

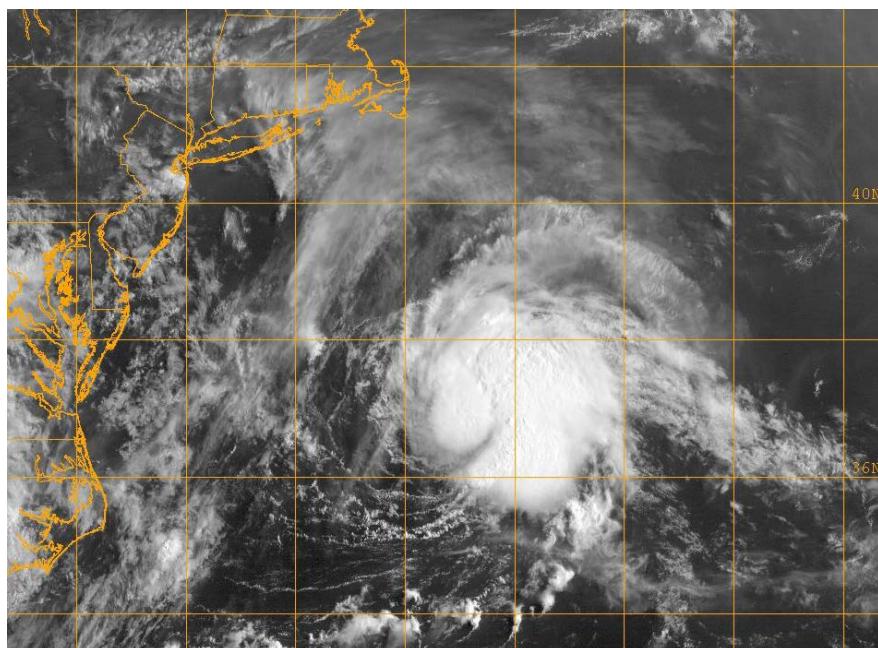


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM CLAUDETTE (AL032015)

13-14 July 2015

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National Hurricane Center
14 August 2015



GOES-E VISIBLE SATELLITE IMAGE OF CLAUDETTE AT 1230 UTC 13 JULY 2015. IMAGE COURTESY OF NAVAL RESEARCH LABORATORY.

Claudette was a short-lived high-latitude tropical storm that formed from a non-tropical low pressure system just off the coast of North Carolina.

Tropical Storm Claudette

13-14 JULY 2015

SYNOPTIC HISTORY

The formation of Claudette was triggered by a short-wave trough in the mid-latitude westerlies that moved east-southeastward across the eastern United States, and reached the Atlantic Ocean in the vicinity of the Outer Banks of North Carolina on 12 July. A non-tropical surface low associated with the trough formed near Cape Hatteras at 0000 UTC 12 July, and moved generally eastward at about 5 to 10 kt for the next 12 to 24 hours over the warm waters of the Gulf Stream. The thunderstorm activity abruptly increased at 0600 UTC 13 July, with some cyclonically curved convective bands wrapping around the eastern half of the low. This increase and subsequent maintenance of the convection near the center of the low was an indication that the system acquired tropical characteristics, marking the formation of a tropical depression. The "best track" chart of Claudette's path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1¹.

Initially, the center of circulation was on the southwestern edge of the convection, but in a few hours, it became embedded within the thunderstorm activity. It is estimated that the cyclone became a tropical storm at 1200 UTC 13 July, and reached its peak intensity of 45 kt and minimum pressure of 1003 mb at 1800 UTC on that day about halfway between Bermuda and Cape Cod. Embedded within the southwesterly flow ahead of a mid-latitude trough, Claudette moved toward the northeast between 15 and 20 kt over the cooler waters of the North Atlantic, where strong wind shear gradually separated the center from the intermittent thunderstorm activity. The center became poorly defined and detached from the convection by 0000 UTC 15 July, when the cyclone became a remnant low. The low was absorbed by a frontal system by 1800 UTC 15 July near Newfoundland.

METEOROLOGICAL STATISTICS

Observations in Claudette (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB). Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological

¹ A digital record of the complete best track, including wind radii, can be found on line at <ftp://ftp.nhc.noaa.gov/atcf>. Data for the current year's storms are located in the *btk* directory, while previous years' data are located in the *archive* directory.

Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Claudette.

The estimated peak intensity of Claudette of 45 kt at 1800 UTC 13 July was based on ASCAT data (Fig.4). Satellite imagery also indicated that the cloud pattern was best organized near that time. The Dvorak intensity estimates, however, were lower than the ~ 45-kt winds measured by ASCAT. The environmental pressures were high, and the central pressure of Claudette deviated from the normal Dvorak or Knaff-Zehr-Courtney pressure-wind relationships.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Claudette.

FORECAST AND WARNING CRITIQUE

The genesis of Claudette was poorly forecast. The system was first assigned a low (< 40% chance of formation) probability of formation about 24 hours before genesis occurred. This unexpected genesis is not uncommon for systems that develop from perturbations embedded within the mid-latitude flow, particularly when the perturbation is first observed over land. Global models, however, correctly predicted the evolution of the short wave trough over the eastern United States and the formation of a low pressure system in the western North Atlantic. Initially, phase-space diagrams from the Florida State University indicated that the low would remain a cold core system. However, the model diagnosis changed near the genesis time in suggesting the development of a warm core low.

A verification of NHC official track forecasts for Claudette is given in Table 3. With only a few forecasts to verify, the official forecast track errors were greater than the mean official errors for the previous 5-yr period. A verification of NHC official intensity forecasts for Claudette is given in Table 4. The official forecast intensity errors were lower than the mean official errors for the previous 5-yr period. Due to the small number of forecasts, the model track and intensity errors are not included here.

Table 1. Best track for Tropical Storm Claudette, 13-14 July 2015.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
12 / 0000	35.4	75.4	1010	25	low
12 / 0600	35.3	74.6	1010	25	"
12 / 1200	35.2	73.6	1010	25	"
12 / 1800	35.3	72.8	1010	25	"
13 / 0000	35.5	72.2	1010	25	"
13 / 0600	36.0	71.1	1008	30	tropical depression
13 / 1200	36.8	69.4	1005	40	tropical storm
13 / 1800	37.6	67.5	1003	45	"
14 / 0000	38.4	65.7	1004	45	"
14 / 0600	39.4	64.1	1004	45	"
14 / 1200	40.7	62.0	1004	45	"
14 / 1800	42.0	60.0	1004	40	"
15 / 0000	43.5	58.2	1004	35	low
15 / 0600	45.0	56.9	1004	30	"
15 / 1200	46.0	55.9	1004	30	"
15 / 1800					absorbed
13 / 1800	37.6	67.5	1003	45	minimum pressure/ maximum winds

Table 2. Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the “Low” category do not include forecasts of a 0% chance of genesis.

	Hours Before Genesis	
	48-Hour Outlook	120-Hour Outlook
Low (<40%)	24	24
Medium (40%-60%)	-	-
High (>60%)	-	-

Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Claudette. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	43.5	93.1					
OCD5	93.1	106.1					
Forecasts	4	2					
OFCL (2010-14)	28.4	45.0	60.4	77.1	113.1	157.8	210.0
OCD5 (2010-14)	48.3	101.5	161.5	222.6	329.8	412.6	483.9

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Claudette. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	0.0	2.5					
OCD5	2.5	5.0					
Forecasts	4	2					
OFCL (2010-14)	6.2	9.4	11.5	13.3	14.6	14.6	15.8
OCD5 (2010-14)	7.3	10.8	13.3	15.3	17.7	17.8	17.6

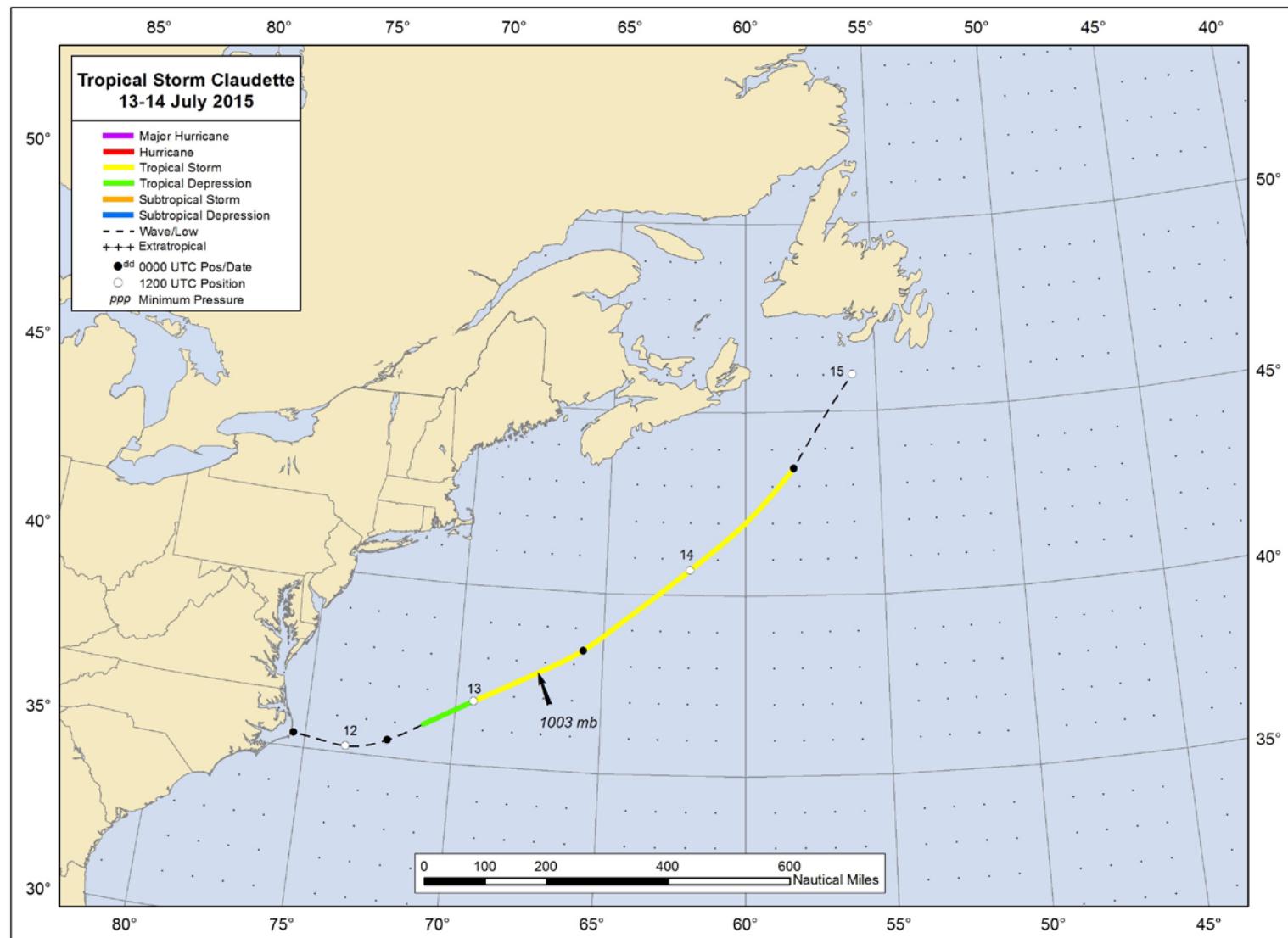


Figure 1. Best track positions for Tropical Storm Claudette, 13-14 July 2015.

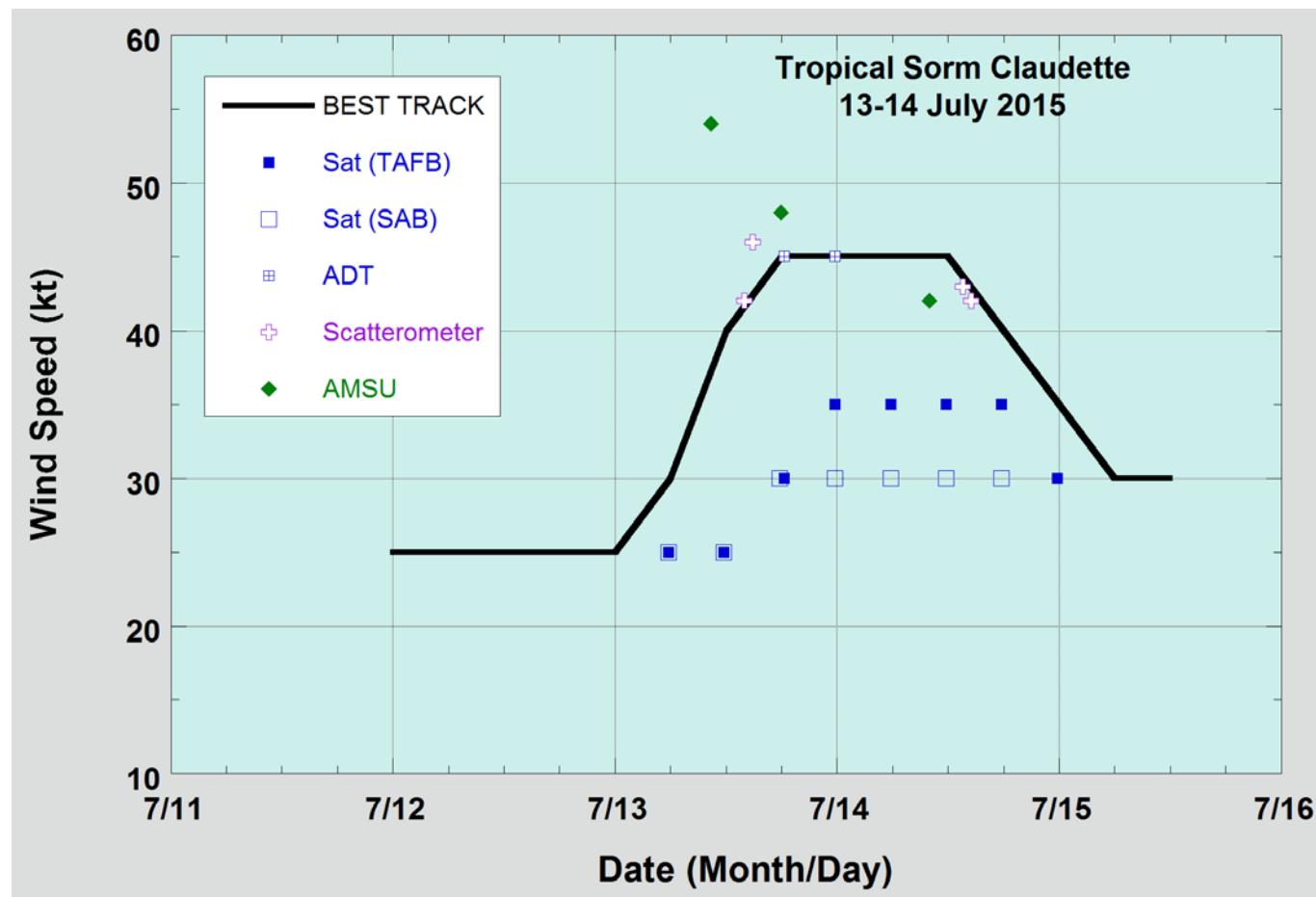


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Claudette, 13-14 July 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

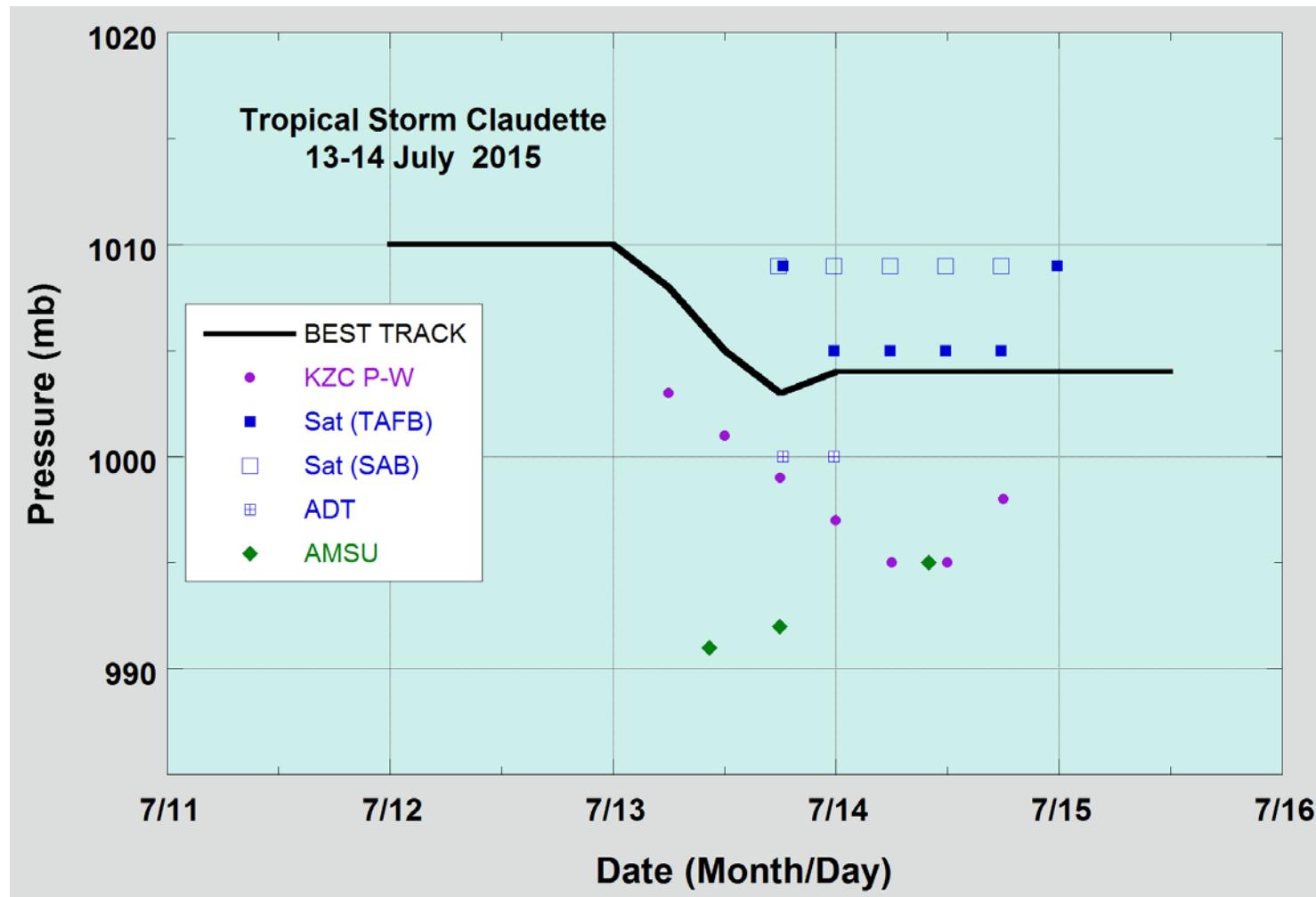


Figure 3.

Selected pressure observations and best track minimum central pressure curve for Tropical Storm Claudette, 13-14 July 2015. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.

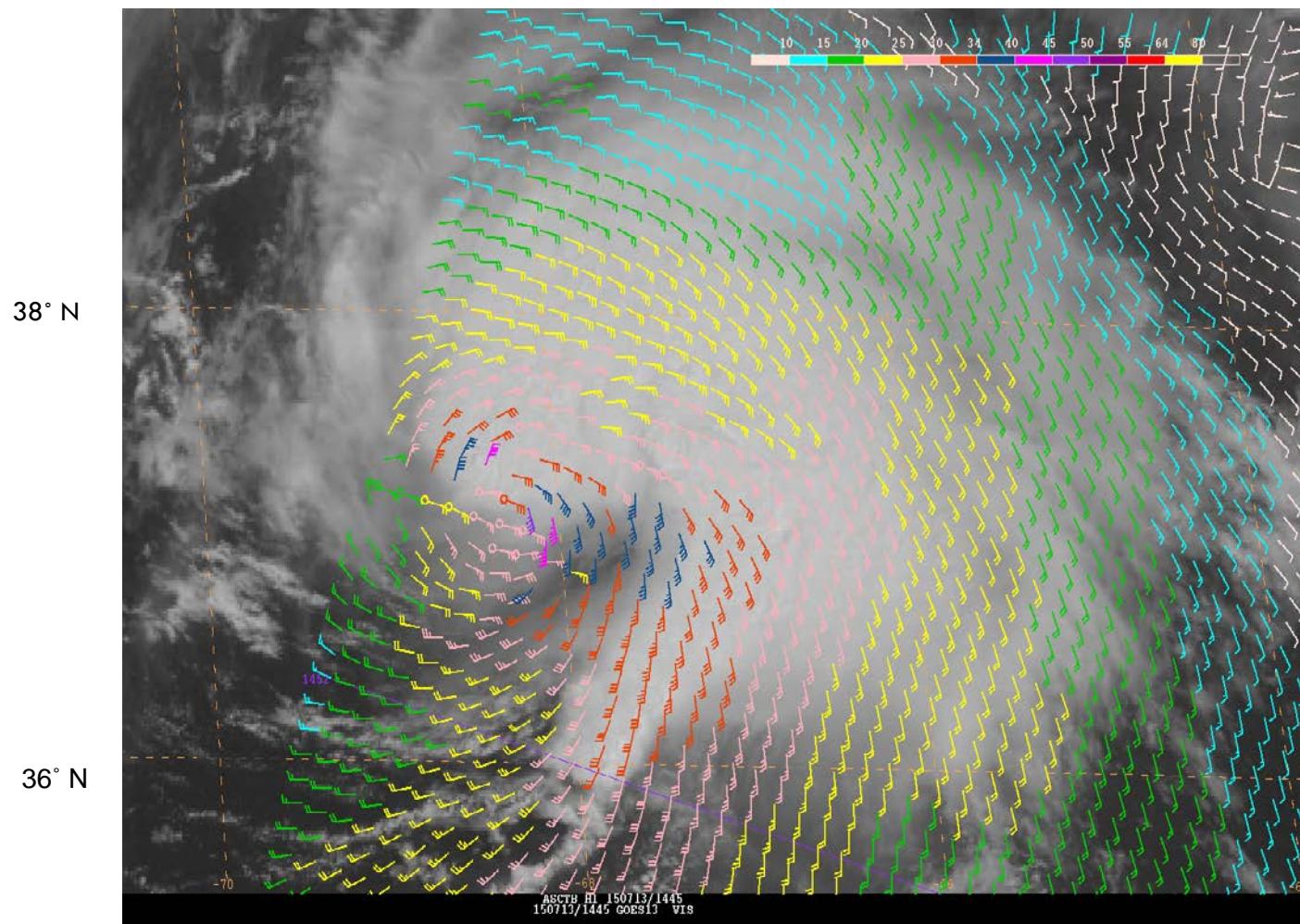


Figure 4. ASCAT-B pass at 1452 UTC 13 July 2015 over Tropical Storm Claudette.