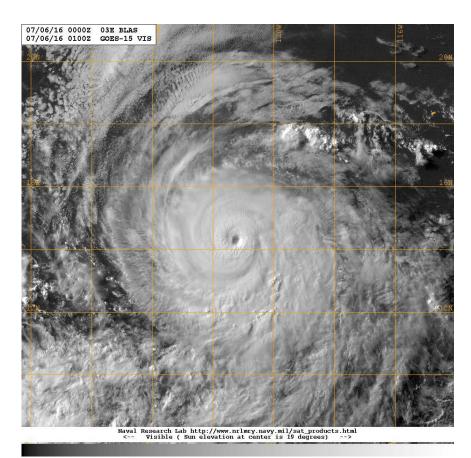# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE BLAS
(EP032016)

2 – 10 July 2016

Richard J. Pasch
National Hurricane Center
13 March 2017

GOES-15 VISIBLE SATELLITE IMAGE OF HURRICANE BLAS AT ITS PEAK INTENSITY OF 120 KT AT 0100 UTC 6 JULY 2016. IMAGE COURTESTY OF NAVAL RESEARCH LABORATORY.

Blas was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that had no significant impact on land.

Hurricane Blas

2 – 10 JULY 2016

SYNOPTIC HISTORY

Blas appears to have originated from a tropical wave that moved from western Africa into the eastern tropical Atlantic on 19 June. The system crossed the Atlantic and Caribbean Sea, producing only a few showers and thunderstorms, and entered the eastern North Pacific on 28 June. Over the next few days while the system moved to the south of Mexico, there was an increase in the associated deep convection, and by early on 1 July a broad area of low pressure had formed several hundred miles south of the southwestern coast of Mexico. Later that day, the low-level circulation became better defined with convective banding features becoming evident, and it is estimated that a tropical depression formed around 1800 UTC 2 July while centered about 500 n mi south-southwest of Manzanillo, Mexico. 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].

During the next several days, the tropical cyclone moved west-northwestward to the south of a mid-level ridge, through an environment of low vertical shear and over warm ocean waters of around 29°C. The system steadily strengthened, becoming a tropical storm by 0600 UTC 3 July and intensifying into a hurricane around 1200 UTC 4 July. Blas then underwent rapid intensification, becoming a major hurricane on 5 July and strengthening to its peak intensity of 120 kt around 0000 UTC 6 July while centered a little over 800 n mi southwest of the southern tip of the Baja California peninsula. At that time, the hurricane exhibited a distinct eye surrounded by a fairly symmetrical ring of deep convection (cover picture). Blas soon weakened a little, to 110 kt, but it maintained that intensity for nearly a day while continuing to have a large, distinct eye. A steady weakening trend commenced on 7 July when Blas began moving over sub-26°C waters. Blas turned northwestward due to a break in the ridge and moved over progressively cooler waters during the next couple of days, weakening to a tropical storm around 0600 UTC 9 July. By 0600 UTC 10 July, the cyclone became devoid of organized deep convection and degenerated into a remnant low pressure system. Steered by the low-level easterlies, the low turned toward the west while weakening, and dissipated by 0000 UTC 12 July about 800 n mi east of the Hawaiian Islands

METEOROLOGICAL STATISTICS

Observations in Blas (Figs. 2 and 3) include subjective satellite-based Dvorak technique

---

[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.

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 Global Precipitation Mission (GPM), 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 Blas.

The estimated 120-kt peak intensity of this hurricane is based on a blend of subjective and objective Dvorak estimates.

There were no ship reports of winds of tropical storm force associated with Blas.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Blas.

FORECAST AND WARNING CRITIQUE

The genesis of Blas was reasonably well anticipated in the long term, but not very well anticipated in the short term. The tropical wave from which the tropical cyclone formed was first mentioned, while it was over Central America, in the Tropical Weather Outlook (TWO) 120 h prior to formation with a 5-day genesis probability in the "low" category (Table 2). The 5-day probability was raised to a medium chance 96 h before genesis and to a high chance 54 h prior to genesis. A 2-day genesis probability for the system was first introduced into the TWO 54 h before genesis, in the low category. The 2-day probability was raised to the medium category 18 h prior to genesis, and to high just 6 h before tropical cyclone formation.

A verification of NHC official track forecasts for Blas is given in Table 3a. Official forecast track errors were substantially lower than the mean official errors for the previous 5-yr period at all forecast intervals. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The GFS ensemble mean (AEMI) was an excellent performer for Blas, and it had lower track errors than the mean official forecasts at all forecast intervals. Interestingly, climatology and persistence (OCD5) bested the official forecast at day 5, with a mean error of only about 101 n mi for that time period.

A verification of NHC official intensity forecasts for Blas is given in Table 4a. The official intensity forecasts were quite good overall, with average errors that were significantly lower than the mean official errors for the previous 5-yr period. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The Decay-SHIPS guidance had lower mean errors than the official forecasts for 36 through 96 h, the Florida State Superensemble (FSSE) bested the official forecasts for 48 through 120 h, and the HFIP Corrected Consensus (HCCA) guidance had lower errors than the official forecasts for 36 through 96 h. The

official forecasts anticipated the rapid intensification of Blas fairly well, though the forecast peak intensity was a little late in comparison to the time of the observed maximum (Fig. 4).

No coastal watches or warnings were required for Blas.

Table 1.   Best track for Hurricane Blas, 2 – 10 July 2016 .

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
02 / 1800	10.8	106.8	1008	25	tropical depression
03 / 0000	11.1	107.8	1007	30	"
03 / 0600	11.4	108.8	1006	35	tropical storm
03 / 1200	11.7	109.8	1005	40	"
03 / 1800	12.0	110.7	1003	45	"
04 / 0000	12.3	111.7	1002	50	"
04 / 0600	12.6	112.7	1000	55	"
04 / 1200	13.0	113.9	994	65	hurricane
04 / 1800	13.4	115.1	989	70	"
05 / 0000	13.8	116.4	985	75	"
05 / 0600	14.0	117.9	978	85	"
05 / 1200	14.1	119.2	970	95	"
05 / 1800	14.2	120.2	960	105	"
06 / 0000	14.3	121.2	947	120	"
06 / 0600	14.5	122.1	951	115	"
06 / 1200	14.8	123.1	956	110	"
06 / 1800	15.1	124.2	956	110	"
07 / 0000	15.5	125.0	956	110	"
07 / 0600	15.8	125.9	956	110	"
07 / 1200	16.1	126.7	958	105	"
07 / 1800	16.4	127.5	964	100	"
08 / 0000	16.7	128.3	968	95	"
08 / 0600	17.1	128.9	972	90	"
08 / 1200	17.6	129.6	974	85	"
08 / 1800	18.1	130.2	980	75	"
09 / 0000	18.6	130.8	985	70	"
09 / 0600	19.2	131.4	992	60	tropical storm
09 / 1200	19.8	132.1	995	55	"
09 / 1800	20.5	132.9	1002	45	"
10 / 0000	20.9	133.8	1003	35	"
10 / 0600	21.1	134.7	1007	30	low

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
10 / 1200	21.3	135.8	1007	30	"
10 / 1800	21.5	136.8	1008	30	"
11 / 0000	21.5	137.9	1008	30	"
11 / 0600	21.4	139.1	1008	30	"
11 / 1200	21.2	140.2	1009	25	"
11 / 1800	21.0	141.4	1010	25	"
12 / 0000					dissipated
06 / 0000	14.3	121.2	947	120	minimum pressure and maximum winds

Table 2.   Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the "Low" category do not include forecasts of a 0% chance of genesis.

	Hours Before Genesis	
	48-Hour Outlook	**120-Hour Outlook**
Low (<40%)	54	120
Medium (40%-60%)	18	96
High (>60%)	6	54

Table 3a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Blas, 2 – 10 July 2016. Mean errors for the previous 5-yr period 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	**16.4**	**24.6**	**28.4**	**33.9**	**50.7**	**82.3**	**108.1**
OCD5	27.6	52.7	80.8	104.3	142.0	144.3	100.2
Forecasts	27	25	23	21	17	13	9
OFCL (2011-15)	23.4	36.4	47.2	59.4	89.0	123.6	159.5
OCD5 (2011-15)	36.6	74.2	116.5	159.7	245.6	331.1	427.4

Table 3b.   Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Blas, 2 – 10 July 2016. 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	16.0	24.3	28.4	32.7	53.7	91.9	123.0
OCD5	26.6	52.3	83.4	110.5	151.4	157.0	**101.3**
GFSI	16.5	25.5	30.3	32.7	**52.2**	**88.5**	150.4
GHMI	16.1	**23.7**	37.9	53.9	65.3	**80.2**	**100.4**
HWFI	19.2	29.6	33.8	45.1	73.0	93.6	**121.7**
EGRI	22.1	36.3	45.6	62.8	96.9	118.7	137.3
EMXI	16.4	**24.2**	**27.5**	32.8	71.3	115.5	135.5
CMCI	20.9	31.5	37.5	44.5	54.0	**62.4**	**110.3**
CTCI	20.4	38.3	48.4	56.5	77.3	96.6	149.0
TCON	16.1	26.8	33.3	40.3	55.0	**78.8**	**104.3**
TVCE	**14.9**	25.6	32.5	38.2	53.7	**78.7**	**112.7**
FSSE	**14.8**	25.1	30.1	**31.9**	56.0	**85.0**	**111.1**
HCCA	**14.2**	**22.8**	29.3	34.7	57.7	**89.9**	**118.9**
AEMI	**15.7**	**22.1**	**25.6**	**31.0**	**40.9**	**63.9**	**109.6**
BAMS	38.8	73.3	108.6	148.6	219.6	255.1	251.9
BAMM	29.1	53.1	76.2	101.0	152.6	198.0	254.0
BAMD	27.7	49.7	70.5	92.2	147.1	246.3	399.4
Forecasts	25	23	21	19	15	11	7

Table 4a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Blas, 2 – 10 July 2016. Mean errors for the previous 5-yr period 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	**4.8**	**6.4**	**6.1**	**7.6**	**9.1**	**9.6**	**6.7**
OCD5	8.1	12.0	16.0	19.2	24.6	25.5	16.9
Forecasts	27	25	23	21	17	13	9
OFCL (2011-15)	5.9	9.8	12.5	14.0	15.5	16.3	14.9
OCD5 (2011-15)	7.7	12.8	16.4	18.8	21.1	20.9	19.7

Table 4b.   Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Blas, 2 – 10 July 2016. 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 4a due to the homogeneity requirement.

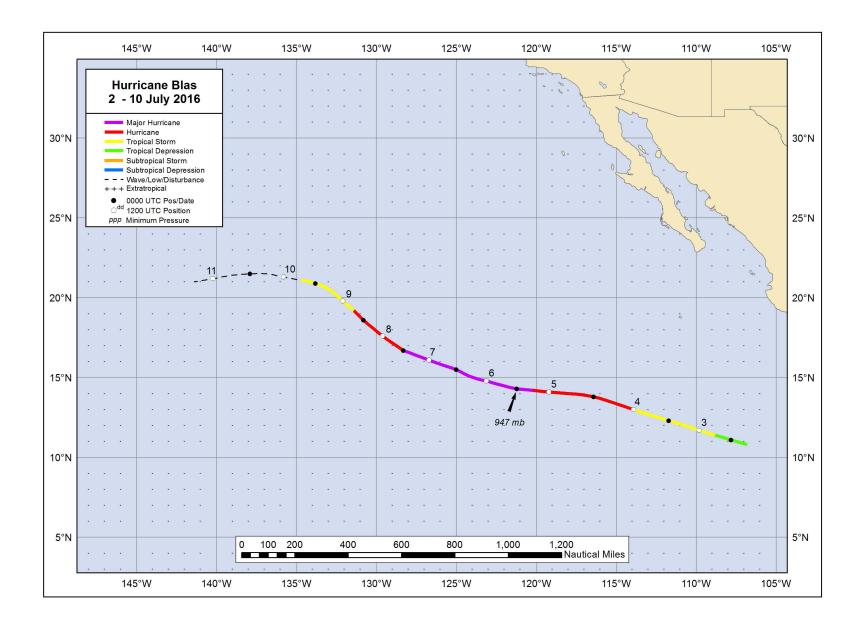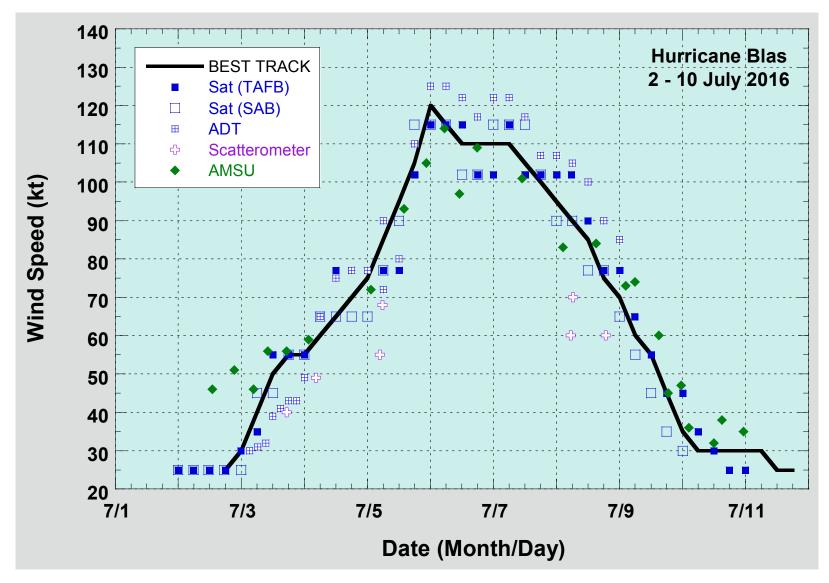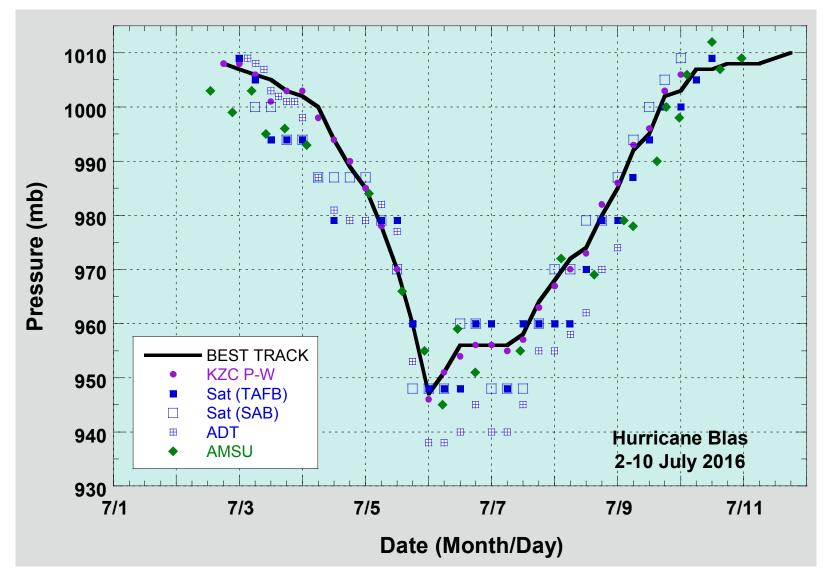| Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	4.4	6.5	6.2	8.2	8.0	9.1	5.7
OCD5	7.8	12.5	16.7	19.6	21.1	21.2	11.9
HWFI	8.8	13.3	15.6	18.4	17.5	17.7	16.4
GHMI	10.2	17.4	21.8	23.3	20.4	19.7	14.6
DSHP	5.9	6.7	**6.1**	**4.9**	**5.5**	**8.6**	15.7
LGEM	6.6	9.1	10.1	9.4	9.2	11.9	11.3
ICON	7.1	9.7	11.4	12.4	11.2	11.9	9.4
IVCN	7.2	10.1	12.4	14.1	12.2	11.3	8.7
CTCI	8.1	14.0	19.0	22.4	18.4	12.9	11.7
GFSI	8.0	11.9	12.1	12.6	16.1	16.6	15.7
EMXI	10.1	18.3	24.7	29.5	30.4	31.1	24.3
HCCA	6.6	9.9	9.9	**6.7**	**4.9**	**4.6**	6.1
FSSE	6.0	8.3	8.4	**8.1**	**7.5**	**5.9**	**3.3**
Forecasts	25	23	21	19	15	11	7

Figure 1.   Best track positions for Hurricane Blas, 2 – 10 July 2016.

Figure 2.   Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Blas, 2 – 10 July 2016. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

Figure 3.   Selected pressure observations and best track minimum central pressure curve for Hurricane Blas, 2 – 10 July 2016. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.
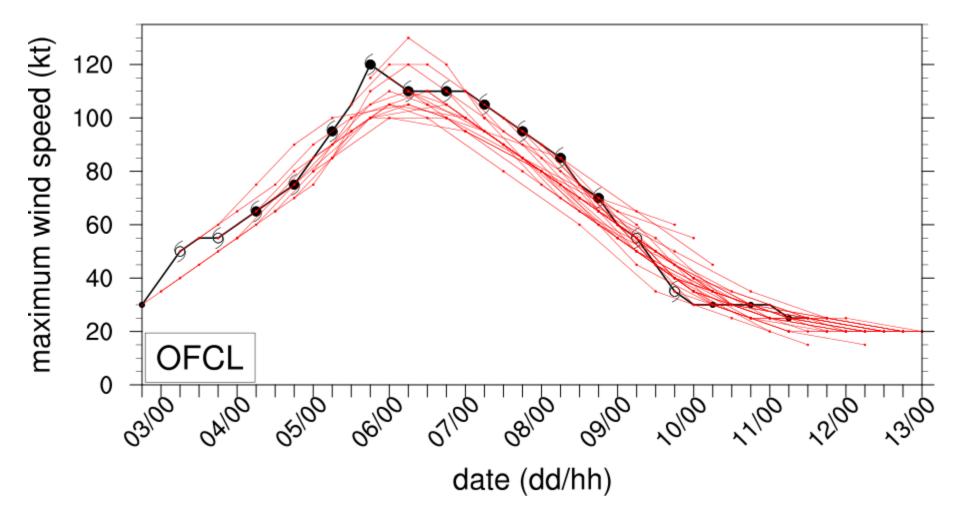
Figure 4.   Official intensity forecasts (red) and best track intensities (black) for Hurricane Blas, 3-10 July 2016. Times are in UTC.