Tropical Cyclone Report
Tropical Storm Gaston
(AL092010)
1-2 September 2010

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Gaston was a short-lived tropical storm over the central tropical Atlantic Ocean.

a. Synoptic History

Gaston developed from a strong tropical wave that moved westward from the African coast on 28 August, accompanied by some deep convection. A burst of thunderstorms left a mid-level circulation near the wave axis on 30 August, and showers and thunderstorms consolidated near the mid-level feature later that day. On 31 August, a broad surface low was evident, with curved banding features forming by that evening. Early on 1 September, scatterometer and satellite data indicate that there was an increase in banding and the circulation become better defined, signifying the formation of a tropical depression at 0600 UTC, located about 800 n mi west-southwest of the Cape Verde Islands. The "best track" chart of the tropical cyclone's path is given in Figure 1, with the wind and pressure histories shown in Fig 2 and 3, respectively. The best track positions and intensities are listed in Table 1[1].

The depression strengthened to a tropical storm 6 h later when a burst of convection formed near the center. However, Gaston did not last long as a tropical storm, with convection starting to diminish late on 1 September as the cyclone moved slowly westward. It weakened to a tropical depression the next day and became a remnant low by 1800 UTC, located about midway between Africa and the Lesser Antilles. Thunderstorms redeveloped near the center late on 3 September, and the system was very close to becoming a tropical depression again the next day. At that time, the remnants of Gaston consisted of a well-defined circulation, with a coiled but shallow band wrapping around the center. Convection did not remain organized for long, however, and the system remained a remnant low.

Dropsonde data from a National Science Foundation G-V research mission on 5 September indicated that very dry air was present to the south of the circulation center, and this air appeared to be wrapped into the cyclone. This is probably why the storm weakened so quickly after genesis and why the remnants of Gaston did not maintain convection for very long, despite waters in excess of 29°C. As Gaston approached the Leeward Islands, sporadic bursts of convection occurred, though the system continued to lose organization. A ridge built to the north of the remnant low, and the system accelerated westward into the Caribbean Sea, producing locally heavy rain over portions of Puerto Rico (Figure 4). Although convection increased during

[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.

the daylight hours on 7 September, data from another G-V mission suggest that the vortex had decayed since the time of the earlier mission, with very little signature above 850 mb. The convection dissipated by early on 8 September, with the low opening up into a trough later that day just southeast of the Dominican Republic.

b. Meteorological Statistics

Observations in Gaston (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB), and UW-CIMSS intensity estimates using the Advanced Microwave Sounding Unit (AMSU). Data and imagery from NOAA polar-orbiting satellites, Defense Meteorological Satellite Program (DMSP) satellites, National Aeronautics and Space Administration (NASA) satellites, including TRMM, and Aqua, the U.S. Navy WindSat, and the EUMETSAT ASCAT, among other satellites, were also useful in constructing the best track of Gaston.

The 35-kt estimated peak intensity of Gaston is based on a blend of subjective Dvorak classifications and ASCAT data. The peak intensity is lower than suggested by Dvorak alone because ASCAT data indicated that those estimates, in general, were too high. The ASCAT data suggest a peak intensity of 30-35 kt, and it is possible that Gaston never attained tropical storm strength. The time of the analyzed peak was also shifted forward in time from operational estimates to better conform with the ASCAT data.

There were no ships reporting winds of tropical storm force associated with Gaston.

c. Forecast and Warning Critique

The genesis of Gaston was not well anticipated by NHC or the global models. The wave that eventually spawned Gaston was introduced in the Tropical Weather Outlook only about 24 h before genesis and stayed in the low category (<30%).

A verification of NHC official track forecasts for Gaston is given in Table 2a. In general, the forecasts were near or a little better than the long-term average. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b.

A verification of NHC official intensity forecasts for Gaston is given in Table 3a. The 12 h forecast intensity errors were above the long-term average. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. In general, the NHC forecast and model guidance indicated strengthening of Gaston, whereas the storm quickly degenerated into a remnant low in a little over 24 h after formation.

There were no coastal watches or warnings required for Gaston and no reports of damage or injuries.

Table 1. Best track for Tropical Storm Gaston, 1-2 September 2010.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
01 / 0000	12.2	32.2	1008	25	low
01 / 0600	12.4	33.6	1007	30	tropical depression
01 / 1200	12.7	35.0	1005	35	tropical storm
01 / 1800	12.9	36.1	1005	35	"
02 / 0000	13.1	37.2	1006	30	tropical depression
02 / 0600	13.2	38.0	1007	30	"
02 / 1200	13.3	38.8	1008	30	"
02 / 1800	13.5	39.5	1009	25	low
03 / 0000	13.8	40.1	1009	25	"
03 / 0600	14.1	40.6	1009	25	"
03 / 1200	14.5	41.3	1009	25	"
03 / 1800	15.0	42.0	1008	25	"
04 / 0000	15.4	43.0	1008	25	"
04 / 0600	15.9	44.2	1008	30	"
04 / 1200	16.3	45.5	1008	30	"
04 / 1800	16.5	46.6	1008	30	"
05 / 0000	16.7	47.7	1009	25	"
05 / 0600	16.8	48.8	1009	25	"
05 / 1200	16.9	50.0	1008	30	"
05 / 1800	17.0	51.2	1008	30	"
06 / 0000	17.1	52.6	1008	30	"
06 / 0600	17.3	54.0	1009	30	"
06 / 1200	17.4	55.5	1009	30	"
06 / 1800	17.5	57.2	1010	25	"
07 / 0000	17.4	59.0	1010	25	"
07 / 0600	17.1	60.8	1010	25	"
07 / 1200	16.8	62.7	1010	25	"
07 / 1800	16.8	64.6	1010	25	"
08 / 0000	17.0	66.3	1010	25	"
08 / 0600	17.4	67.7	1010	25	"
08 / 1200					dissipated
01 / 1800	12.9	36.1	1005	35	minimum pressure

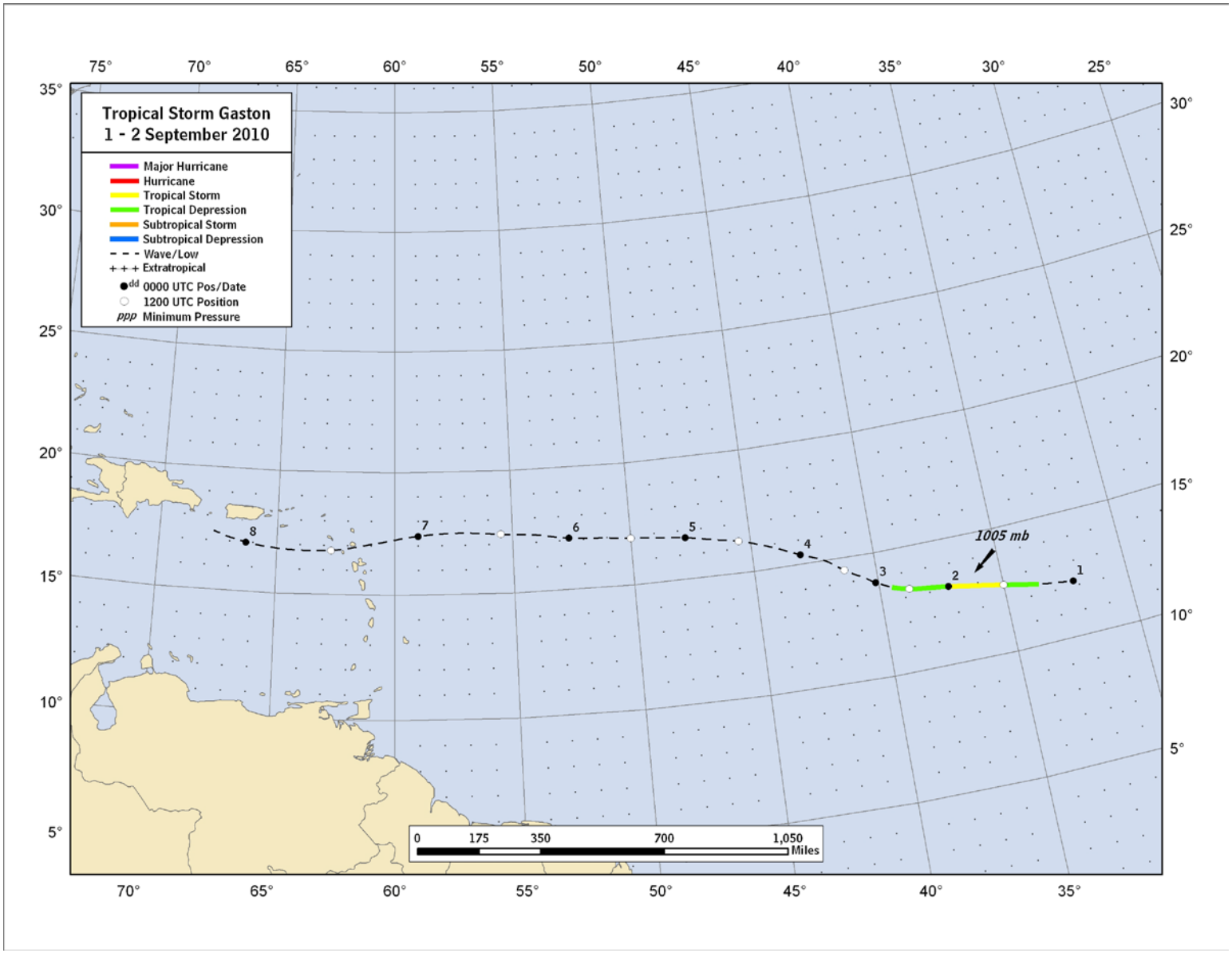

Figure 1. Best track positions for Tropical Storm Gaston, 1-2 September 2010.

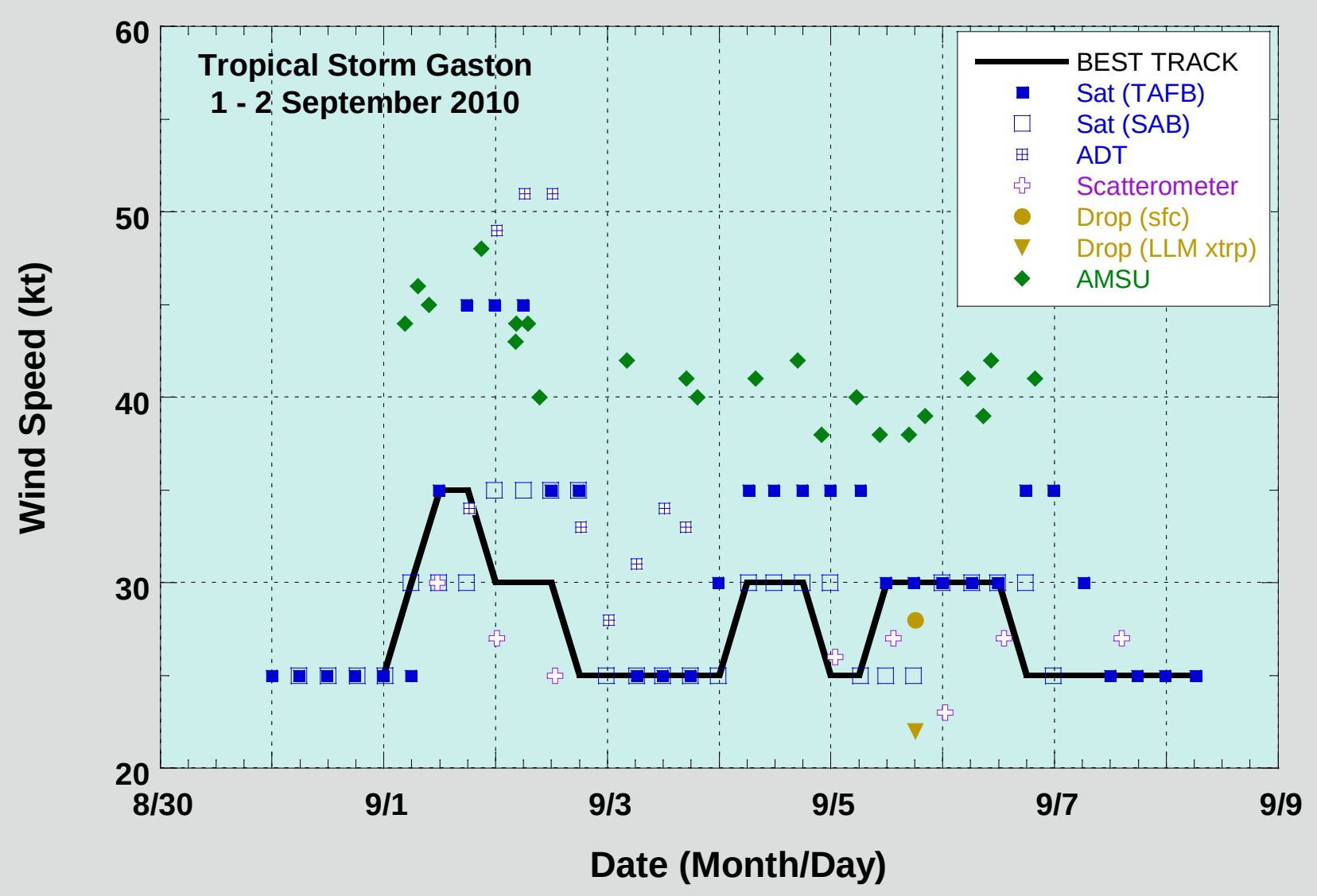

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Gaston, 1-2 September 2010. Dashed vertical lines correspond to 0000 UTC.

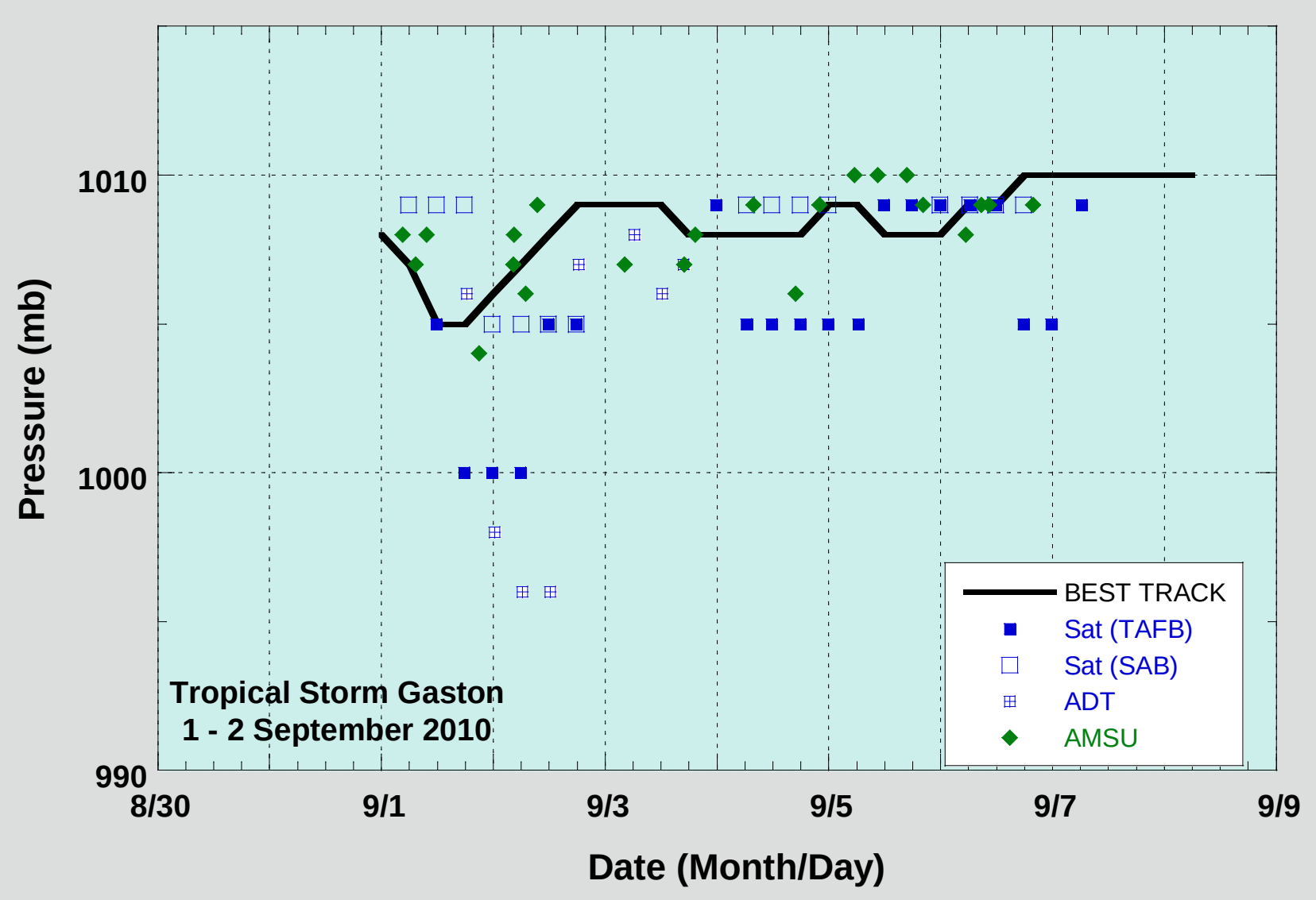

Figure 3. Selected pressure observations and best track minimum central pressure curve for Gaston, 1-2 September 2010. Dashed vertical lines correspond to 0000 UTC.

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Gaston. Mean errors for the five-year period 2005-9 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (Gaston)	**28.6**	61.1					
OCD5 (Gaston)	73.5	128.6					
Forecasts	3	1					
OFCL (2005-9)	31.8	53.4					
OCD5 (2005-9)	46.9	97.3					

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Gaston. Errors smaller than the NHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	28.6	61.1					
OCD5	73.5	128.6					
GHMI	44.8	102.2					
HWFI	**27.6**	66.0					
NGPI	62.9	312.7					
EMXI	45.7	83.8					
TVCN	30.8	103.0					
TVCC	36.1	119.4					
LBAR	39.4	65.3					
BAMD	**22.8**	**54.7**					
BAMM	**26.2**	**8.4**					
BAMS	29.0	**51.2**					
Forecasts	3	1					

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Gaston. Mean errors for the five-year period 2005-9 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (Gaston)	8.3	**5.0**					
OCD5 (Gaston)	9.3	10.0					
Forecasts	3	1					
OFCL (2005-9)	7.0	10.7					
OCD5 (2005-9)	8.6	12.5					

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Gaston. Errors smaller than the NHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	8.3	5.0					
OCD5	9.3	10.0					
DSHP	11.0	12.0					
LGEM	10.0	10.0					
GHMI	**4.0**	**2.0**					
HWFI	**7.7**	5.0					
ICON	8.3	5.0					
IVCN	**7.3**	5.0					
Forecasts	3	1					

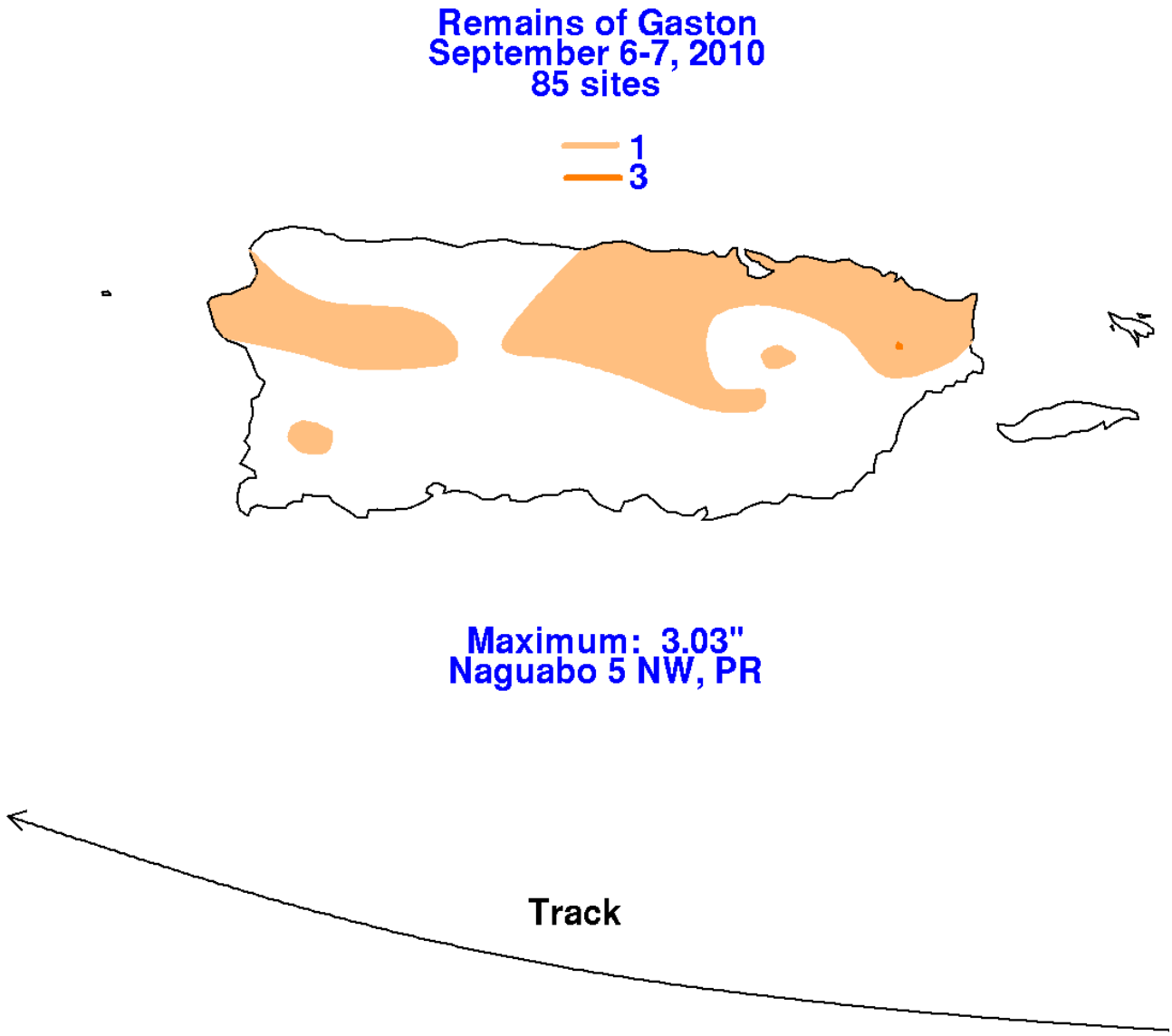

Figure 4. Map of the rainfall totals from the remnants of Gaston as it passed south of Puerto Rico. Figure courtesy David Roth of the Hydrometeorological Prediction Center.