

Tropical Cyclone Report  
Hurricane Joyce  
25 September - 2 October 2000

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Joyce was an 80-knot hurricane east of the Windward Islands, but was weakening from a tropical storm to a depression when it passed through the Windward Islands.

a. Synoptic history

Joyce emerged from the coast of Africa as a poorly organized tropical wave on 22 September. This was several days behind Isaac. But while Isaac moved northwestward and became a powerful recurving hurricane, Joyce remained far to the south. Joyce moved on an undulating, but generally westward track at 12 to 16 kt for its entire existence. Its center remained south of 13 degrees north latitude, under the influence of a strong ridge to the north that built westward in the wake of Isaac.

The tropical wave showed signs of a closed low-level circulation on 25 September while located about 350 n mi southwest of the Cape Verde Islands. These signs were evident on visible Meteosat images and on SSM/I and TRMM microwave images. In contrast, a QuikSCAT pass on the 25<sup>th</sup> showed a shear line rather than a well-defined closed circulation. With the preponderance of the evidence in favor of a closed circulation, the "best track" begins with a tropical depression at 1200 UTC on the 25<sup>th</sup>. Best track positions are plotted in Fig. 1 and Figs. 2 and 3 show plots of best-track wind speed and pressure curves as a function of time, along with the data on which they are based. Table 1 lists best track position, maximum one-minute surface wind speed, and minimum central sea-level pressure at six-hour intervals.

Convection associated with the depression became better organized with banding features. The cyclone is estimated to have become Tropical Storm Joyce at 0000 UTC on the 26<sup>th</sup>, although there is considerable uncertainty about this, as a QuikSCAT pass on the 27<sup>th</sup> still showed an open wave. Strengthening continued and Joyce is estimated to have reached its maximum intensity of 80 kt early on the 28<sup>th</sup>, while located midway between Africa and the Lesser Antilles. This was soon after the appearance of a short-lived "pinhole" eye feature on a TRMM pass. Visible satellite imagery later on the 28<sup>th</sup> showed the center partially exposed to the southwest of the deep convection, implying an increase in vertical shear. With occasional bursts of convection, Joyce's convective cloud pattern gradually became disorganized. Joyce weakened to a tropical storm on the 29<sup>th</sup> and moved across the Windward Islands and into the Caribbean Sea on 1 September while weakening from a storm to a depression.

Joyce quickly and somewhat unexpectedly deteriorated to an open wave on 2 September while located in the southeastern Caribbean Sea just north of Venezuela.

Data from NOAA aircraft GPS dropsondes on the 30th and satellite imagery suggest that a mechanism responsible for the above weakening was the entrainment of lower-tropospheric dry Saharan air into Joyce's circulation.

#### b. Meteorological statistics

There were two USAF reconnaissance flights into Joyce on 1 October, just before and after the center moved across the Windward Islands. Data from these flights indicated that Joyce was a weakening, minimal tropical storm. A third flight on the 2<sup>nd</sup> confirmed that Joyce was an open wave. Otherwise, satellite data were the basis for all determinations concerning the best track, including the maximum wind speed of 80 kt.

The highest surface winds reported were from Barbados: sustained 30 kt with gusts to 40 kt. Joyce's center passed about 120 n mi south of that island. The center of the storm passed close to Tobago and winds there backed from north-northwest to south to east over about a 24-hour period. Maximum sustained winds reported from Tobago were 26 kt.

#### c. Casualty and damage statistics

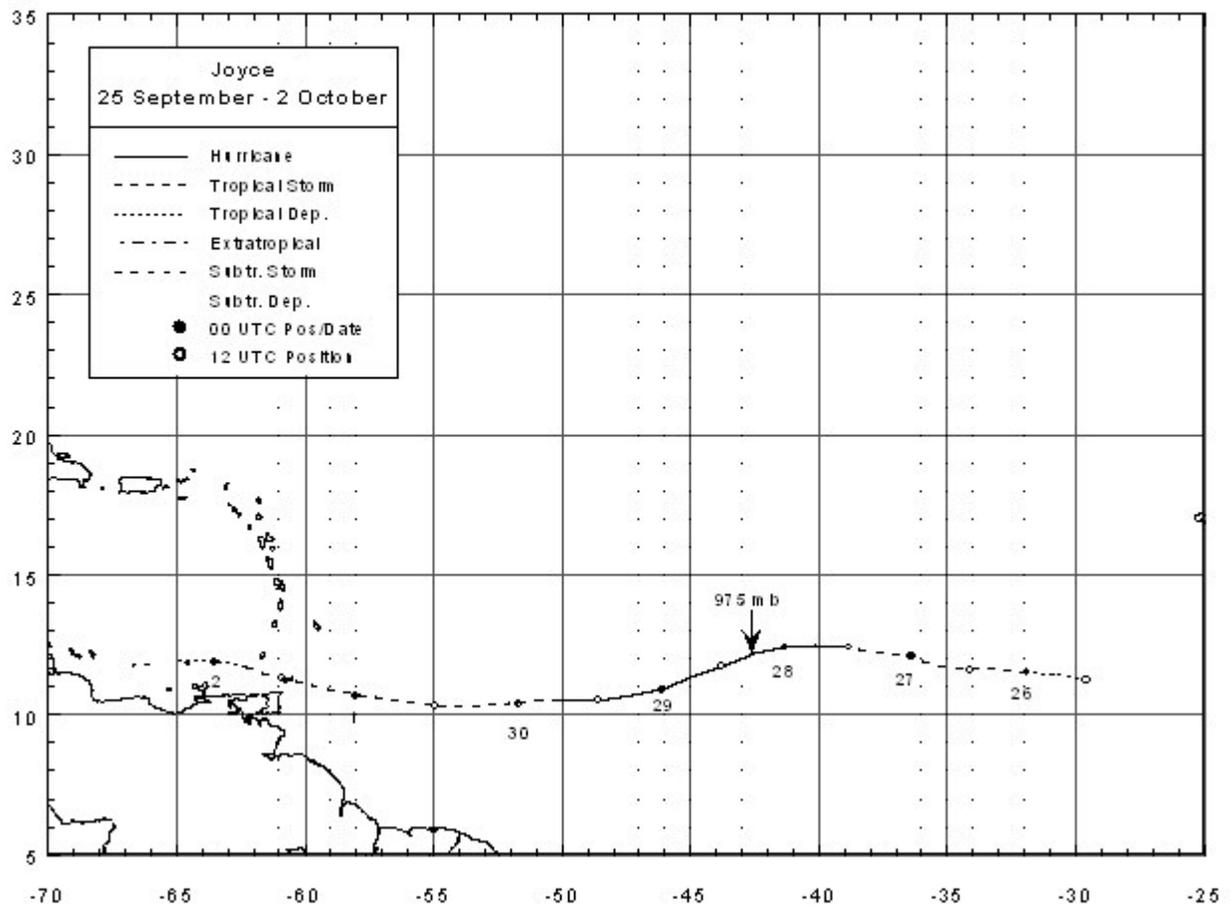
There were no reports of death or damage.

#### d. Forecast and warning critique

Official track forecast errors ranged from 67 n mi at 24 hours (19 cases) to 129 n mi at 48 hours (15 cases) to 208 n mi at 72 hours (11 cases). These errors are 10 to 20 percent less than the average official errors for the previous ten years. There was a northward bias to these forecasts, which might be expected with a track that is a statistical outlier in terms of it being located so far south.

Intensity errors were rather large. On 28 September, while Joyce was located about 1000 n mi east of the Windward Islands, the wind speed was forecast to go from an initial value of 75 knots to 95 knots in 72 hours, an over-forecast of 60 kt. The average 72-hour bias for 11 forecasts was +31 kt, compared to an average bias of +19 kt for the previous ten years. Even the forecast that was issued six hours before Joyce dissipated called for 60 kt at 72 hours. This large official positive bias may be partially explained by the unexpected dissipation described in section a. above along with a reliance on the SHIPS intensity model guidance which had an even larger positive bias...+34 kt at 72 hours for ten forecasts.

Table 2 lists the tropical storm watches and warnings issued for the Windward Islands. No official reports of sustained winds to tropical storm force were received, but may have occurred at some locations in the areas warned, as the wind reports from Barbados were close to tropical storm force.



**Fig. 1. Best track positions for Hurricane Joyce, 25 September - 2 October 2000.**

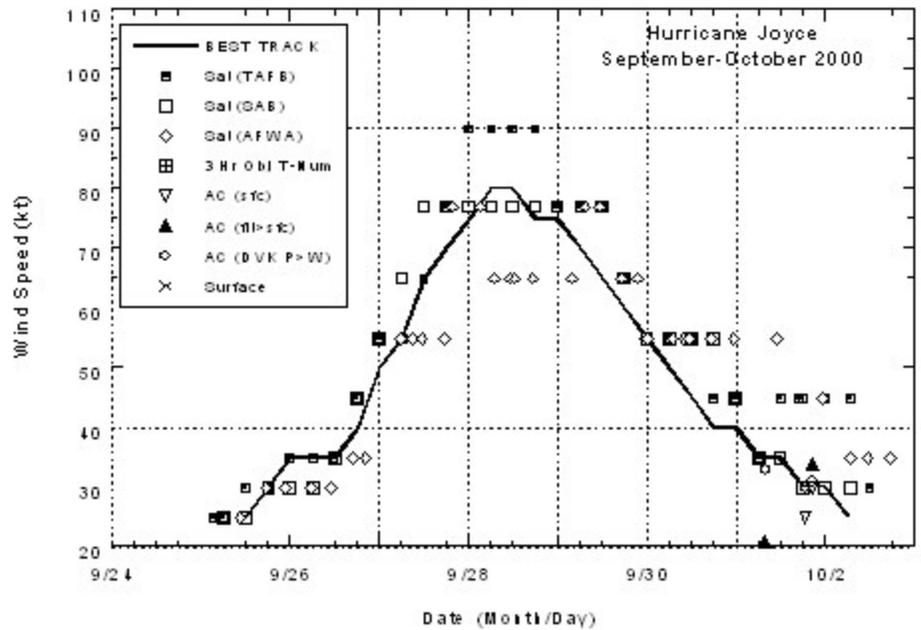


Fig. 2. Best track one-min. wind speed curve, 25 September-2 October 2000. Aircraft observations have been adjusted for elevation using an 85% reduction factor for observations from 1500 ft.

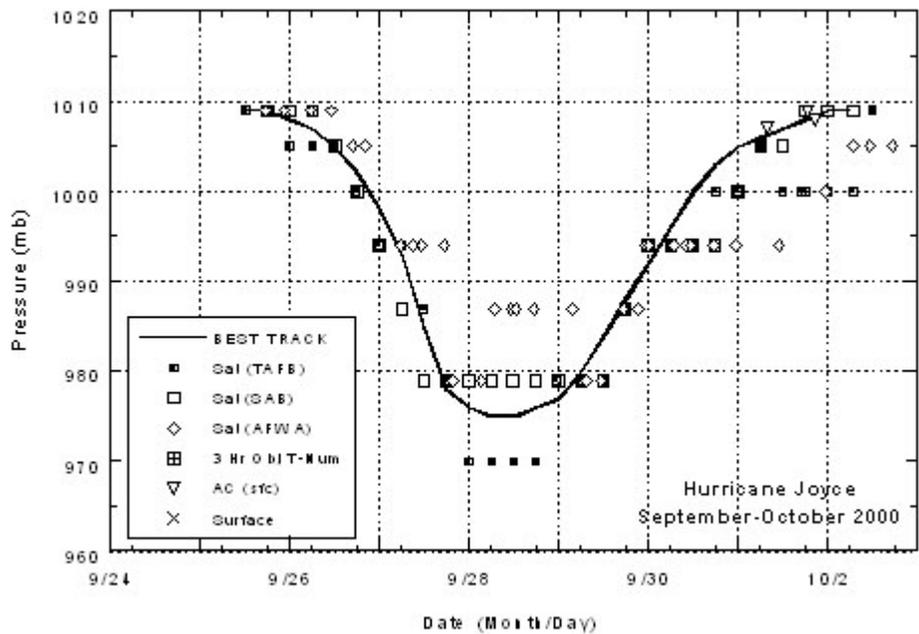


Fig. 3. Best track minimum central pressure curve, 25 September-2 October 2000.

Table 1. Best track for Hurricane Joyce, 25 September - 2 October 2000.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25/1200	11.2	29.6	1009	25	tropical depression
1800	11.4	30.7	1009	30	"
26/0000	11.5	31.9	1008	35	tropical storm
0600	11.6	33.0	1007	35	"
1200	11.6	34.1	1005	35	"
1800	11.7	35.3	1002	40	"
27/0000	12.1	36.4	998	50	"
0600	12.2	37.6	993	55	"
1200	12.4	38.8	985	65	hurricane
1800	12.5	40.1	978	70	"
28/0000	12.4	41.3	976	75	"
0600	12.2	42.5	975	80	"
1200	11.7	43.8	975	80	"
1800	11.3	45.0	976	75	"
29/0000	10.9	46.1	977	75	"
0600	10.7	47.2	980	70	"
1200	10.5	48.6	984	65	"
1800	10.5	50.1	988	60	tropical storm
30/0000	10.4	51.7	992	55	"
0600	10.3	53.3	996	50	"
1200	10.3	54.9	1000	45	"
1800	10.5	56.6	1003	40	"
01/0000	10.7	58.0	1005	40	"
0600	11.0	59.5	1006	35	"
1200	11.3	60.9	1007	35	"
1800	11.7	62.3	1008	30	tropical depression
02/0000	11.9	63.5	1009	30	"
02/0600	11.9	64.9	1009	25	"
28/0600	12.2	42.5	975	80	minimum pressure
28/1200	11.7	43.8	975	80	minimum pressure

Table 2. Watch and warning summary, Hurricane Joyce, 25 Sept. - 2 Oct. 2000.

<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
30/0900	tropical storm watch issued	Barbados, St. Vincent, the Grenadines, Trinidad, Tobago, Grenada and its dependencies.
30/1000	tropical storm watch issued	St. Lucia
30/1500	tropical storm warning issued	Trinidad, Tobago, Grenada and its dependencies.
01/0600	tropical storm warning downgraded to watch	Trinidad
01/1200	tropical storm watch discontinued	Barbados, St. Vincent
01/1500	tropical storm watch discontinued	Trinidad, St. Lucia
01/1500	tropical storm warning discontinued	Tobago
01/2100	tropical storm warning discontinued	Grenada and its dependencies