Tropical Cyclone Report
Hurricane Gordon (AL082012)
15-20 August 2012

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Gordon reached category 2 status (on the Saffir-Simpson Hurricane Wind Scale) in the north Atlantic. It weakened to a category 1 hurricane before it moved over Santa Maria Island in the Azores.

a.   Synoptic History

Gordon developed from a tropical wave that moved off the west coast of Africa on 9 August. The wave was accompanied by a large area of disturbed weather, and surface observations from western Africa and the Cape Verde Islands indicated significant 24-h surface pressure falls (3 to 5 mb) as the wave moved nearby. However, the convection dissipated once the wave moved over cooler waters west of the Cape Verde Islands. Low-cloud tracers indicated that a circulation separated from the wave and moved west-northwestward and northwestward for a few days while the parent wave continued westward across the tropical Atlantic. The circulation reached an area of warmer waters, and organized convection developed. It is estimated that a tropical depression formed at 1200 UTC 15 August about 600 n mi southeast of Bermuda. 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].

The depression moved northwestward and then northward and became a tropical storm at 0000 UTC 16 August. Gordon reached the base of the mid-latitude westerlies and made a sharp turn toward the northeast and then east with some additional increase in forward speed. After a short period of slight weakening on 17 August, the cyclone moved within an environment of relatively low shear, resulting in intensification. An eye developed, and it is estimated that Gordon became a hurricane at 0600 UTC 18 August about 500 n mi west-southwest of the Azores. There was additional intensification and Gordon reached an estimated peak intensity of 95 knots and a minimum pressure of 965 mb at 0000 UTC 19 August. The cyclone continued on a general eastward track toward the Azores, and the center of the weakening hurricane passed over the island of Santa Maria in the Azores at 0530 UTC 20 August. Once the cyclone passed the Azores and continued eastward, it encountered cold waters and strong shear. The low-level center separated from the convection, and the cyclone weakened. Gordon became a strong post-tropical cyclone at 1800 UTC 20 August, and dissipated about 420 n mi east of the Azores 24 h later.

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[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 Hurricane Gordon (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 Gordon.

Gordon's peak intensity was estimated to occur when the eye formed and the Dvorak estimates were the highest, around 0000 UTC 19 August.

Gordon passed over Santa Maria Island and the Meteorological Institute of Portugal provided a report of a 10-min wind of 53 kt, and a wind gust of 70 kt at that island. In addition, the weather station at the island airport of Sao Miguel recorded a 10-min wind of 35 knots and a gust to 54 kt.   A buoy located at the port of Sao Miguel recorded a wave height of near 21 feet.

There were no reports from ships of tropical-storm-force winds associated with Gordon.

c.   Casualty and Damage Statistics

There were no reports of casualties associated with Gordon.   The elevated sea level resulted in minor floods in several shore locations in the Azores. There were some fallen trees, a few landslides and power outages, but there were no significant material losses.

d.   Forecast and Warning Critique

The disturbance from which Gordon formed was well organized when it moved off the west coast of Africa, and it was introduced in the Tropical Weather Outlook (TWO) with a medium chance (30 to 50%) of genesis at 0000 UTC 10 August. This was about five days before formation. However, when the disturbance lost its convective organization the chances of genesis were lowered to 10% and remained low for about three days. The chances were increased to the medium category 24 h before genesis and then increased to the high category only 6 h before the formation of a tropical depression.

A verification of NHC official track forecasts for Gordon is given in Table 2a. Official forecast track errors were remarkably lower than the mean official errors at all forecast times for the previous 5-yr period. In contrast, the climatology-persistence model errors were about twice

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as large as the errors for the previous 5-yr for that model. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. Despite the low official forecast errors, the Global Forecast System (GFSI) performed better than the official forecast and other models in Gordon. The EMXI followed the GFSI with low errors in the 24 to 48 h period.

A verification of NHC official intensity forecasts for Gordon is given in Table 3a. Unlike the track forecasts, the official forecast intensity errors were greater than the mean official errors for the previous 5-yr period except at 96 h. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. Most of the intensity models performed better than the official forecast, primarily the DSHP model which had much lower errors than the official forecast from 36 to 96 h.

Watches and warnings associated with Gordon are given in Table 4.

Table 1.   Best track for Hurricane Gordon, 15-20 August, 2012.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 1200	27.6	54.6	1013	30	tropical depression
15 / 1800	29.1	55.1	1012	30	"
16 / 0000	30.5	55.4	1010	35	tropical storm
16 / 0600	31.7	55.2	1009	40	"
16 / 1200	32.9	54.4	1006	45	"
16 / 1800	33.9	53.0	998	55	"
17 / 0000	34.3	51.1	995	60	"
17 / 0600	34.6	49.1	998	55	"
17 / 1200	34.4	47.0	997	55	"
17 / 1800	34.3	45.0	993	55	"
18 / 0000	34.2	43.1	990	60	"
18 / 0600	34.0	41.5	987	65	hurricane
18 / 1200	34.0	39.6	979	75	"
18 / 1800	34.0	37.5	969	90	"
19 / 0000	34.3	35.0	965	95	"
19 / 0600	34.7	32.6	969	90	"
19 / 1200	35.2	30.6	969	90	"
19 / 1800	35.7	28.5	977	80	"
20 / 0000	36.4	26.6	981	70	"
20 / 0600	37.1	25.0	984	65	"
20 / 1200	37.9	23.2	990	60	tropical storm
20 / 1800	38.9	21.1	996	45	low
21 / 0000	39.8	19.3	1000	40	"
21 / 0600	40.0	17.7	1002	40	"
21 / 1200	39.8	16.6	1004	30	"
21 / 1800					dissipated
20 / 0530	37.0	25.1	984	65	Landfall on Santa Maria Island, Azores
19 / 0000	34.3	35.0	965	95	minimum pressure

Table 2a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Gordon. 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	**19.4**	**33.8**	**48.6**	**62.8**	**82.9**	**47.1**	
OCD5	46.6	119.1	229.0	355.6	613.2	852.4	
Forecasts	18	16	14	12	8	4	
OFCL (2007-11)	30.4	48.4	65.9	83.1	124.4	166.5	
OCD5 (2007-11)	46.9	95.2	151.7	211.6	316.8	404.3	

Table 2b.   Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Gordon. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 2a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	19.4	33.8	48.6	62.8	82.9	90.4	
OCD5	46.6	119.1	229.0	355.6	613.2	894.3	
GFSI	**17.9**	**26.7**	**26.6**	**33.2**	**33.9**	**45.5**	
GHMI	30.4	49.8	65.3	73.5	**78.8**	133.5	
HWFI	25.1	49.4	70.7	99.5	105.4	**68.6**	
EMXI	19.9	**29.8**	**36.5**	**44.4**	88.5	170.8	
CMCI	39.5	82.3	107.9	128.4	143.2	188.2	
AEMI	20.8	36.8	51.0	**62.2**	**64.6**	118.2	
TVCA	21.0	36.8	53.5	67.2	86.4	**80.1**	
LBAR	30.6	58.3	80.0	95.5	105.4	125.7	
BAMD	44.7	80.7	113.7	147.2	257.0	381.3	
BAMM	29.4	48.9	51.7	**47.4**	**64.4**	142.7	
BAMS	44.5	85.8	128.9	163.1	184.9	174.0	
Forecasts	18	16	14	12	8	3	

Table 3a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Gordon. 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	7.8	12.8	13.9	17.9	24.4	**13.8**	
OCD5	9.2	16.3	18.1	19.2	20.1	8.0	
Forecasts	18	16	14	12	8	4	
OFCL (2007-11)	7.1	10.8	13.0	15.0	16.9	17.1	
OCD5 (2007-11)	8.4	12.4	15.4	17.7	20.5	21.5	

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Gordon. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 3a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	7.8	12.8	13.9	17.9	24.4	13.8	
OCD5	9.2	16.3	18.1	19.2	**20.1**	**8.0**	
DSHP	8.2	12.8	**13.0**	**14.2**	**17.9**	**9.3**	
LGEM	8.6	13.2	**13.7**	**16.4**	**23.3**	16.3	
ICON	8.1	**12.6**	**11.6**	**11.3**	**17.3**	14.0	
LGEM	8.6	13.2	**13.7**	**16.4**	**23.3**	16.3	
IVCN	8.1	**12.6**	**11.6**	**11.3**	**17.3**	14.0	
GHMI	8.6	14.4	16.7	18.6	**22.1**	23.3	
HWFI	8.1	**12.1**	**11.3**	**7.1**	**12.6**	23.3	
Forecasts	18	16	14	12	8	4	

Table 4.   Watch and warning summary for Hurricane Gordon, 15-20 August 2012.

Date/Time (UTC)	Action	Location
17 / 2100	Tropical Storm Watch issued	Central Azores to Eastern Azores
18 / 0900	Tropical Storm Watch changed to Tropical Storm Warning	Central Azores to Eastern Azores
18 / 1500	Tropical Storm Warning changed to Hurricane Warning	Central Azores to Eastern Azores
20 / 1200	Hurricane Warning discontinued	All
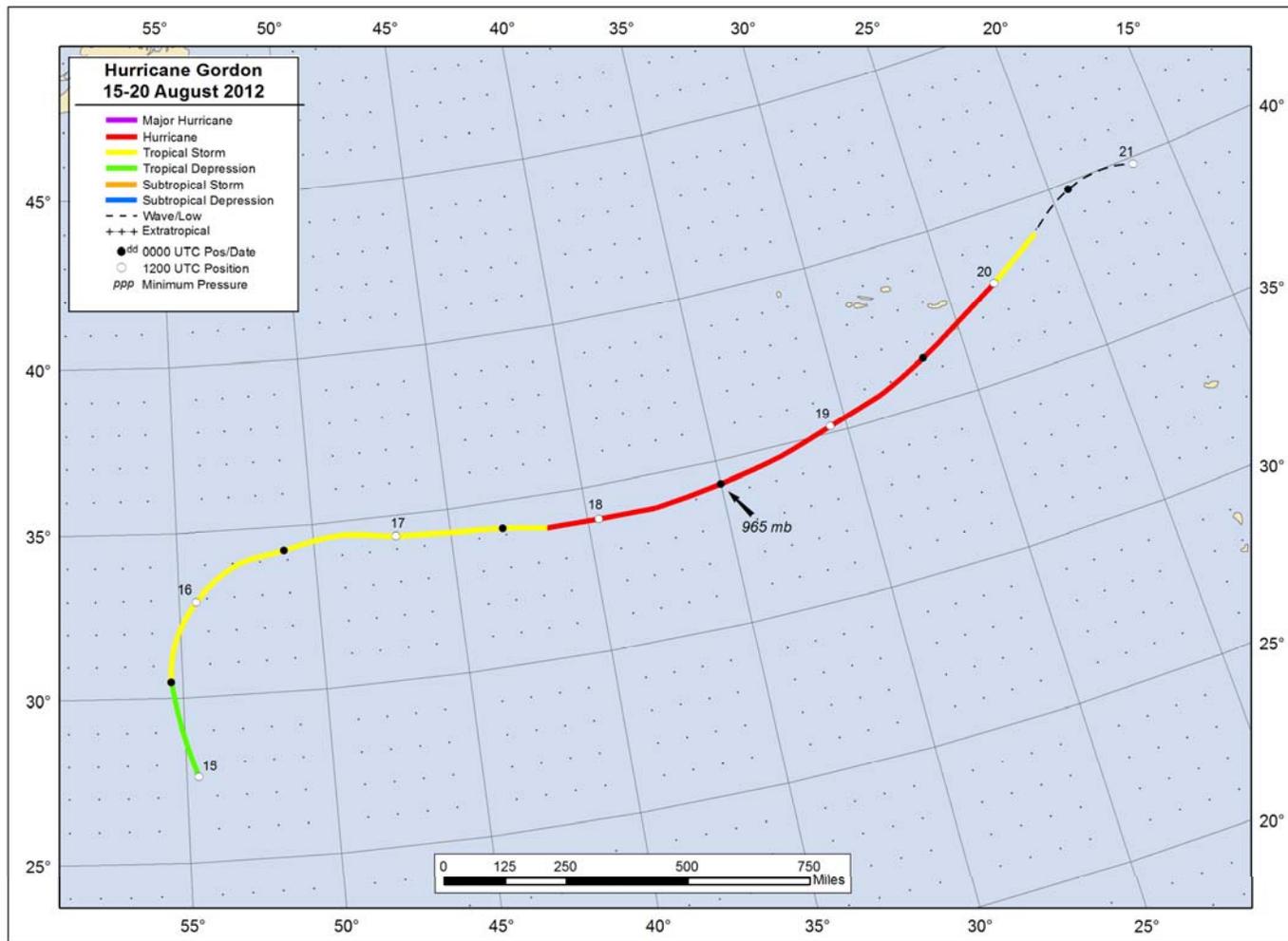
Figure 1.   Best track positions for Hurricane Gordon, 15-20 August 2012. Track during the post-tropical stage is based on analyses from the NOAA Ocean Prediction Center.
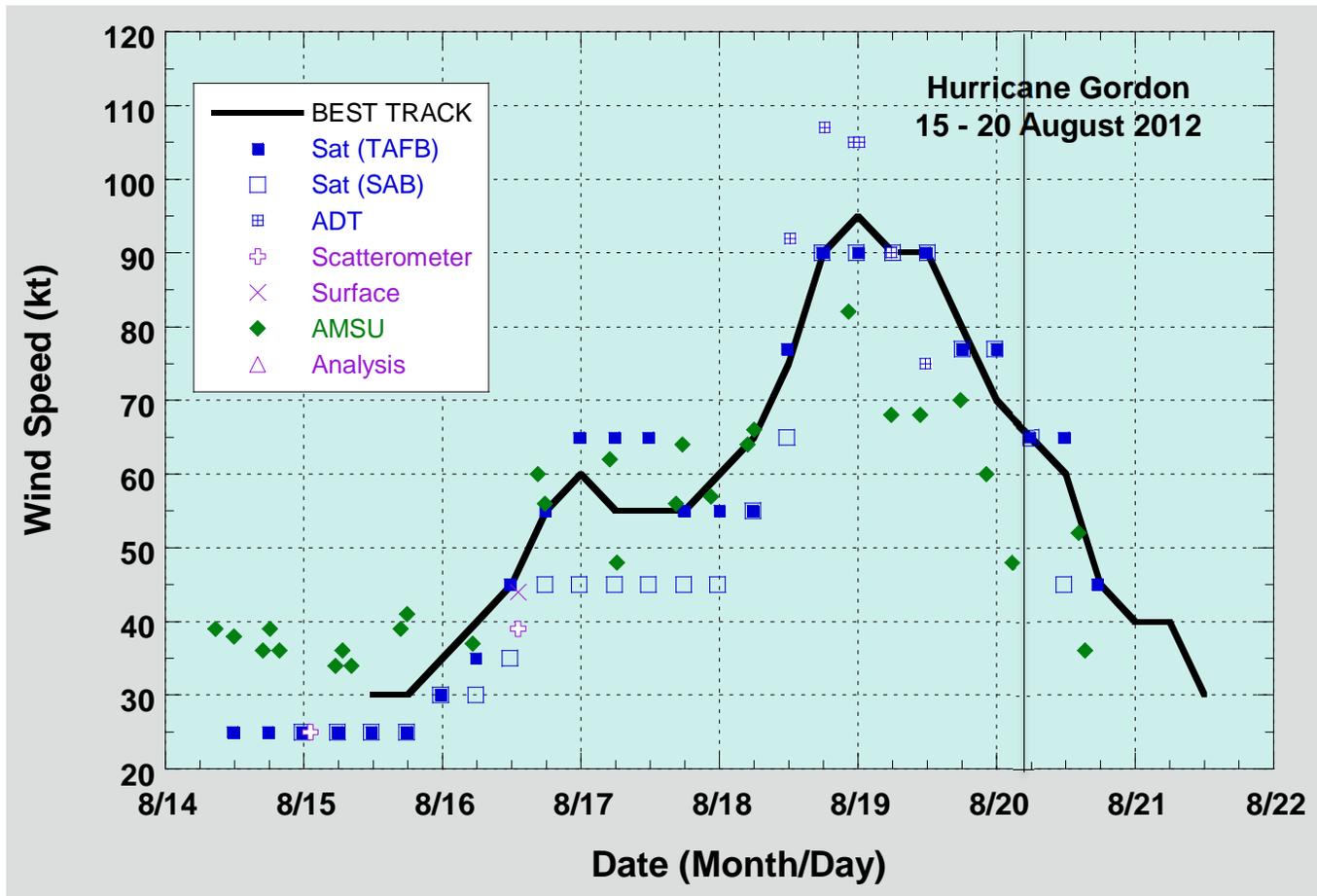
Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Gordon, 15-20 August 2012. Advanced Dvorak Technique estimates represent Current Intensity (CI) numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Estimates during the post-tropical stage are based on analyses from the NOAA Ocean Prediction Center. Dashed vertical lines correspond to 0000 UTC. Solid vertical line denotes landfall.
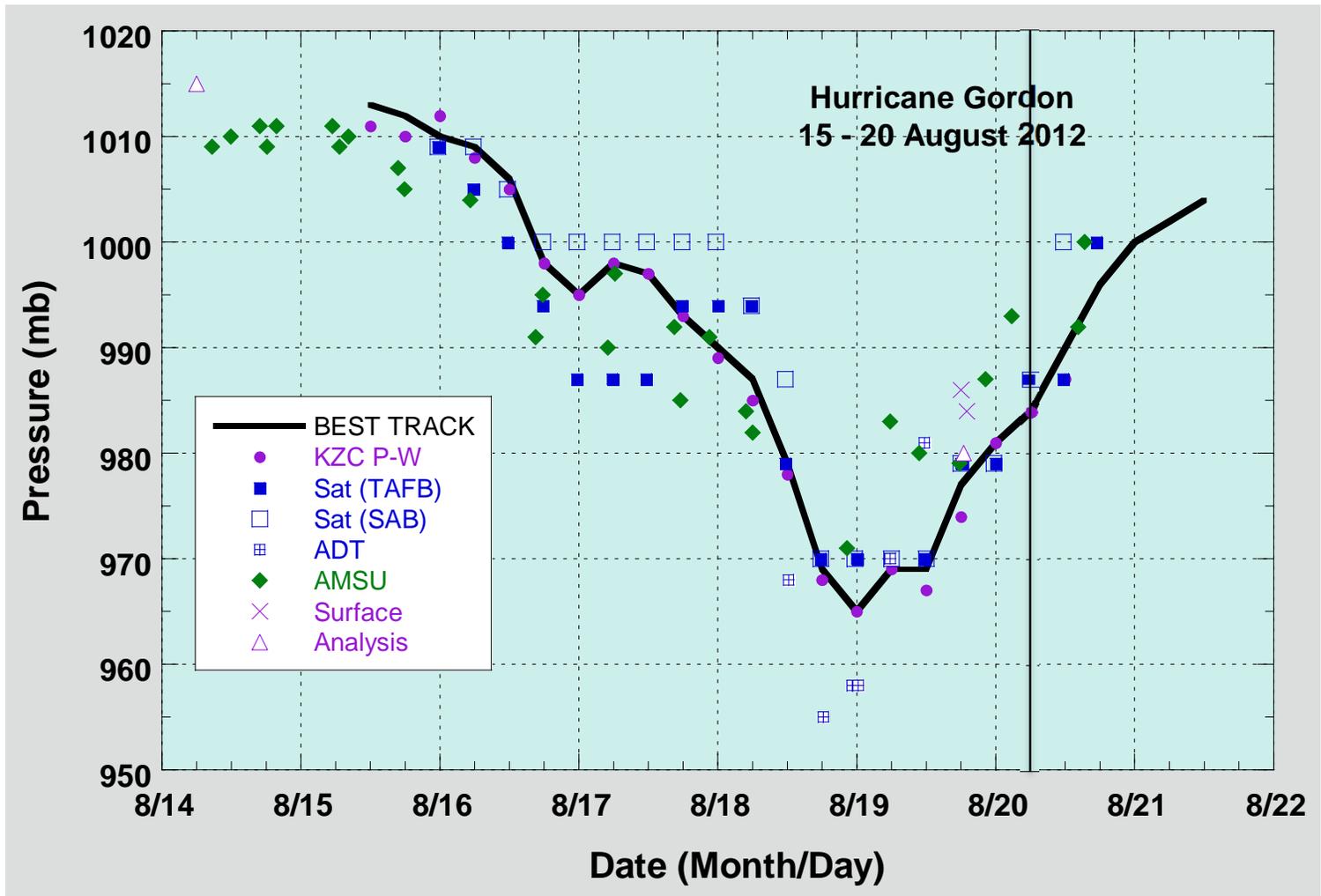
Figure 3.   Selected pressure observations and best track minimum central pressure curve for Hurricane Gordon, 15-20 August 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data. Estimates during the post-tropical stage are based on analyses from the NOAA Ocean Prediction Center. Dashed vertical lines correspond to 0000 UTC. Solid vertical line denotes landfall.