Tropical Cyclone Report
Tropical Storm Joyce
(AL102012)
22-24 August 2012

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8 January 2013

Joyce was a short-lived tropical storm over the eastern North Atlantic that did not affect land.

a. Synoptic History

A tropical wave exited the west coast of Africa on 19 August. This system produced sporadic and disorganized deep convection for a couple of days while it moved westward across the eastern tropical Atlantic. Late on 21 August, a well-defined surface low developed within the tropical wave, however, the associated deep convection was not sufficiently organized at that time for the low to be classified as a tropical cyclone. By 0600 UTC 22 August, the system had acquired enough organization to be designated a tropical depression, about 600 n mi west-southwest of the Cape Verde Islands. The "best track" chart of the tropical cyclone'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 1[1].

For the short duration of the tropical cyclone's lifetime, the system was steered toward the west-northwest at around 15 kt along the southern periphery of a deep-layer subtropical ridge. After formation, the tropical cyclone encountered a marginally conducive environment for development with 10-15 kt of southwesterly 850-200 mb shear, 27-28^{o}C sea surface temperatures, and modestly moist mid-level air. Under these conditions, the tropical cyclone was slow to strengthen, reaching tropical storm intensity around 1200 UTC 23 August while centered about 1050 n mi west of the Cape Verde Islands. Tropical storm intensity was short-lived, as the deep convection began dissipating around 0000 UTC 24 August, when the system weakened to a tropical depression located about 1075 n mi east of the Leeward Islands. An environment of dry air, coupled with an increase of southwesterly vertical shear induced primarily by an upper-level low to the northwest of Joyce, continued to adversely affect the cyclone on 24 August. Joyce degenerated into a remnant low around 1200 UTC that day and dissipated shortly thereafter. Some deep convection did redevelop near the remnants of Joyce on 25 and 26 August, but a closed surface circulation was not evident on those dates. The remnant trough dissipated completely on 27 August just to the southeast of Bermuda.

[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.

b. Meteorological Statistics

Observations in Joyce (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), and objective Advanced Dvorak Technique (ADT) estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Tropical Rainfall Measuring Mission (TRMM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Joyce.

Joyce's estimated peak intensity of 35 kt at both 1200 and 1800 UTC 23 August is based upon subjective Dvorak intensity estimates of 35 kt from both TAFB and SAB, and an objective ADT intensity estimate of 37 kt.

There were no ship, buoy, or land station observations of tropical-storm-force winds in association with Joyce.

c. Casualty and Damage Statistics

There were no reports of damage or casualties associated with Tropical Storm Joyce.

d. Forecast and Warning Critique

Joyce's genesis was well predicted. The tropical wave that spawned Joyce was first mentioned in the Tropical Weather Outlook with a "low" (<30%) chance of formation at 0000 UTC 20 August, 54 h before genesis. The likelihood of genesis was increased to "medium" (30-50%) at 1800 UTC 20 August, 36 h before formation. A "high" (>50%) chance of genesis was predicted starting at 1200 UTC 21 August, 18 hours prior to formation.

A verification of NHC official track forecasts for Joyce is given in Table 2 and a verification of NHC official intensity forecasts for Joyce is given in Table 3. The very short duration of the tropical cyclone precludes any meaningful interpretation of the official (and model-based) forecast errors. It should be noted that none of the NHC official forecasts (with the exception of the last one issued prior to the cyclone becoming a remnant low) explicitly anticipated the rather quick demise of the system and instead predicted an intensifying tropical storm passing north of the Lesser Antilles between 27 and 29 August. This is yet another example of the limited skill in forecasting tropical cyclone intensity change.

No land-based watches or warnings were issued in association with Joyce.

Table 1. Best track for Tropical Storm Joyce, 22-24 August 2012.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
21 / 1800	10.7	31.7	1011	25	low
22 / 0000	11.1	33.1	1011	25	"
22 / 0600	11.5	34.5	1011	25	tropical depression
22 / 1200	12.1	35.8	1009	30	"
22 / 1800	12.8	37.3	1009	30	"
23 / 0000	13.5	38.7	1009	30	"
23 / 0600	14.2	40.0	1009	30	"
23 / 1200	14.8	41.1	1007	35	tropical storm
23 / 1800	15.5	42.1	1006	35	"
24 / 0000	16.1	43.2	1008	30	tropical depression
24 / 0600	16.7	44.3	1008	30	"
24 / 1200	17.4	45.4	1009	30	low
24 / 1800					dissipated
23 / 1800	15.5	42.1	1006	35	maximum wind and minimum pressure

Table 2. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Joyce, 22-24 August 2012. Mean errors for the 5-yr period 2007-11 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 (Joyce)	38.6	**45.6**	**56.6**				
OCD5 (Joyce)	30.4	38.9	37.6				
Forecasts	6	4	2				
OFCL (2007-11)	30.4	48.4	65.9				
OCD5 (2007-11)	46.9	95.2	151.7				

Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Joyce, 22-24 August 2012. Mean errors for the 5-yr period 2007-11 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 (Joyce)	**5.8**	**7.5**	17.5				
OCD5 (Joyce)	6.0	5.8	16.0				
Forecasts	6	4	2				
OFCL (2007-11)	7.1	10.8	13.0				
OCD5 (2007-11)	8.4	12.4	15.4				

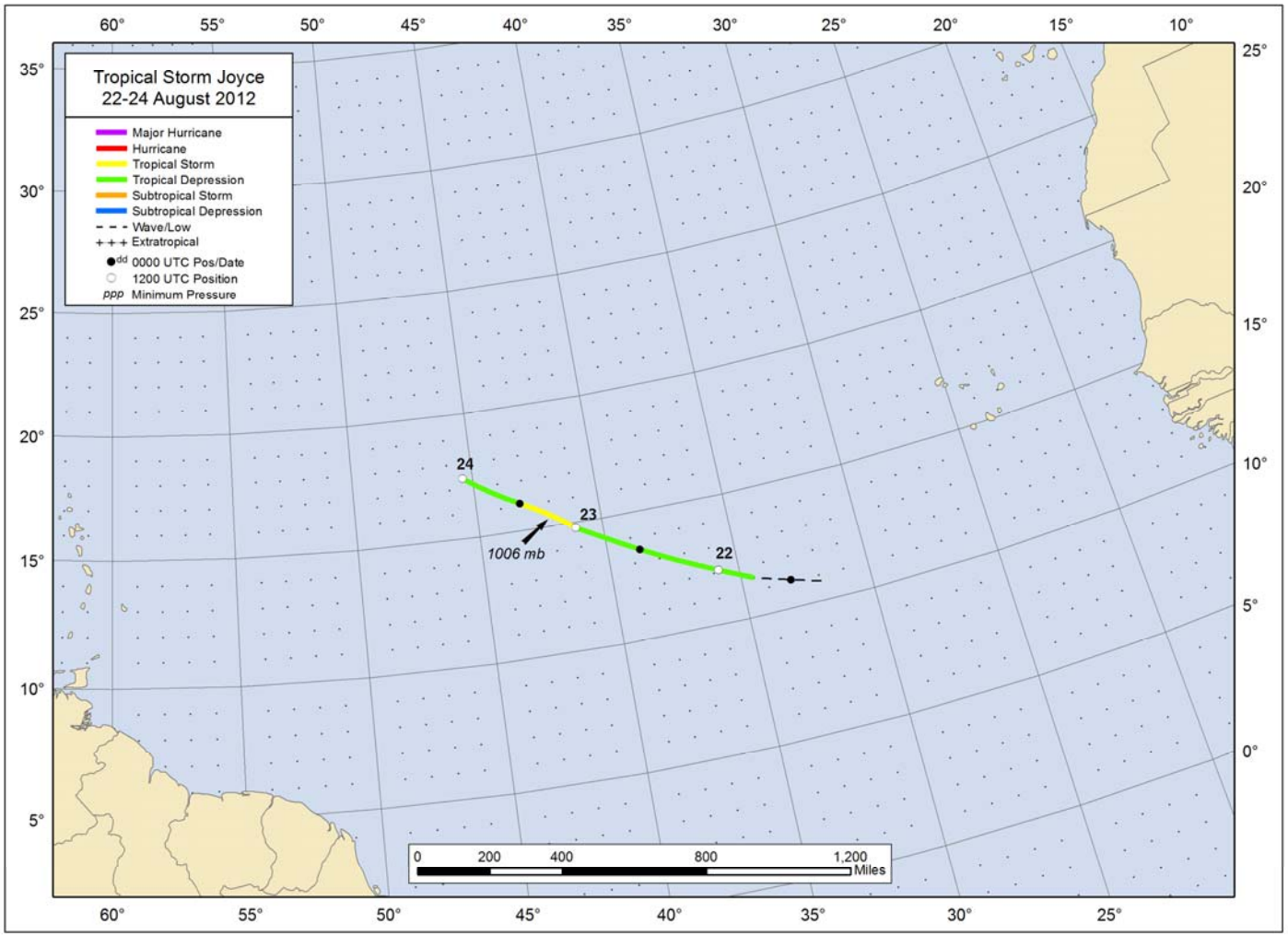

Figure 1. Best track positions for Tropical Storm Joyce, 22-24 August 2012.

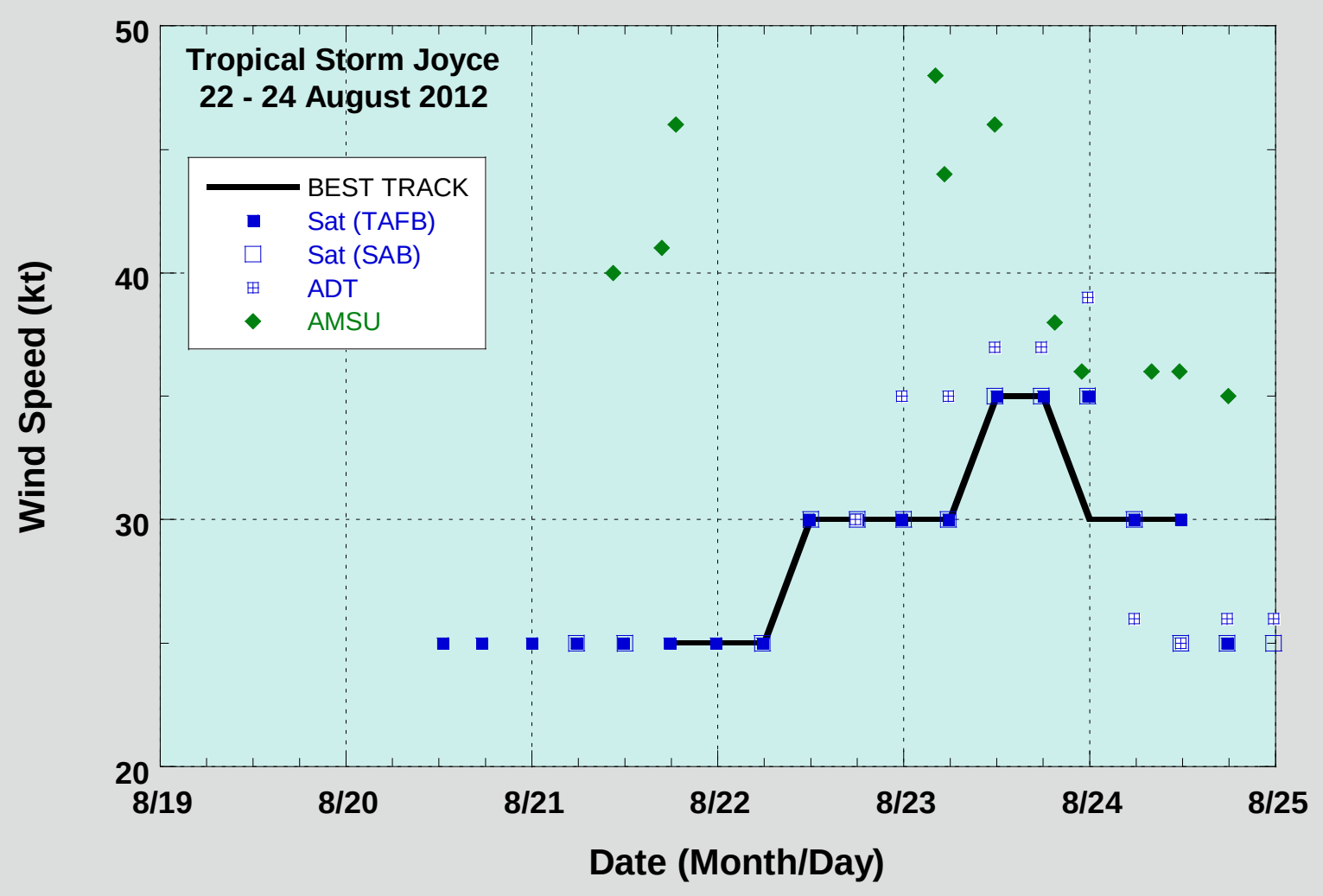

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Joyce, 22-24 August 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Vertical lines correspond to 0000 UTC.

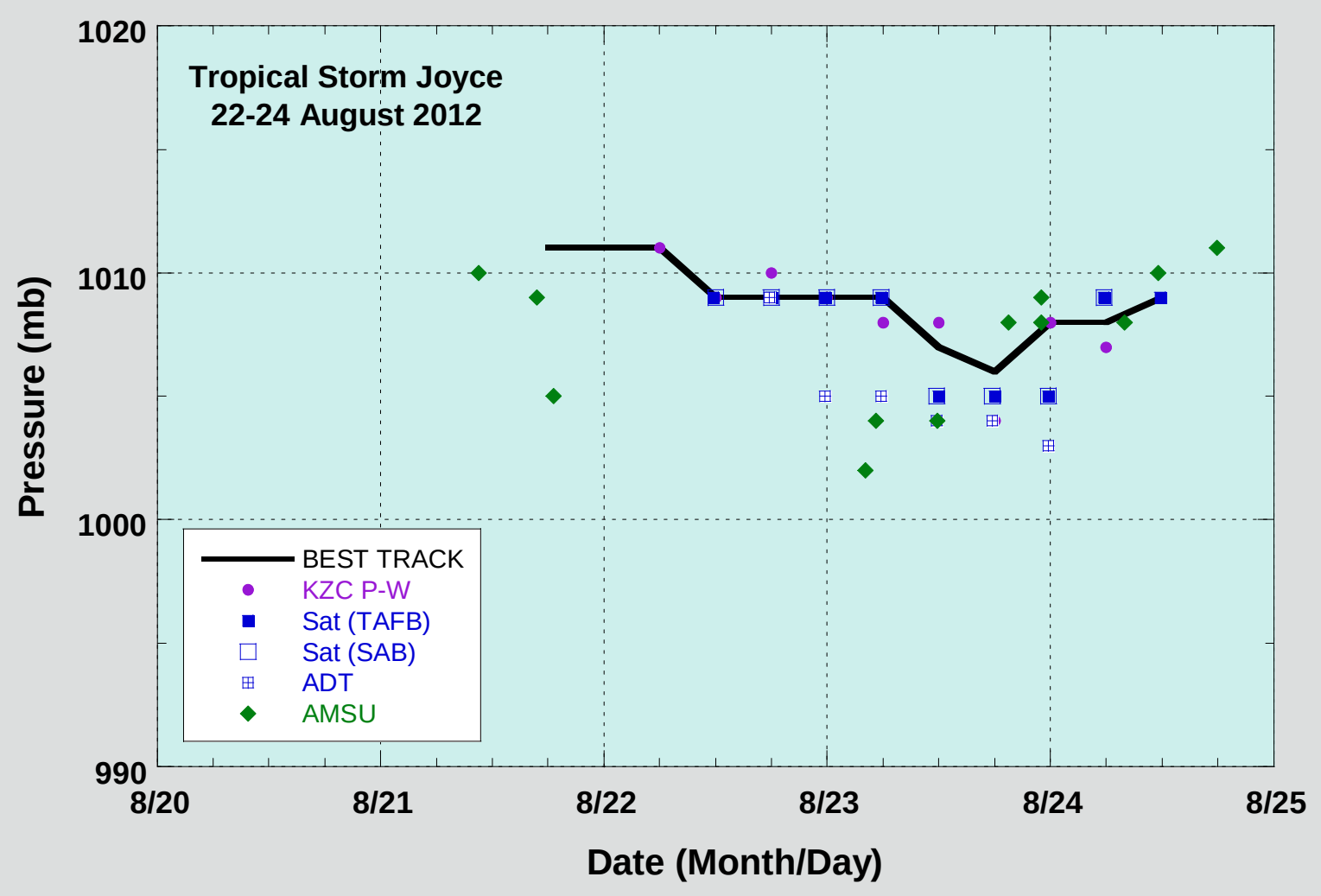

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Joyce, 22-24 August 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data. Vertical lines correspond to 0000 UTC.