Tropical Cyclone Report
Tropical Storm Blas
(EP032010)
17 – 21 June 2010

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Blas was a sheared tropical storm that remained over the open waters of the eastern North Pacific Ocean.

a. Synoptic History

Blas developed from a tropical wave that moved off the west coast of Africa on 30 May and crossed the Atlantic over the next ten days. The wave produced very little shower or thunderstorm activity during that time, but deep convection began to increase when the system moved across Central America on 9 and 10 June. An area of low pressure developed along the wave axis by 13 June, but it was another 48 h before geostationary and microwave imagery suggested that the system had acquired a well-defined surface center of circulation. The system meandered from 15 to 17 June, and shower and thunderstorm activity was not persistent enough for the low to be classified as a tropical cyclone. The low finally began to maintain organized deep convection early on 17 June, and it is estimated that a tropical depression formed around 0600 UTC that day, centered about 265 n mi south-southwest of Manzanillo, Mexico. A ship, the *Maersk Dhahran* (call sign A8PX5), reported 40-kt winds near the center at 1500 UTC that day, indicating that the depression had become a tropical storm by 1200 UTC. The "best track" chart of Blas'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].

After becoming a tropical storm, Blas accelerated toward the northwest and then west-northwest as a mid-tropospheric ridge built westward from Mexico over the eastern North Pacific waters. About 15 to 20 kt of northeasterly to easterly 850 – 200 mb vertical shear prevented the cyclone from strengthening over the 24-h period ending at 1800 UTC 18 June. The shear then lessened to 10 – 15 kt, allowing the low-level center of circulation to become embedded under the northeastern edge of the deep convection, and Blas intensified to its estimated peak intensity of 55 kt by 1200 UTC 19 June (Fig. 4). Soon thereafter, the storm began to move into a more stable environment and over sea surface temperatures less than 26°C, and the associated showers and thunderstorms diminished markedly. Blas weakened to a tropical depression around 0000 UTC 21 June and then degenerated into a remnant low at 1800 that day when it was centered about 620 n mi west-southwest of the southern tip of Baja California. The remnant low moved generally westward for the next 24 h, dissipating after 0000 UTC 23 June.

[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 Blas (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 Dvorak estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison (UW-CIMSS). Data and imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM) and Aqua, the European Space Agency's Advanced Scatterometer (ASCAT), Defense Meteorological Satellite Program (DMSP) satellites, and the NRL/NPOESS WindSat, among others, were also useful in constructing the best track of Blas.

Blas's estimated peak intensity of 55 kt from 1200 to 1800 UTC 19 June is based on subjective satellite intensity estimates of 55 kt from TAFB and SAB and a peak 3-h averaged objective satellite intensity estimate of 51 kt from the UW-CIMSS Advanced Dvorak Technique.

The ship *Maersk Dhahran* (call sign A8PX5) reported winds of 40 kt and 39 kt at 1500 UTC and 1600 UTC, respectively, on 17 June very near the center of Blas; these observations support the cyclone's upgrade to a tropical storm at 1200 UTC. The ship also reported a pressure of 1002 mb at 1500 UTC.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

Since environmental conditions were marginally conducive for Blas's development, its genesis was recognized as a possibility, but forecaster confidence was never high and the timing of genesis was not well predicted. The Tropical Weather Outlook first mentioned that the precursor disturbance had a "low" (0 to 20%) chance of genesis over the next 48 h at 0000 UTC 12 June, 5.25 days before the post-analysis designates Blas as a tropical depression. The disturbance was eventually given a "medium" (30 to 50%) chance about 2.5 days before genesis at 1800 UTC 14 June, but it was never given a "high" (greater than 50%) chance before genesis occurred.

A verification of NHC official track forecasts for Blas is given in Table 2a. Official forecast track errors were lower than the mean official errors for the previous five-year period from 12 to 48 h but were higher at 72 and 96 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. The Florida State Superensemble was the only guidance that outperformed the official track forecast at all time periods from 12 to 48 h, but in general, the track consensus model TCON, the Global Ensemble Forecast System (AEMI), and the shallow- and medium-layer Beta and Advection Model (BAMS and BAMM) also had lower errors than the official forecast. The official track forecast consistently outperformed the

individual dynamical global and regional hurricane models, with the exception of the Global Forecast System (GFS).

A verification of NHC official intensity forecasts for Blas is given in Table 3a. Official forecast intensity errors were higher than the mean official errors for the previous five-year period at 12 h and lower from 24 to 96 h. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. The official intensity forecasts were rarely beaten by the intensity or intensity consensus models, especially from 24 to 48 h, and no model had lower average errors than the official forecast at 48 h.

Table 1. Best track for Tropical Storm Blas, 17 – 21 June 2010.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 0600	14.6	105.3	1008	20	low
15 / 1200	14.7	105.2	1007	25	"
15 / 1800	14.9	105.3	1007	25	"
16 / 0000	15.0	105.5	1007	25	"
16 / 0600	14.8	105.7	1007	25	"
16 / 1200	14.6	105.6	1007	25	"
16 / 1800	14.7	105.4	1007	25	"
17 / 0000	14.8	105.4	1007	25	"
17 / 0600	14.9	105.5	1005	30	tropical depression
17 / 1200	15.0	105.7	1003	35	tropical storm
17 / 1800	15.2	106.0	1001	40	"
18 / 0000	15.4	106.4	1000	40	"
18 / 0600	15.6	106.8	1000	40	"
18 / 1200	15.8	107.3	1000	40	"
18 / 1800	16.1	107.8	1000	40	"
19 / 0000	16.3	108.4	999	45	"
19 / 0600	16.4	109.0	996	50	"
19 / 1200	16.5	109.6	994	55	"
19 / 1800	16.7	110.3	994	55	"
20 / 0000	17.0	111.1	996	50	"
20 / 0600	17.3	112.0	999	45	"
20 / 1200	17.6	113.0	1002	40	"
20 / 1800	17.7	114.2	1005	35	"
21 / 0000	17.8	115.4	1007	30	tropical depression
21 / 0600	17.8	116.7	1008	30	"
21 / 1200	17.6	117.9	1009	30	"
21 / 1800	17.3	119.2	1009	25	remnant low
22 / 0000	17.0	120.5	1009	25	"
22 / 0600	16.7	121.8	1010	25	"
22 / 1200	16.5	123.2	1010	25	"
22 / 1800	16.3	124.6	1010	25	"
23 / 0000	16.2	125.9	1011	25	"
23 / 0600					dissipated
19 / 1200	16.5	109.6	994	55	maximum wind and minimum pressure

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Blas, 17 – 21 June 2010. 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	**26.4**	**45.3**	**58.3**	**72.5**	149.2	316.7	
OCD5	31.7	60.9	92.1	123.8	215.2	437.6	
Forecasts	15	13	11	9	5	1	
OFCL (2005-9)	30.8	51.5	71.6	89.6	120.9	155.0	
OCD5 (2005-9)	38.9	75.3	115.7	155.8	226.9	275.1	

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Blas, 17 – 21 June 2010. 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	21.3	38.8	57.1	70.4	145.6		
OCD5	28.9	59.5	96.4	127.4	**134.3**		
GFSI	21.8	38.9	**56.2**	**57.2**	**88.6**		
GHMI	29.3	54.6	71.4	88.6	208.4		
HWFI	22.2	46.0	64.2	87.1	**72.2**		
GFNI	41.7	71.2	107.2	158.2	354.7		
NGPI	27.2	50.9	65.9	80.5	171.1		
UKMI	27.2	55.3	78.3	97.1	188.8		
EGRI	27.2	55.8	82.3	97.1	188.8		
EMXI	23.5	44.6	63.9	72.2	**85.4**		
AEMI	**20.2**	40.9	**50.1**	**52.1**	**90.8**		
FSSE	**18.6**	**36.3**	**48.5**	**51.2**	**137.3**		
TCON	**18.9**	39.4	**50.5**	**47.8**	**114.9**		
TVCN	21.9	41.4	**55.7**	**62.1**	**137.1**		
TVCC	26.7	43.6	57.3	73.2	148.9		
GUNA	22.0	44.0	58.6	**62.6**	**142.8**		
LBAR	**18.5**	45.7	78.3	136.5	297.1		
BAMD	**20.7**	51.7	76.9	112.8	**141.5**		
BAMM	**14.2**	**32.1**	**50.0**	76.1	**96.3**		
BAMS	**21.1**	41.8	**49.3**	**49.6**	**12.9**		
Forecasts	11	11	8	6	1		

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Blas, 17 – 21 June 2010. 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	6.7	**9.6**	**11.8**	**11.1**	**5.0**	**10.0**	
OCD5	6.8	9.8	12.5	13.1	11.7	16.0	
Forecasts	15	13	11	9	5	1	
OFCL (2005-9)	6.3	10.5	13.8	15.5	17.5	19.0	
OCD5 (2005-9)	7.1	11.6	15.0	17.4	18.7	19.8	

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Blas, 17 – 21 June 2010. 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	7.1	10.0	10.6	9.2	5.0		
OCD5	7.2	10.6	13.0	12.2	16.0		
GHMI	7.3	11.2	16.1	15.3	13.0		
HWFI	**6.0**	11.1	13.8	14.0	**0.0**		
GFNI	7.5	12.4	13.8	11.8	5.0		
FSSE	**7.0**	10.3	13.1	12.3	**4.0**		
DSHP	7.1	**9.6**	**10.3**	10.8	8.0		
LGEM	7.2	10.6	**9.9**	9.8	**2.0**		
ICON	**6.9**	10.3	12.6	11.8	**1.0**		
IVCN	**6.4**	10.4	12.0	11.0	**1.0**		
Forecasts	12	12	8	6	1		

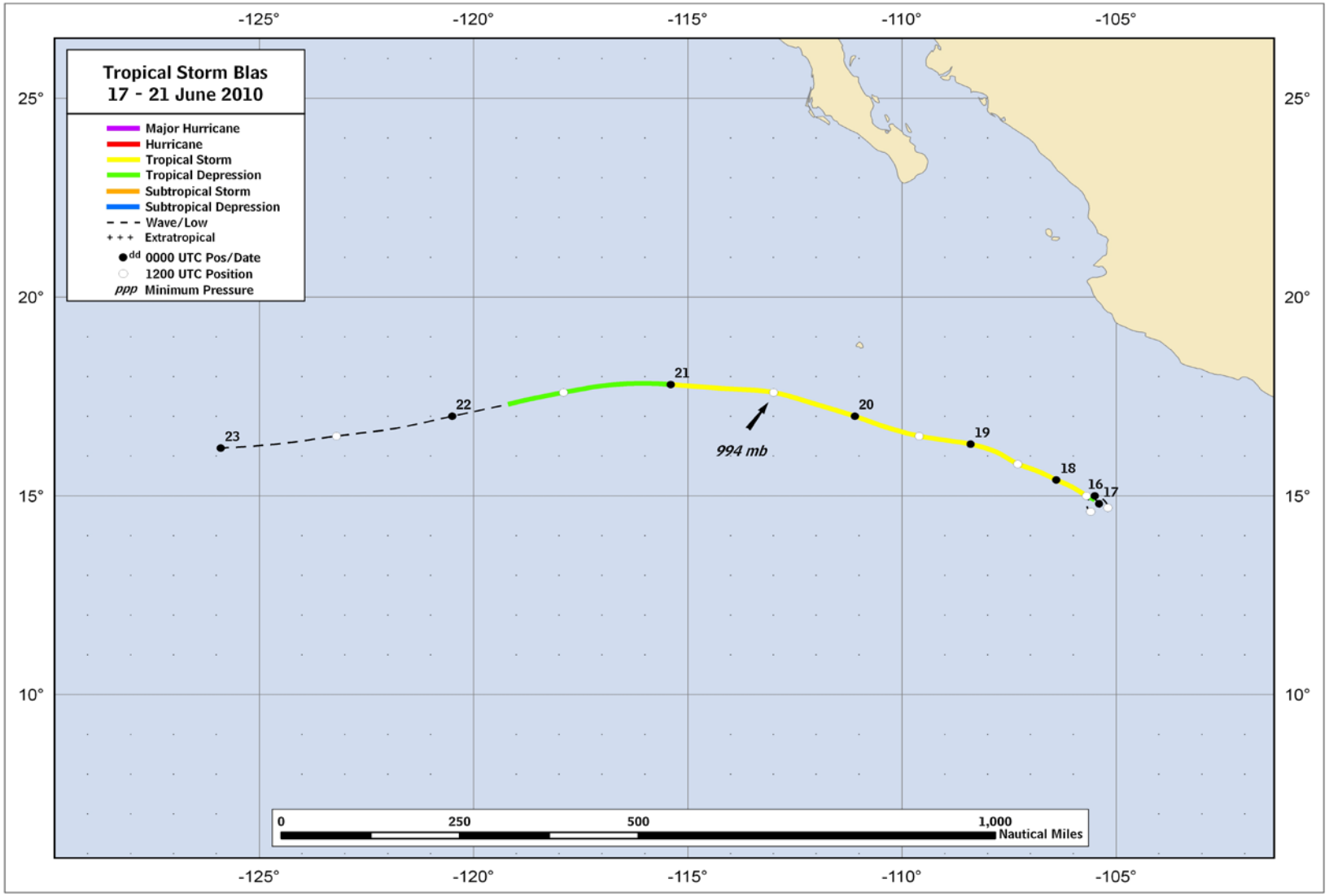

Figure 1. Best track positions for Tropical Storm Blas, 17 – 21 June 2010.

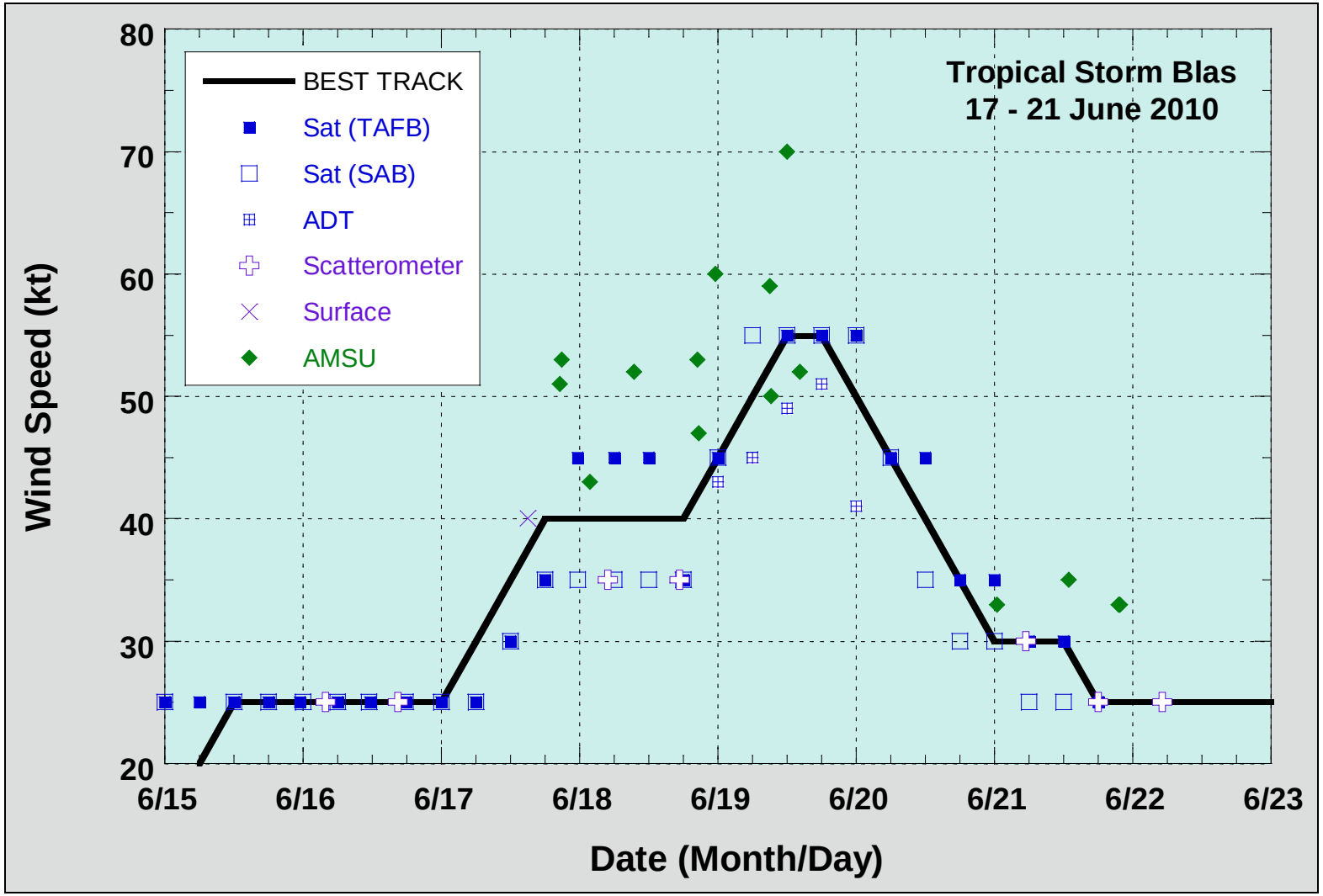

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Blas, 17 – 21 June 2010. ADT points represent linear averages of UW-CIMSS Advanced Dvorak Technique estimates over a three-hour period centered on the nominal observation time. AMSU intensity estimates are from the UW-CIMSS technique. Dashed vertical lines correspond to 0000 UTC.

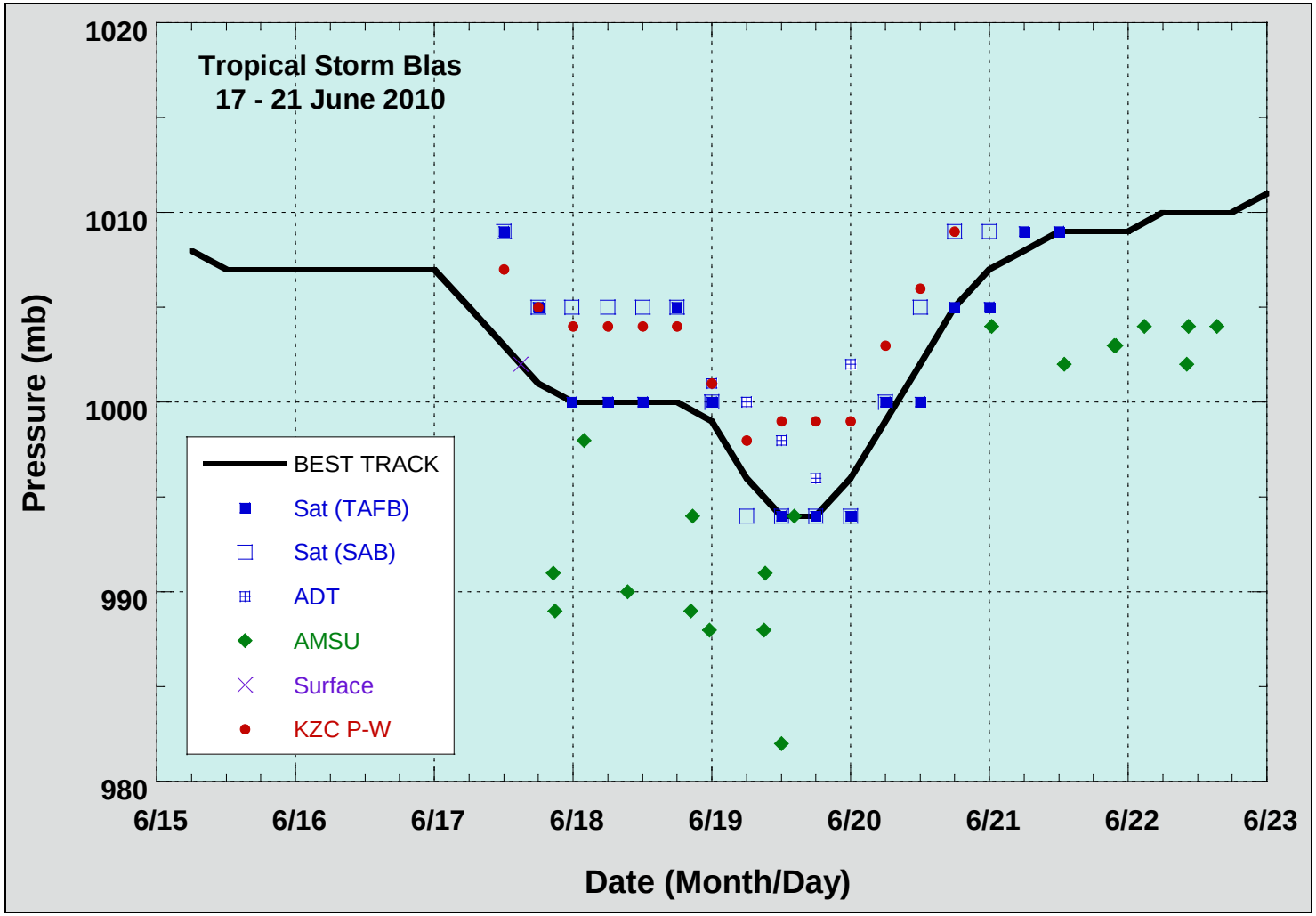

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Blas, 17 – 21 June 2010. ADT points represent linear averages of UW-CIMSS Advanced Dvorak Technique estimates over a three-hour period centered on the nominal observation time. AMSU intensity estimates are from the UW-CIMSS technique. Dashed vertical lines correspond to 0000 UTC. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship.

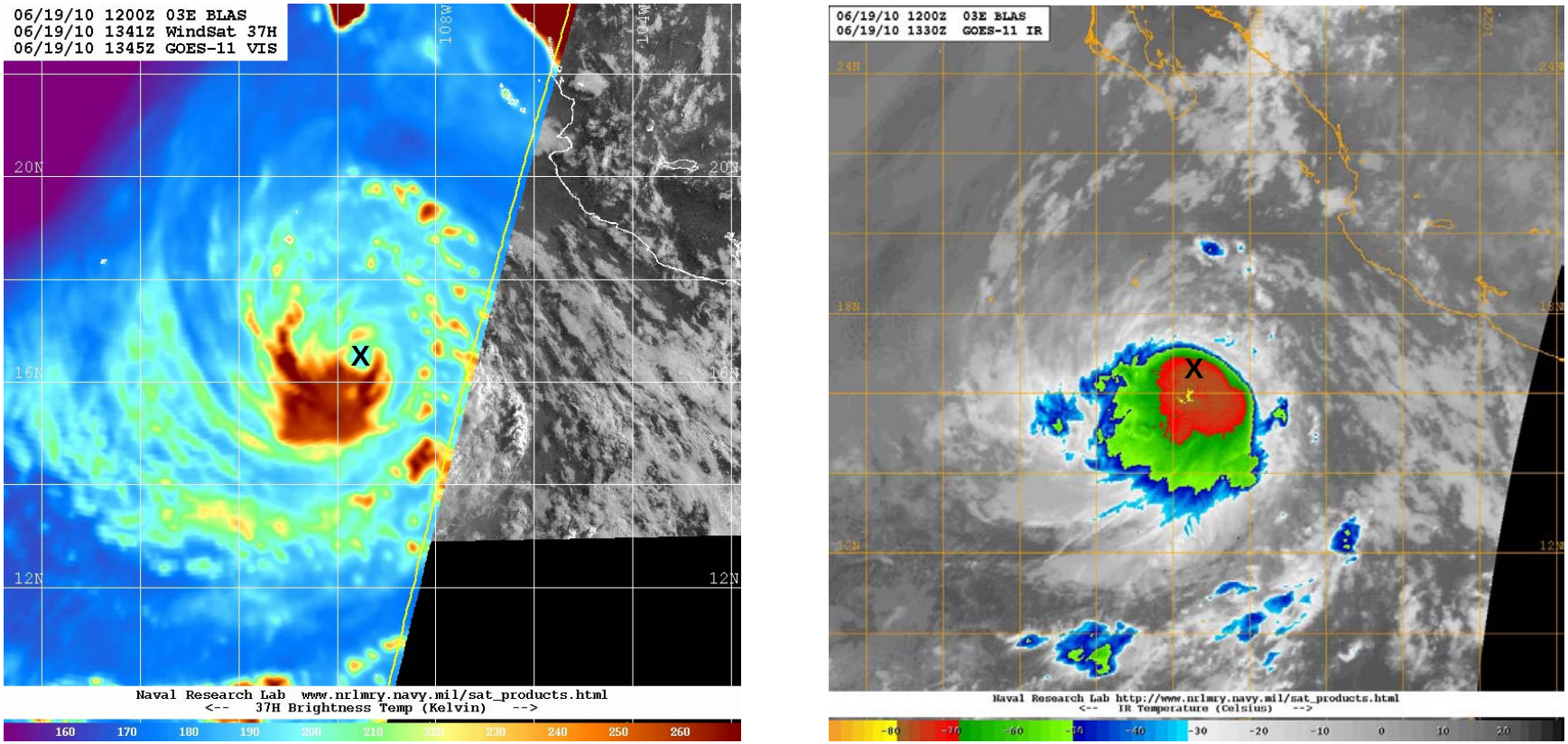

Figure 4. 37 GHz h-pol WindSat image of Tropical Storm Blas at 1341 UTC 19 June (left) and a geostationary infrared satellite image from GOES-11 at 1330 UTC 19 June (right). These images show Blas at its peak intensity of 55 kt with the low-level center depicted as an "**X**" in each image. The deepest convection is displaced over the southwestern semicircle of the cyclone, indicating the presence of northeasterly shear.