

Tropical Cyclone Report
Tropical Storm Chantal
(AL032007)
31 July-1 August 2007

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Chantal was a short-lived tropical storm that moved roughly parallel to, but offshore from, the U.S. east coast.

a. Synoptic History

A frontal system moved off the coasts of North Carolina and South Carolina on 21 July. Over the next several days the front drifted southward and southeastward while decaying into a low-level trough, and had generated an area of cloudiness and convection several hundred miles east of northeastern Florida by 25 July. The area of disturbed weather drifted southward and became quasi-stationary a few hundred miles east of the Bahamas by 26 July. Convection was not very persistent over the area for the next few days, and it was not until 28 July that the first Dvorak classification was performed on this weather system. The clouds and convection did not become significantly better organized over the next couple of days while the system moved slowly northward. By 1200 UTC 30 July, visible satellite images showed that a surface circulation had developed, but the convection was too far removed from the center to justify designating the system as a tropical cyclone. Around 0000 UTC 31 July, however, the low-level circulation center became well-enough involved with the deep convection to warrant designating the system as a tropical depression, while centered about 210 n mi north-northwest of Bermuda and about 450 n mi east of Cape Hatteras, North Carolina. Over the ensuing 6 to 12 h, there was an increase in the amount of deep convection near the center, and QuikSCAT scatterometer data suggest that the cyclone had strengthened into a tropical storm by 0600 UTC 31 July. QuikSCAT observations also indicate that Chantal reached its peak intensity of 45 kt by 1200 UTC 31 July. The “best track” chart of Chantal’s path is given in Fig. 1, with the wind and pressure time series displayed in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1.

During Chantal’s brief existence, the primary steering feature was a mid-tropospheric trough situated just off the U.S. east coast. The flow on the eastern side of the trough drove the tropical cyclone on a north-northeastward to northeastward trajectory with an increasing forward speed of motion. By 0000 UTC 01 August, a convective band that had been wrapping around the center of the storm was weakening, and the circulation became embedded within a frontal zone, signifying that Chantal was losing tropical characteristics. The system transformed into an extratropical cyclone by 0600 UTC 1 August, and subsequently passed over the eastern end of the Avalon Peninsula of Newfoundland around 1300 to 1400 UTC that day. This resulted in very heavy rainfall over the peninsula (see next section). The post-Chantal cyclone intensified to near hurricane force as it raced northeastward over the north Atlantic late on 1 August and early

on 2 August. Some weakening of the cyclone, with a considerable decrease of forward speed, occurred on 2 August but the extratropical storm re-intensified to near hurricane strength again by early on 3 August. By then the system had turned toward the east. The cyclone began its final weakening later on 3 August, and passed a couple hundred miles south and southeast of Iceland by 4 August. On 5 August, Chantal's extratropical remnant turned northeastward and merged with another extratropical cyclone several hundred miles east of Iceland – and finally lost its identity.

b. Meteorological Statistics

Observations in Chantal (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB). Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in tracking Chantal. Several QuikSCAT overpasses helped to assess the intensity of the tropical cyclone, including the maximum wind estimate of 45 kt.

Ship reports of winds of tropical storm force associated with Chantal are given in Table 2.

The post-Chantal extratropical cyclone caused very heavy rainfall over parts of southeastern Newfoundland. Analyses from the Canadian Hurricane Centre indicate that rainfall totals approached 8 inches over portions of the Avalon Peninsula of Newfoundland. These rains resulted in severe flooding over some sections of the Peninsula.

c. Casualty and Damage Statistics

There were no reports of damage or casualties associated with Chantal. However the extratropical cyclone that was formerly Chantal did cause some flood-related damages in southeastern Newfoundland.

d. Forecast and Warning Critique

The disturbance that eventually formed into Chantal was first mentioned in the Tropical Weather Outlook (TWO) issued at 1530 UTC 28 July, 56.5 h before genesis. The TWO issued 8.5 h prior to genesis first indicated the possibility of the system becoming a tropical or subtropical cyclone “before merging with a frontal boundary”.

Since Chantal was a tropical cyclone for only one day, none of the official forecasts associated with the five advisories verified beyond 24 h. There were three 12-h track forecasts that had an average error of 36 n mi and one 24-h forecast that had an error of 0 n mi. The few official intensity forecasts had errors of 10 kt or less.

Watches and/or warnings were not required for Chantal.

Table 1. Best track for Tropical Storm Chantal, 31 July-1 August 2007.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|---|
| 31 / 0000 | 35.5 | 66.5 | 1007 | 30 | tropical depression |
| 31 / 0600 | 37.1 | 65.5 | 1004 | 35 | tropical storm |
| 31 / 1200 | 39.1 | 64.2 | 999 | 45 | " |
| 31 / 1800 | 40.7 | 62.3 | 999 | 45 | " |
| 01 / 0000 | 42.5 | 60.0 | 994 | 45 | " |
| 01 / 0600 | 44.0 | 57.5 | 992 | 45 | extratropical |
| 01 / 1200 | 46.0 | 54.5 | 990 | 55 | " |
| 01 / 1800 | 49.0 | 49.5 | 988 | 60 | " |
| 02 / 0000 | 53.0 | 43.0 | 985 | 60 | " |
| 02 / 0600 | 55.5 | 38.5 | 975 | 50 | " |
| 02 / 1200 | 57.5 | 35.4 | 970 | 50 | " |
| 02 / 1800 | 58.6 | 33.9 | 967 | 55 | " |
| 03 / 0000 | 58.9 | 32.1 | 964 | 60 | " |
| 03 / 0600 | 58.9 | 30.4 | 964 | 60 | " |
| 03 / 1200 | 58.9 | 28.0 | 964 | 60 | " |
| 03 / 1800 | 58.9 | 25.2 | 967 | 55 | " |
| 04 / 0000 | 59.1 | 22.6 | 967 | 55 | " |
| 04 / 0600 | 59.5 | 19.1 | 970 | 50 | " |
| 04 / 1200 | 60.7 | 16.3 | 975 | 50 | " |
| 04 / 1800 | 61.7 | 14.0 | 978 | 45 | " |
| 05 / 0000 | 62.7 | 12.0 | 980 | 45 | " |
| 05 / 0600 | 64.0 | 9.5 | 982 | 45 | " |
| 05 / 1200 | 66.0 | 7.0 | 985 | 35 | " |
| 05 / 1800 | | | | | merged with another extratropical cyclone |
| 01 / 0000 | 42.5 | 60.0 | 994 | 45 | minimum pressure |

Table 2. Selected ship reports with winds of at least 34 kt for Tropical Storm Chantal, 31 July-1 August 2007.

| Date/Time (UTC) | Ship call sign | Latitude (°N) | Longitude (°W) | Wind dir/speed (kt) | Pressure (mb) |
|-----------------|----------------|---------------|----------------|---------------------|---------------|
| 31 / 0400 | ZCDM6 | 33.9 | 65.9 | 230 / 35 | 1016.6 |
| 31 / 1800 | KHJB | 38.7 | 58.7 | 190 / 42 | 1014.0 |
| 31 / 2100 | KHJB | 38.8 | 59.4 | 180 / 43 | 1011.0 |
| 01 / 0000 | VRBN8 | 41.3 | 59.1 | 210 / 37 | 1011.0 |

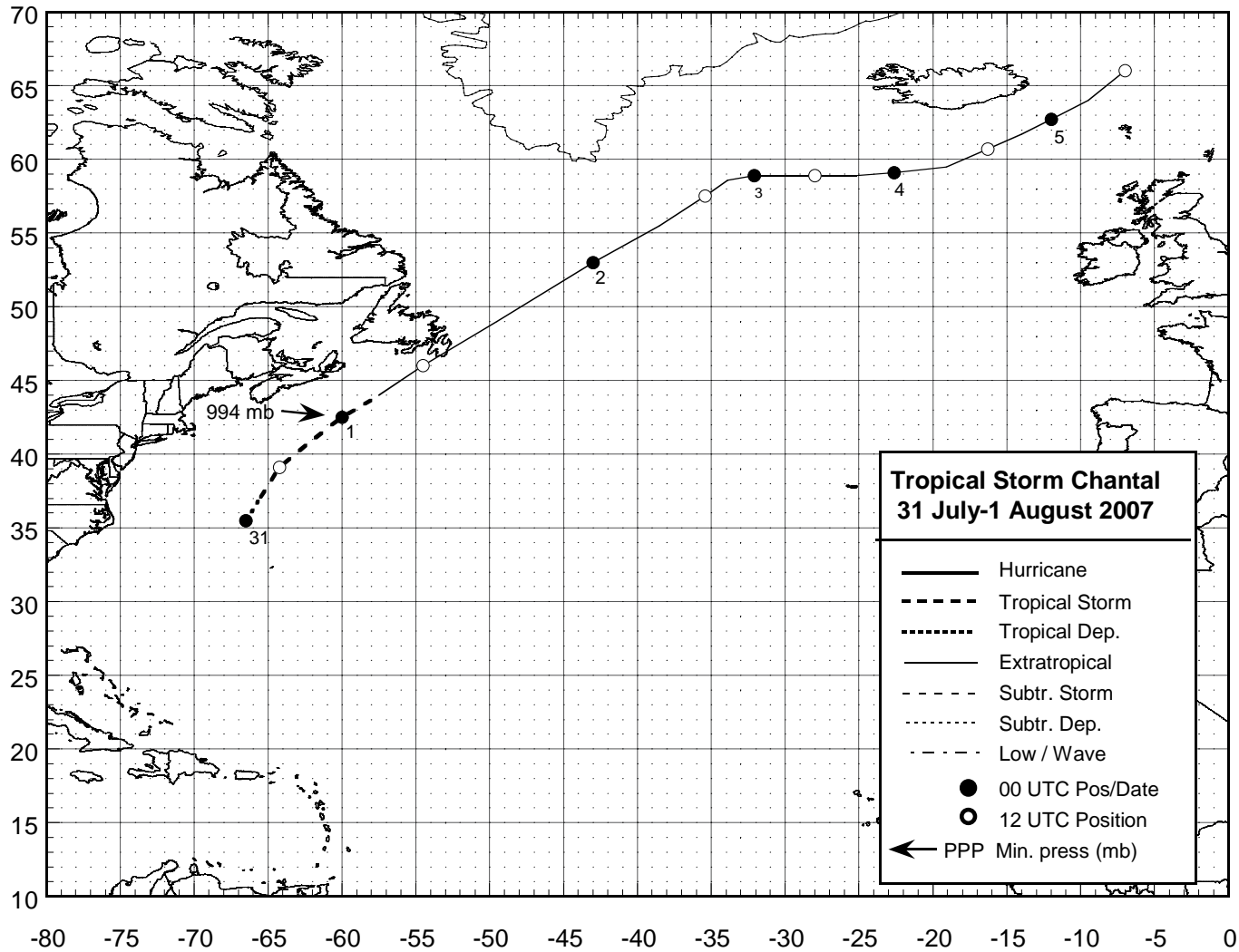


Figure 1. Best track positions for Tropical Storm Chantal, 31 July-1 August 2007. Track during the extratropical stage is based partially on analyses from the NOAA Ocean Prediction Center.

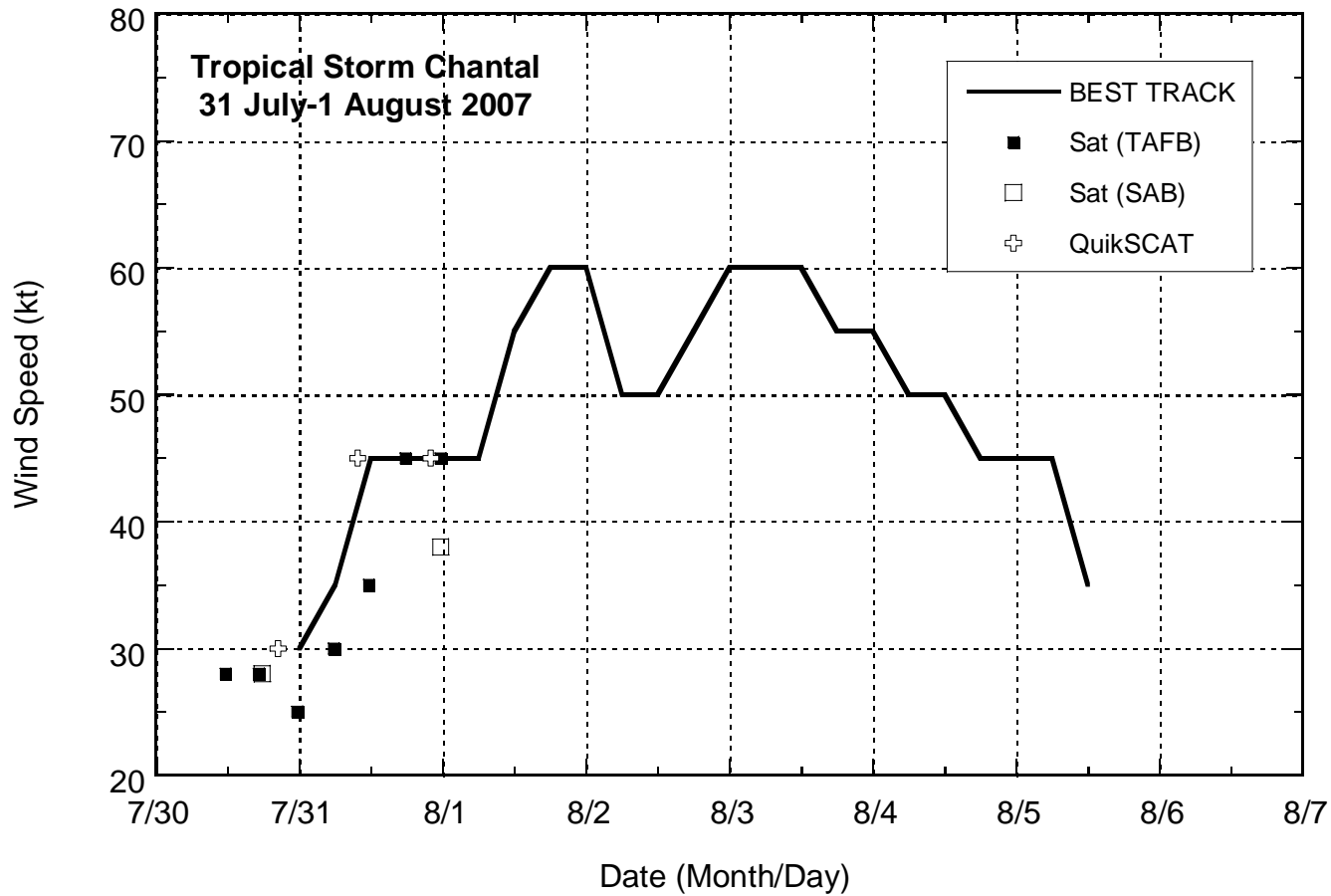


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Chantal, 31 July-1 August 2007. Estimates during the extratropical stage are based partially on analyses from the NOAA Ocean Prediction Center.

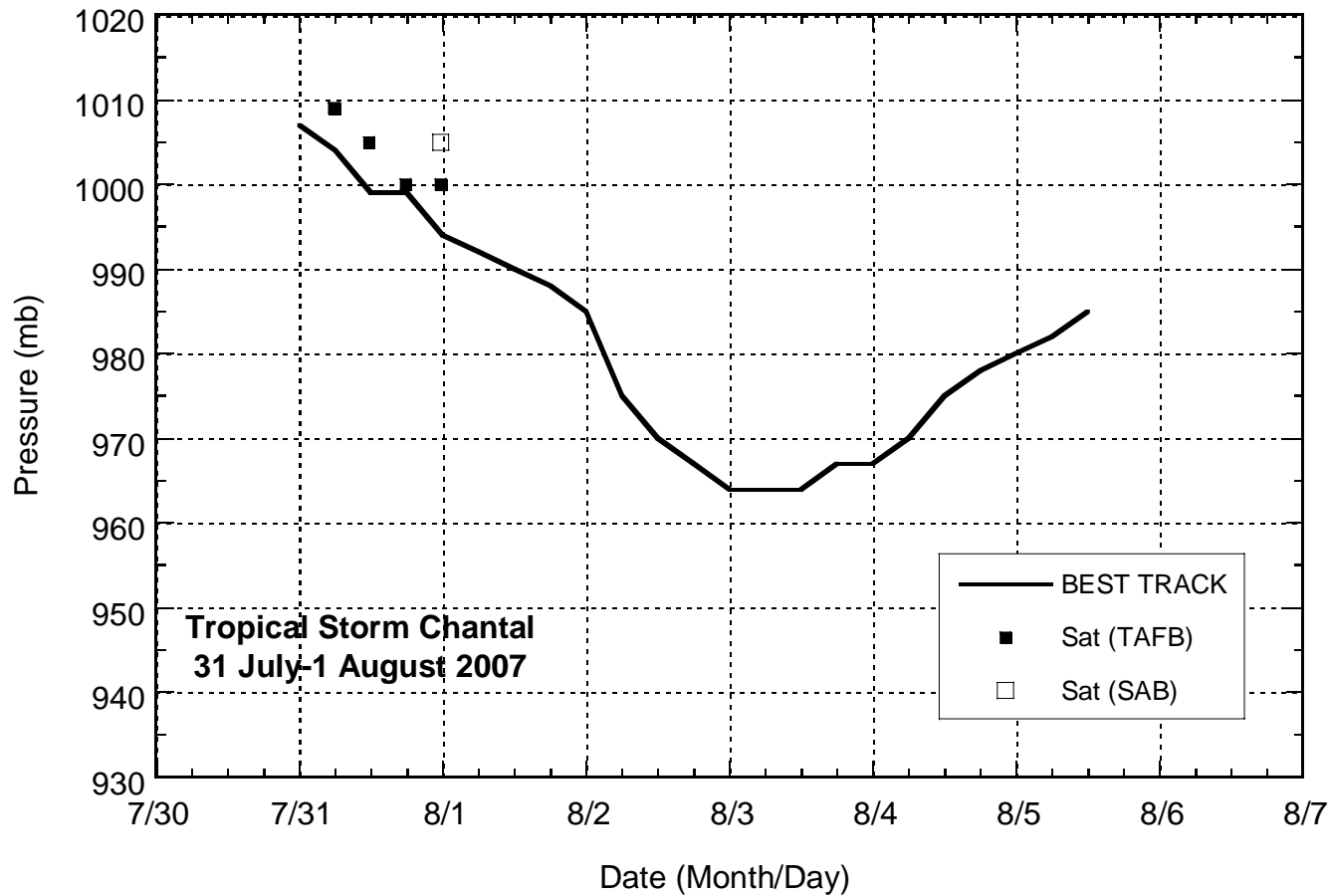


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Chantal, 31 July-1 August 2007. Estimates during the extratropical stage are based partially on analyses from the NOAA Ocean Prediction Center.