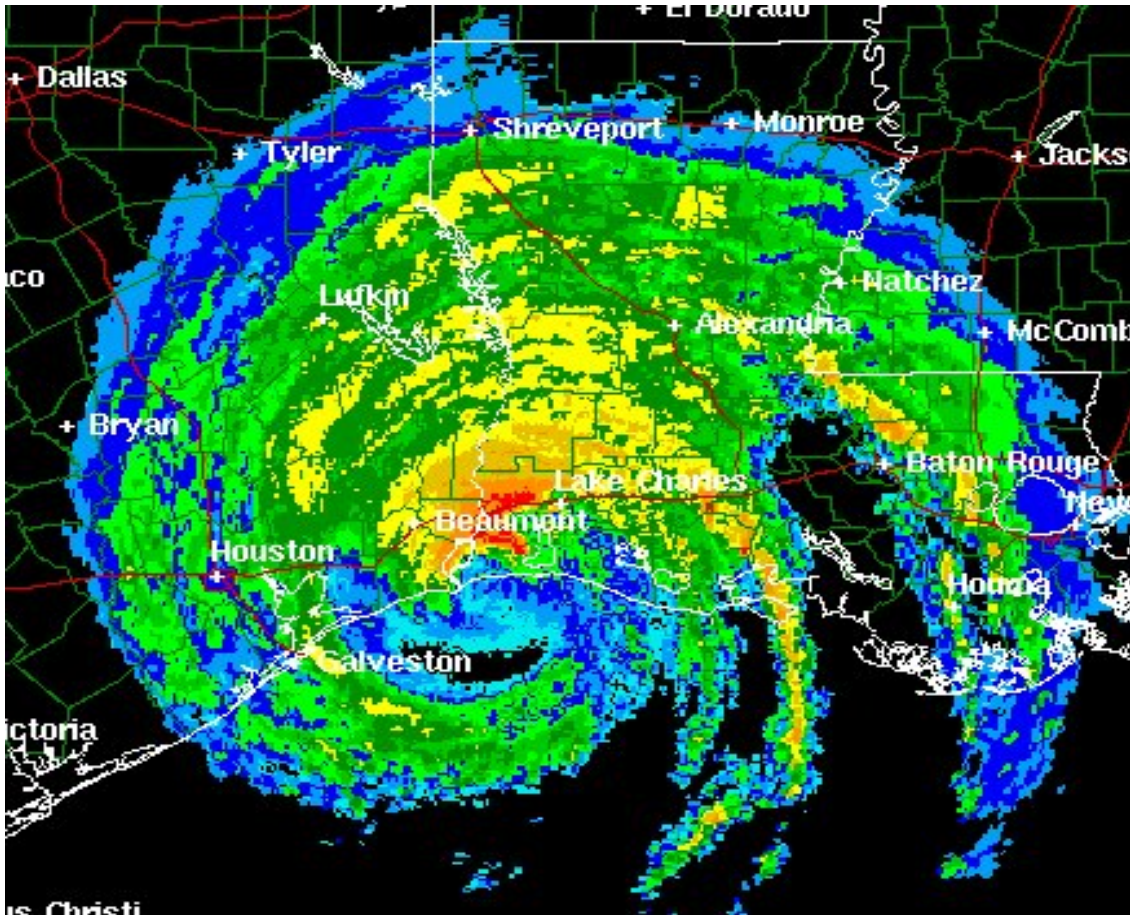


Figure 1. WSR-88D reflectivity image from WFO Lake Charles taken at 2:42 a.m. CDT September 24, 2005.

Rita formed along a dissipated frontal boundary just east of the Turks and Caicos Islands. It became the 17th tropical storm of the season on September 18, less than a day after forming into a tropical depression. Rita moved west-northwest and developed into a hurricane over the favorable environment of the Florida Straits. Rita strengthened rapidly in the even more favorable environment of the central Gulf of Mexico (**Figure 2**).



Figure 2. Track of the center of Rita during the period September 18-25, 2005.

Although Rita threatened crude oil production and refinery facilities in the Gulf of Mexico, it did not do any major damage. There were only two fatalities directly related to Rita. A significant problem with Rita was major traffic gridlocks caused by large amounts of people evacuating from the highly populated Houston metro area.

Peak Wind Gusts Analysis

There were no NWS sponsored flyovers to evaluate damage and estimate peak wind gusts. Weather Forecast Offices (WFO) Lake Charles, LA and Houston, TX conducted ground based damage assessments. The analysis of peak wind gusts is based on observed sustained winds and peak wind gusts, damage evaluations obtained from the post storm reports of WFOs Lake Charles, LA and Houston, TX, and the preliminary maximum sustained wind analysis from NOAA's Hurricane Research Division (HRD).

The highest observed peak wind gusts (**Figure 3**) were in an area located from Port Arthur, TX east to near Cameron, LA. Most of the damage in this area was typical of that caused by an F1 tornado, which has a wind range of 73-112 mph (**Pictures 1 and 2**). Aerial photography missions were conducted by the NOAA Remote Sensing Division and **Picture 3** indicates mostly F1 type damage as well.



Picture 1. Example of damage in Cameron, LA caused by Hurricane Rita. Photo taken by WFO Lake Charles, LA.



Picture 2. Example of damage in Orange County, TX caused by Hurricane Rita. Photo taken by WFO Lake Charles, LA.



Picture 3. Damage in Cameron, LA from Hurricane Rita. Photograph taken by NOAA.

The Hurricane Research Division’s (HRD) preliminary analysis (**Figure 5**) indicates maximum sustained winds were near 100 mph when Rita made landfall. Rita was weakening at landfall. Generally, peak wind gusts are 20-25% higher than the sustained winds when a hurricane moves inland. This would suggest Rita’s peak wind gusts were between 120-125 mph. The maximum observed peak wind gust in Rita was 116 mph in Port Arthur, TX (**Table 1**) and the observed peak wind gusts were 23% higher than the observed sustained winds (average of 11 stations). Therefore, the observed peak wind gusts appear to be representative of the highest wind gusts despite some of the equipment becoming inoperative during the period of strongest winds.

Location	Instrument	Peak Gust (mph)	Direction
Port Arthur, TX	Tex Tech	116	N
Calcasieu Pass, LA	C-MAN	112	E
Orange, TX	FCMP	105	SE
Beaumont, TX	ASOS	105	NW
Nederland, TX	FCMP	100	N
Sabine Pass, TX	C-MAN	99	N
Marsh Island, LA	C-MAN	93	S
Winnie, TX	Tex Tech	86	NW
Anahuac, TX	Tex Tech	85	NW
Buoy 42035 (Galveston)	Buoy	76	NW
Lake Charles, LA	ASOS	74	NE
Galveston, TX	ASOS	62	NW
Houston, TX	ASOS	61	NW

Table 1. Observed peak wind gusts and directions during Hurricane Rita. Wind measurements were taken from Texas Tech University and the Florida Coastal Monitoring Program (FCMP) wind equipment, Automated Surface Observing Systems (ASOS), Coastal Marine Automated Network (C-MAN) stations and National Data Buoy Center (NDBC) Data Buoys.

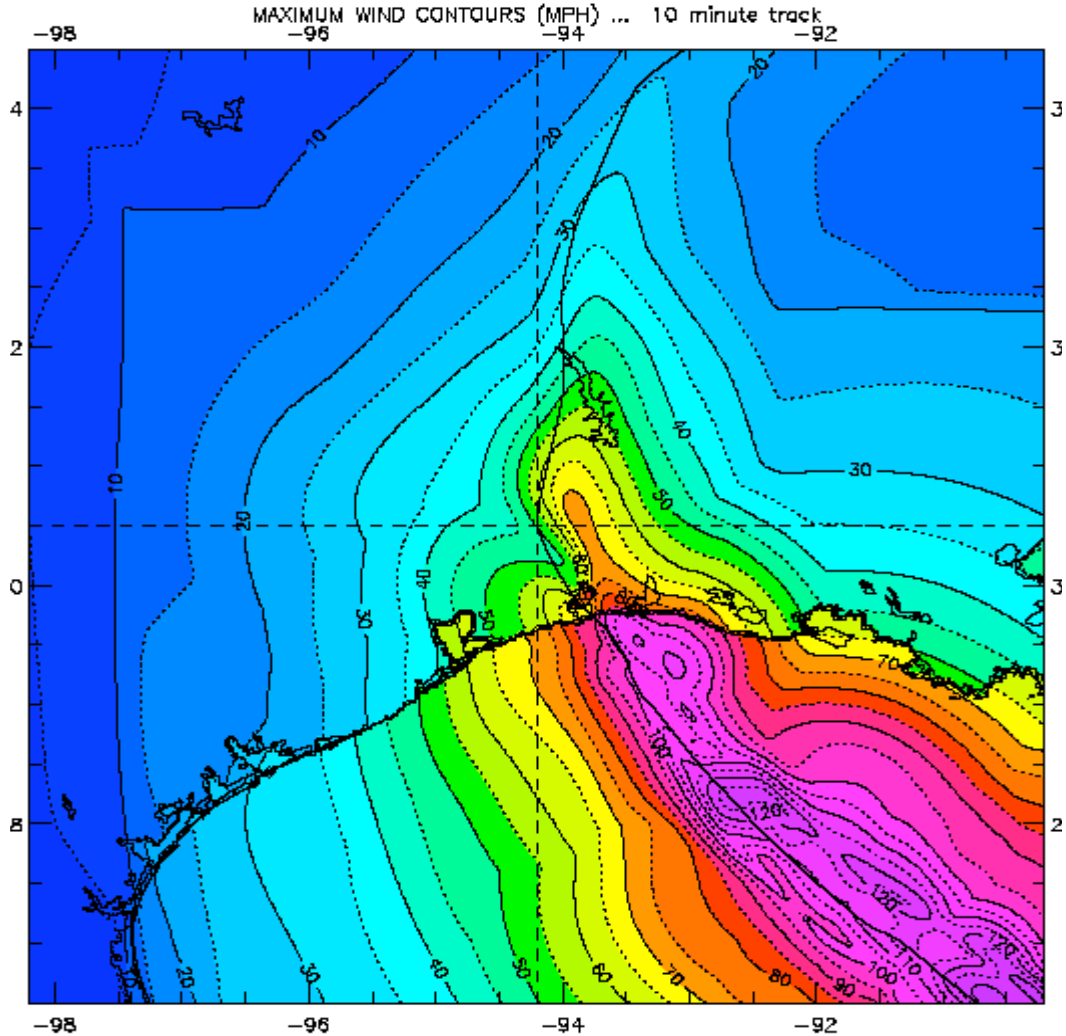


Figure 5. Preliminary maximum sustained wind swath analysis (in mph) for Hurricane Rita from the HRD. It uses the 24 September 0738 UTC landfall analysis and then projects the peak sustained winds along the observed track (black line) of the surface circulation center at 10 minute intervals using the HRD inland decay model. Values are contoured in intervals of 5 mph with each 10 mph displayed.

Storm Surge

The highest storm surge was 15-20 feet above MSL in Cameron Parish Louisiana destroying most of the homes and businesses (**Figure 6**). In Vermillion Parish Louisiana, the surge reached 100-year flood plains across much of the Parish. South of the Lake Charles regional airport in Black Bayou, storm surge was estimated at 10-15 feet above MSL. Storm surge was also 10-15 feet above MSL in Pecan Island destroying most of the homes and businesses. In downtown Lake Charles, the storm surge was 6 feet above MSL flooding much of the downtown area with 3-6 feet of water.

Location	Storm Surge	Time
Port Arthur, TX	9.24 feet MSL	0800 UTC 10/24
Sabine Pass, TX	8.12 feet MSL	0800 UTC 10/24
Rainbow Bridge, TX	7.93 feet MSL	1600 UTC 10/24

Table 2. Some measured storm surges during Hurricane Rita.

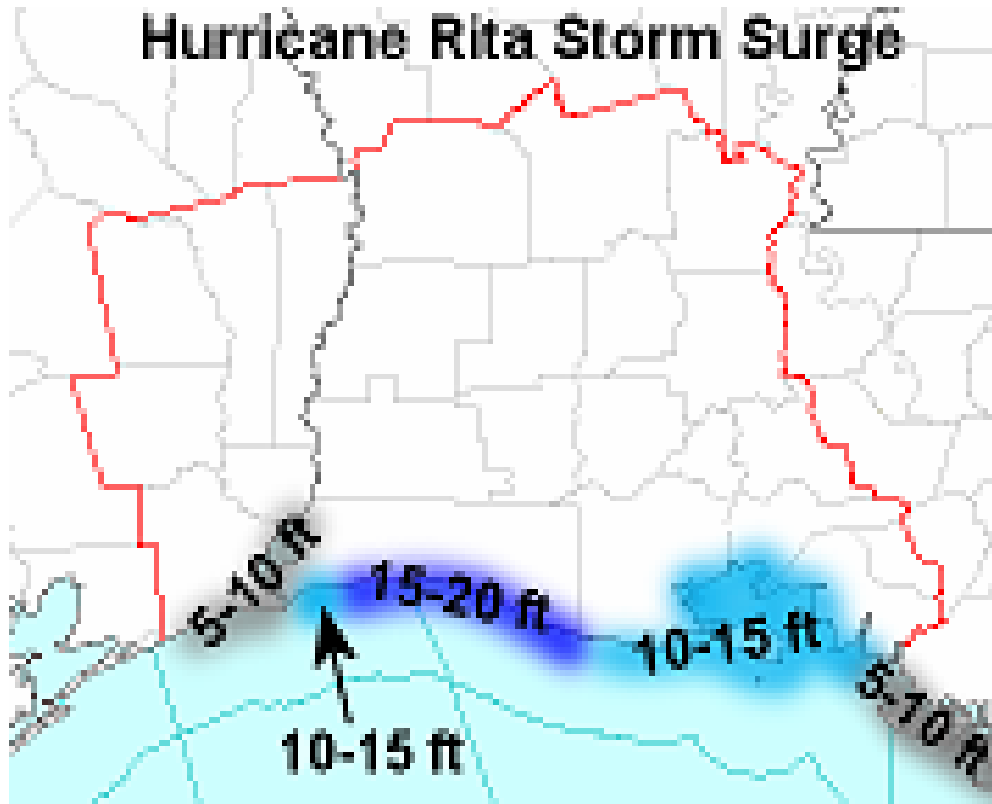


Figure 6. Hurricane Rita storm surge estimates from WFO Lake Charles, LA.