

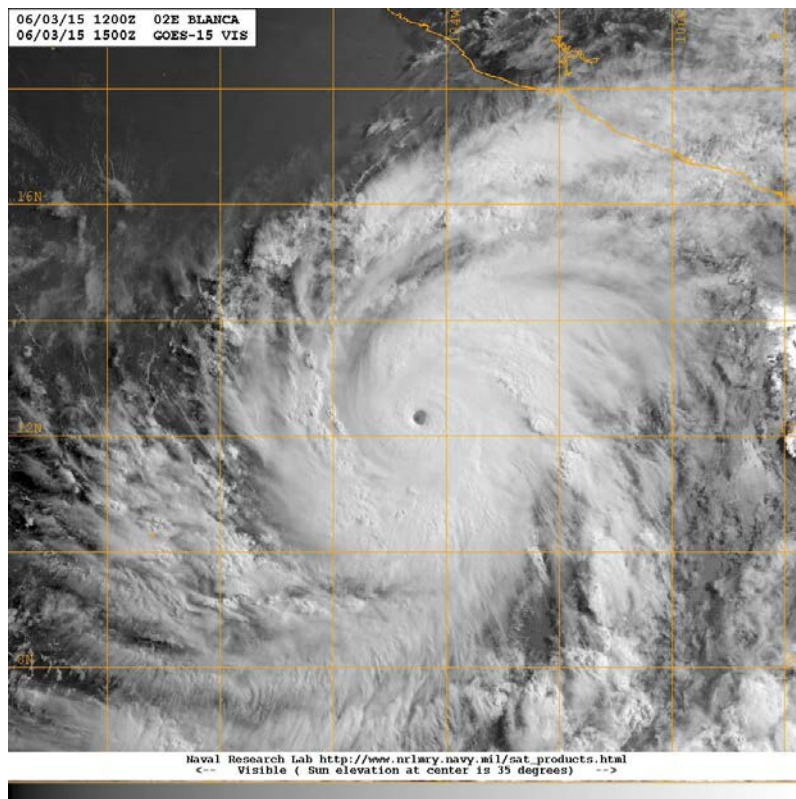


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE BLANCA (EP022015)

31 May – 9 June 2015

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National Hurricane Center
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GOES-15 VISIBLE SATELLITE IMAGE OF HURRICANE BLANCA AT 1500 UTC 3 JUNE 2015, NEAR ITS PEAK INTENSITY OF 125 KT.
IMAGE COURTESY OF NAVAL RESEARCH LABORATORY.

Blanca was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that later made landfall on the Baja California peninsula of Mexico as a tropical storm. It was the earliest second hurricane and the earliest second major hurricane of the season in the eastern North Pacific basin, as well as the earliest landfall on record of a tropical storm on the Baja California peninsula since reasonably accurate records began in the early 1970s.

Hurricane Blanca

31 MAY – 9 JUNE 2015

SYNOPTIC HISTORY

Blanca appears to have originated from a tropical wave that crossed Central America on 26 May. Over the next few days, the wave moved slowly westward to the south of Central America and Mexico with limited associated shower activity until 30 May, when deep convection increased and became consolidated a few hundred miles south of Acapulco, Mexico. This development trend continued, and by 1200 UTC 31 May the cloud pattern became sufficiently well organized to designate the formation of a tropical depression centered about 320 n mi south-southwest of Acapulco. 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 1¹.

The cyclone initially moved west-northwestward to northwestward. The depression was being affected by strong northwesterly vertical shear associated with the outflow of Hurricane Andres to its west, and the center briefly became exposed as a tight swirl of low clouds around 1800 UTC 31 May. However, the vertical shear began to relax on 1 June, allowing the system to strengthen into a tropical storm. In weakening steering currents, Blanca turned toward the west before stalling and then drifting erratically southward. Vertical shear continued to lessen and the cyclone intensified rapidly, becoming a hurricane by 1800 UTC 2 June and a major hurricane with a pinhole eye around 1200 UTC 3 June.

Blanca reached its peak intensity of 125 kt at 1800 UTC 3 June, while centered about 410 n mi south of Manzanillo, Mexico. Rapid weakening then occurred, likely due to the upwelling of cooler waters beneath the slow-moving hurricane as well as an eyewall replacement, and by 1200 UTC 5 June Blanca had weakened to an intensity of 80 kt. Meanwhile, a mid-level ridge that had been blocking the movement of the cyclone shifted eastward, and Blanca began moving toward the northwest at about 10 kt, allowing the cyclone to move away from its cold wake and re-intensify. Aided by the completion of the eyewall replacement cycle, Blanca reached a secondary peak intensity of 115 kt around 1200 UTC 6 June. Later that day, however, the hurricane was again over cooler waters, and a weakening trend began.

Early on 7 June, Blanca turned toward the north-northwest, and its center moved a short distance to the east and northeast of Socorro Island. With steering provided by a mid-level high over northern Mexico and a trough extending southwestward from the western United States, Blanca continued moving north-northwestward while continuing to weaken over progressively cooler waters. Blanca became a tropical storm around 1800 UTC 7 June, and its maximum winds had diminished to near 40 kt by the time it made landfall on the west coast of Baja California Sur shortly before 1200 UTC 8 June. Later that day, the center of the cyclone moved briefly over water to the west of Baja California Sur before making its final landfall on the west coast of that state, as a tropical depression, late on 8 June. Blanca degenerated

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.

into a remnant low over the central Baja California peninsula early on 9 June, and dissipated shortly thereafter.

METEOROLOGICAL STATISTICS

Observations in Blanca (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. Observations also include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from flights of the 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command (the Air Force Hurricane Hunters). 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 Blanca.

The estimated overall peak intensity of 125 kt at 1800 UTC 3 June is based on a subjective Dvorak estimate of 127 kt from TAFB as well as an ADT estimate of 125 kt. A secondary peak intensity of 115 kt at 1200 UTC 6 June is based on subjective Dvorak estimates of 115 kt from both SAB and TAFB.

An automated weather station on Socorro Island reported sustained winds of 300° / 64 kt with a gust to 88 kt, and a minimum pressure of 977.3 mb at 0330 UTC 7 June while the center of Blanca passed about 25 n mi to the northeast, shortly after which the station ceased to function. Cabo San Lucas International Airport reported sustained winds of 40 kt with a gust to 43 kt at 1843 and 2103 UTC, respectively, on 7 June. Puerto Cortes, Baja California Sur, reported a minimum pressure of 990.5 mb at 1015 UTC 8 June, but no winds to tropical storm force. San Juanico, also in Baja California Sur, reported sustained winds of 29 kt with a gust to 45 kt at 1800 and 1820 UTC, respectively, with a minimum pressure of 1001.2 mb at 1700 UTC 8 June. There were no ship reports of winds of tropical storm force associated with Blanca.

Moisture associated with Blanca's remnants produced mostly light rains over portions of the southwestern United States. Rainfall totals were mostly less than an inch, with higher amounts at some of the more elevated locales.

CASUALTY AND DAMAGE STATISTICS

Blanca made its landfalls in sparsely settled areas of Baja California Sur. There were no reports of damage or casualties associated with this tropical cyclone.

FORECAST AND WARNING CRITIQUE

Blanca's genesis was anticipated well in advance (Table 2), although genesis did not occur nearly as soon as was expected. The system was first mentioned in the Tropical Weather Outlook (TWO) with a low probability of development in 120 h more than a week before genesis. It was first assigned a high probability development in the 48-h TWO 90 h prior to genesis.

A verification of NHC official track forecasts for Blanca is given in Table 3a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period at all forecast intervals, and much lower at 3 to 5 days. Blanca's slow and erratic motion for the first few days of its existence was fairly well anticipated by the official forecasts. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The U.K. Met. Office global model (EGRI) and the dynamical model consensus (TVCN) had lower track errors than the official forecasts at most forecast intervals.

A verification of NHC official intensity forecasts for Blanca is given in Table 4a. Official forecast intensity errors were greater than the mean official errors for the previous 5-yr period at the 12- through 72-h forecast times, and less than the 5-yr average errors at 96 and 120 hours. The relatively poor intensity forecasts are not surprising, given Blanca's episodes of rapid intensification and rapid weakening. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The intensity model consensus (IVCN) had lower errors than the official forecasts from 12 through 72 hours, and the Florida State University Superensemble (FSSE) bested the official intensity forecast from 12 through 48 hours.

Watches and warnings associated with Blanca are given in Table 5.



Table 1. Best track for Hurricane Blanca, 31 May – 9 June 2015.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 31 / 1200 | 12.0 | 102.2 | 1008 | 25 | tropical depression |
| 31 / 1800 | 12.2 | 102.7 | 1008 | 25 | " |
| 01 / 0000 | 12.9 | 103.2 | 1006 | 30 | " |
| 01 / 0600 | 13.3 | 103.5 | 1006 | 30 | " |
| 01 / 1200 | 13.3 | 103.5 | 1004 | 35 | tropical storm |
| 01 / 1800 | 13.3 | 103.9 | 1003 | 40 | " |
| 02 / 0000 | 13.3 | 104.2 | 1001 | 45 | " |
| 02 / 0600 | 13.2 | 104.4 | 1001 | 45 | " |
| 02 / 1200 | 13.0 | 104.5 | 999 | 55 | " |
| 02 / 1800 | 12.9 | 104.5 | 989 | 65 | hurricane |
| 03 / 0000 | 12.8 | 104.6 | 980 | 75 | " |
| 03 / 0600 | 12.6 | 104.6 | 968 | 90 | " |
| 03 / 1200 | 12.4 | 104.6 | 948 | 115 | " |
| 03 / 1800 | 12.3 | 104.6 | 936 | 125 | " |
| 04 / 0000 | 12.1 | 104.7 | 941 | 120 | " |
| 04 / 0600 | 12.0 | 104.8 | 950 | 110 | " |
| 04 / 1200 | 12.2 | 104.9 | 960 | 95 | " |
| 04 / 1800 | 12.5 | 105.0 | 975 | 85 | " |
| 05 / 0000 | 13.3 | 105.4 | 975 | 85 | " |
| 05 / 0600 | 13.9 | 105.9 | 972 | 85 | " |
| 05 / 1200 | 14.5 | 106.5 | 972 | 80 | " |
| 05 / 1800 | 15.0 | 107.3 | 975 | 80 | " |
| 06 / 0000 | 15.7 | 107.9 | 966 | 90 | " |
| 06 / 0600 | 16.4 | 108.5 | 956 | 100 | " |
| 06 / 1200 | 17.1 | 109.1 | 943 | 115 | " |
| 06 / 1800 | 17.8 | 109.7 | 952 | 105 | " |



| | | | | | |
|-----------|------|-------|------|-----|--|
| 07 / 0000 | 18.7 | 110.2 | 952 | 105 | " |
| 07 / 0600 | 19.4 | 110.5 | 960 | 95 | " |
| 07 / 1200 | 20.1 | 110.7 | 964 | 85 | " |
| 07 / 1800 | 20.8 | 110.9 | 978 | 60 | tropical storm |
| 08 / 0000 | 21.8 | 111.0 | 984 | 55 | " |
| 08 / 0600 | 23.3 | 111.3 | 990 | 45 | " |
| 08 / 1030 | 24.3 | 111.7 | 990 | 45 | " |
| 08 / 1115 | 24.5 | 111.8 | 994 | 40 | " |
| 08 / 1200 | 24.7 | 111.9 | 994 | 40 | " |
| 08 / 1800 | 26.1 | 112.7 | 998 | 35 | " |
| 08 / 2030 | 26.6 | 113.0 | 1000 | 30 | tropical depression |
| 09 / 0000 | 27.3 | 113.5 | 1001 | 30 | " |
| 09 / 0600 | 28.5 | 114.0 | 1005 | 25 | low |
| 09 / 1200 | | | | | dissipated |
| 03 / 1800 | 12.3 | 104.6 | 936 | 125 | Minimum pressure and maximum winds |
| 08 / 1030 | 24.3 | 111.7 | 990 | 45 | Landfall on Isla Margarita, about 15 n mi southeast of Puerto Cortes, Mexico |
| 08 / 1115 | 24.5 | 111.8 | 994 | 40 | Landfall near Puerto Argudin, Mexico |
| 08 / 2030 | 26.6 | 113.0 | 1000 | 30 | Landfall about 15 n mi south-southwest of El Patrocinio, Mexico |



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%) | 138 | 192 |
| Medium (40%-60%) | 102 | 162 |
| High (>60%) | 90 | 138 |



Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Blanca, 31 May – 9 June 2015. 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 | 22.7 | 34.8 | 40.0 | 47.3 | 61.6 | 81.1 | 88.0 |
| OCD5 | 37.8 | 77.8 | 127.9 | 177.9 | 268.7 | 318.3 | 351.2 |
| Forecasts | 32 | 30 | 28 | 26 | 22 | 18 | 14 |
| OFCL (2010-14) | 23.4 | 36.4 | 47.2 | 59.4 | 89.0 | 123.6 | 159.5 |
| OCD5 (2010-14) | 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 Blanca, 31 May – 9 June 2015. 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 | 21.8 | 35.3 | 40.3 | 47.8 | 64.2 | 99.8 | 94.8 |
| OCD5 | 36.4 | 78.7 | 127.0 | 169.5 | 249.8 | 245.5 | 257.8 |
| GFSI | 25.9 | 44.3 | 54.0 | 64.2 | 82.4 | 123.3 | 168.1 |
| HWFI | 31.4 | 48.3 | 60.6 | 66.4 | 81.5 | 117.2 | 150.2 |
| GHMI | 25.8 | 38.9 | 50.3 | 62.1 | 103.0 | 185.0 | 270.2 |
| EGRI | 23.3 | 31.9 | 31.2 | 34.3 | 46.9 | 41.1 | 60.2 |
| EMXI | 19.8 | 30.4 | 40.7 | 48.6 | 78.8 | 85.9 | 79.2 |
| CMCI | 21.0 | 34.7 | 55.0 | 76.2 | 135.7 | 185.7 | 263.5 |
| AEMI | 26.4 | 44.2 | 52.8 | 62.4 | 83.5 | 106.9 | 115.0 |
| FSSE | 21.1 | 32.9 | 40.8 | 53.1 | 75.3 | 119.5 | 154.1 |
| TVCN | 20.4 | 30.7 | 35.4 | 40.8 | 62.7 | 92.7 | 109.6 |
| LBAR | 29.6 | 55.6 | 83.9 | 123.3 | 190.4 | 297.2 | 331.1 |
| BAMD | 31.8 | 52.2 | 72.3 | 92.0 | 112.4 | 152.8 | 174.2 |
| BAMM | 30.2 | 52.6 | 74.2 | 93.6 | 121.2 | 141.0 | 175.8 |
| BAMS | 43.7 | 83.2 | 117.9 | 144.6 | 157.2 | 180.8 | 186.6 |
| Forecasts | 29 | 27 | 25 | 22 | 19 | 12 | 9 |

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Blanca, 31 May – 9 June 2015. 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 | 8.9 | 15.5 | 20.2 | 21.3 | 16.6 | 13.1 | 10.0 |
| OCD5 | 11.4 | 20.5 | 27.9 | 29.3 | 24.6 | 31.7 | 34.6 |
| Forecasts | 32 | 30 | 28 | 26 | 22 | 18 | 14 |
| OFCL (2010-14) | 5.9 | 9.8 | 12.5 | 14.0 | 15.5 | 16.3 | 14.9 |
| OCD5 (2010-14) | 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 Blanca, 31 May – 9 June 2015. 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 | 9.8 | 17.3 | 23.3 | 22.5 | 13.9 | 16.0 | 11.1 |
| OCD5 | 12.4 | 23.1 | 31.0 | 30.3 | 17.3 | 31.9 | 32.8 |
| GHMI | 10.6 | 19.3 | 28.7 | 26.2 | 20.8 | 22.8 | 21.9 |
| HWFI | 10.6 | 16.6 | 21.8 | 22.7 | 14.6 | 19.8 | 26.7 |
| DSHP | 11.0 | 18.0 | 24.4 | 23.0 | 17.3 | 18.6 | 16.4 |
| LGEM | 10.3 | 17.2 | 25.4 | 25.3 | 18.1 | 20.3 | 18.1 |
| FSSE | 9.5 | 13.5 | 19.1 | 20.1 | 21.7 | 34.6 | 19.8 |
| IVCN | 9.3 | 15.3 | 19.2 | 18.6 | 11.3 | 17.0 | 18.6 |
| GFSI | 12.5 | 20.3 | 24.9 | 27.3 | 13.6 | 18.4 | 18.1 |
| EMXI | 15.8 | 30.0 | 35.3 | 32.2 | 17.7 | 25.3 | 41.2 |
| Forecasts | 29 | 26 | 23 | 22 | 18 | 10 | 9 |

Table 5. Watch and warning summary for Hurricane Blanca, 31 May – 9 June 2015.

| Date/Time (UTC) | Action | Location |
|------------------------|--|--|
| 5 / 2100 | Tropical Storm Watch issued | La Paz to Santa Fe |
| 6 / 0900 | Tropical Storm Watch changed to Tropical Storm Warning | La Paz to Santa Fe |
| 6 / 0900 | Tropical Storm Watch issued | La Paz to San Evaristo |
| 6 / 0900 | Tropical Storm Watch issued | Santa Fe to Cabo San Lazaro |
| 6 / 0900 | Hurricane Watch issued | Cabo San Lucas to Santa Fe |
| 6 / 2100 | Tropical Storm Watch discontinued | La Paz to San Evaristo |
| 6 / 2100 | Tropical Storm Watch discontinued | Santa Fe to Cabo San Lazaro |
| 6 / 2100 | Tropical Storm Watch issued | Loreto to Mulege |
| 6 / 2100 | Tropical Storm Watch issued | Puerto San Andresito to Punta Abreojos |
| 6 / 2100 | Tropical Storm Warning discontinued | La Paz to Santa Fe |
| 6 / 2100 | Tropical Storm Warning issued | Loreto to Puerto San Andresito |
| 7 / 0900 | Tropical Storm Watch discontinued | Puerto San Andresito to Punta Abreojos |
| 7 / 0900 | Tropical Storm Warning modified to | Loreto to Punta Abreojos |
| 7 / 2100 | Hurricane Watch discontinued | All |
| 8 / 1500 | Tropical Storm Warning modified to | Loreto to La Paz |
| 8 / 2100 | Tropical Storm Watch discontinued | All |
| 8 / 2100 | Tropical Storm Warning discontinued | All |

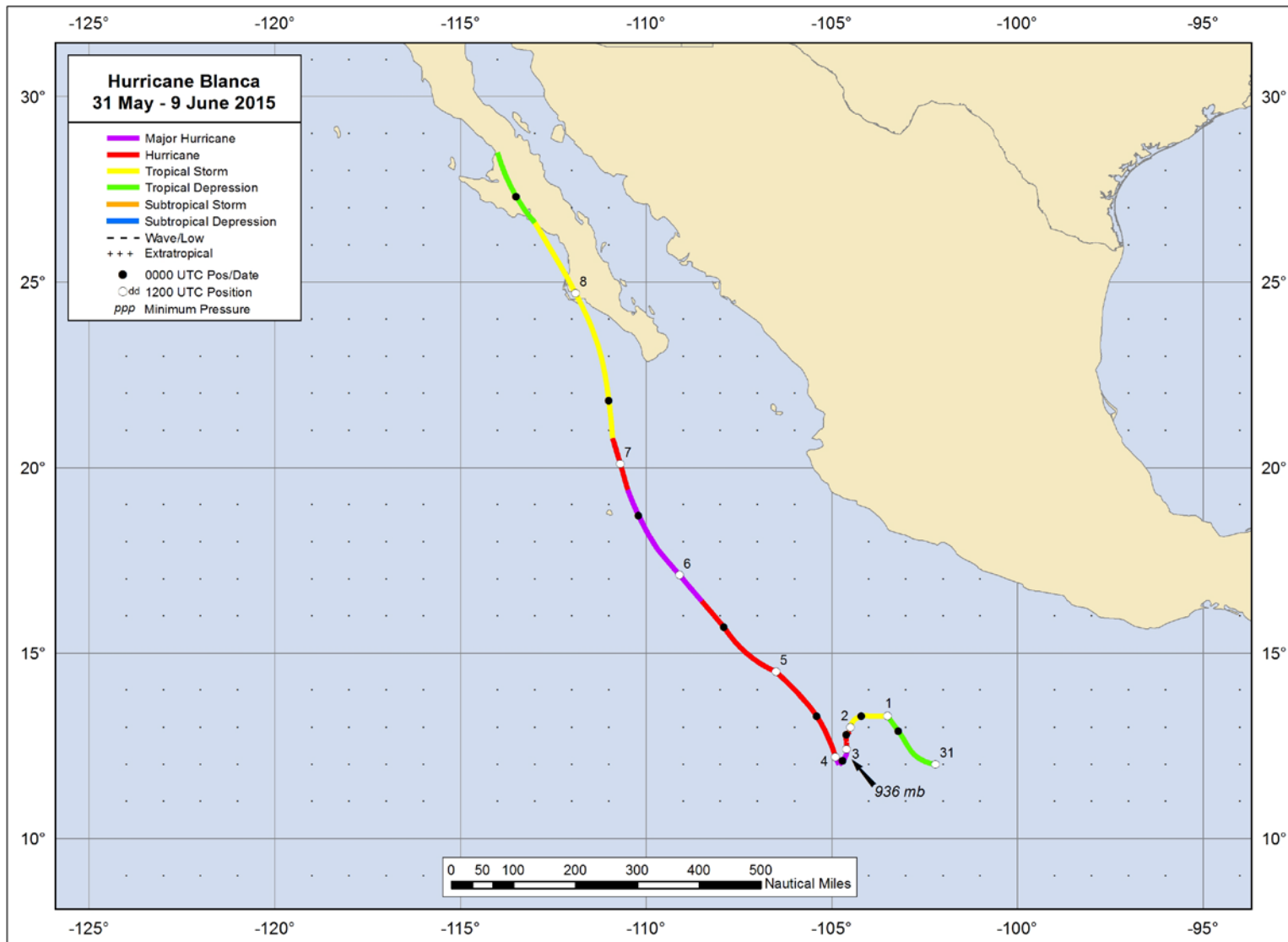


Figure 1. Best track positions for Hurricane Blanca, 31 May – 9 June 2015.

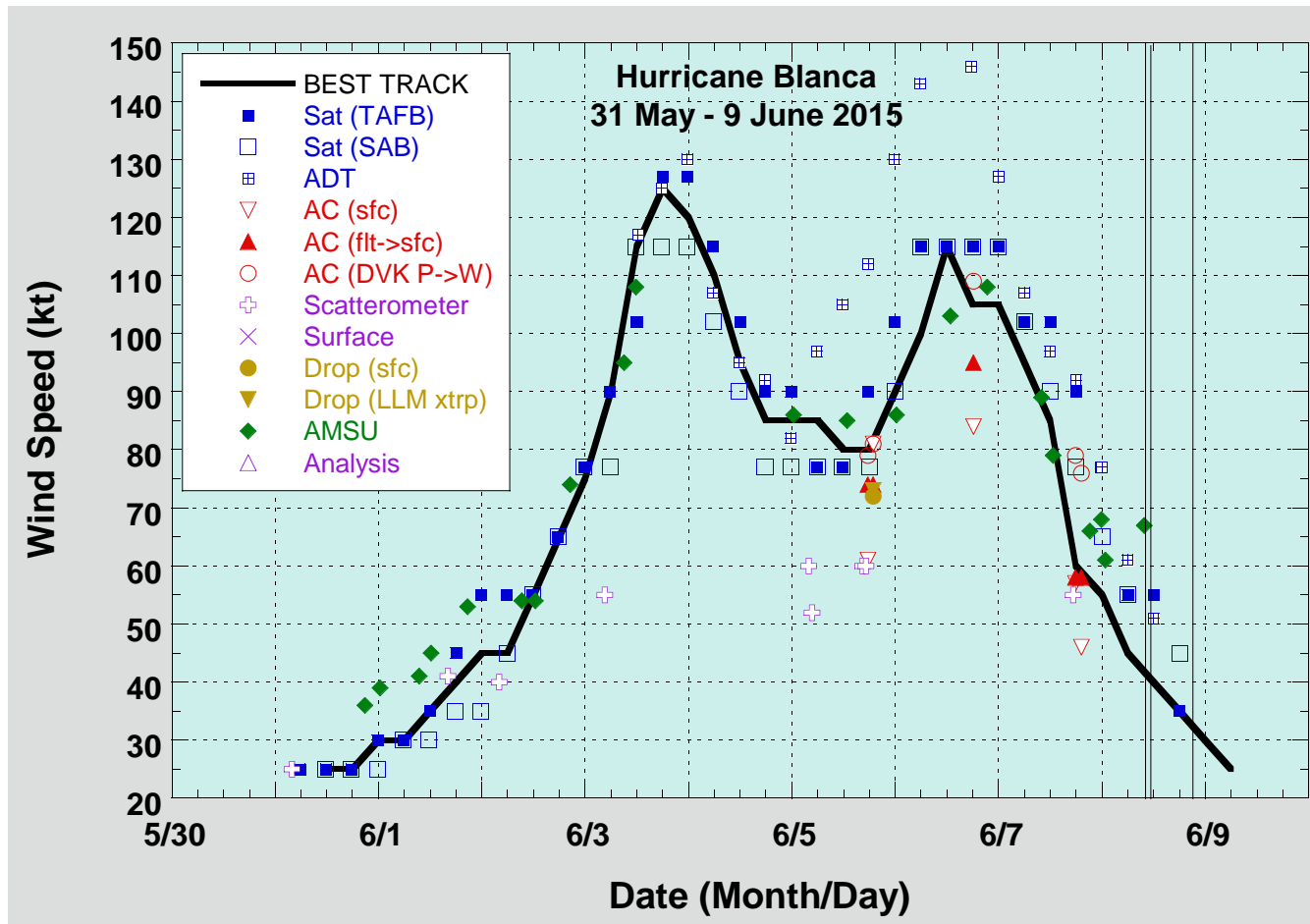


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Blanca, 31 May – 9 June 2015. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dropwindsonde observations include actual 10 m winds (sfc), as well as surface estimates derived from the mean wind over the lowest 150 m of the wind sounding (LLM). 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, and solid vertical lines correspond to landfalls.

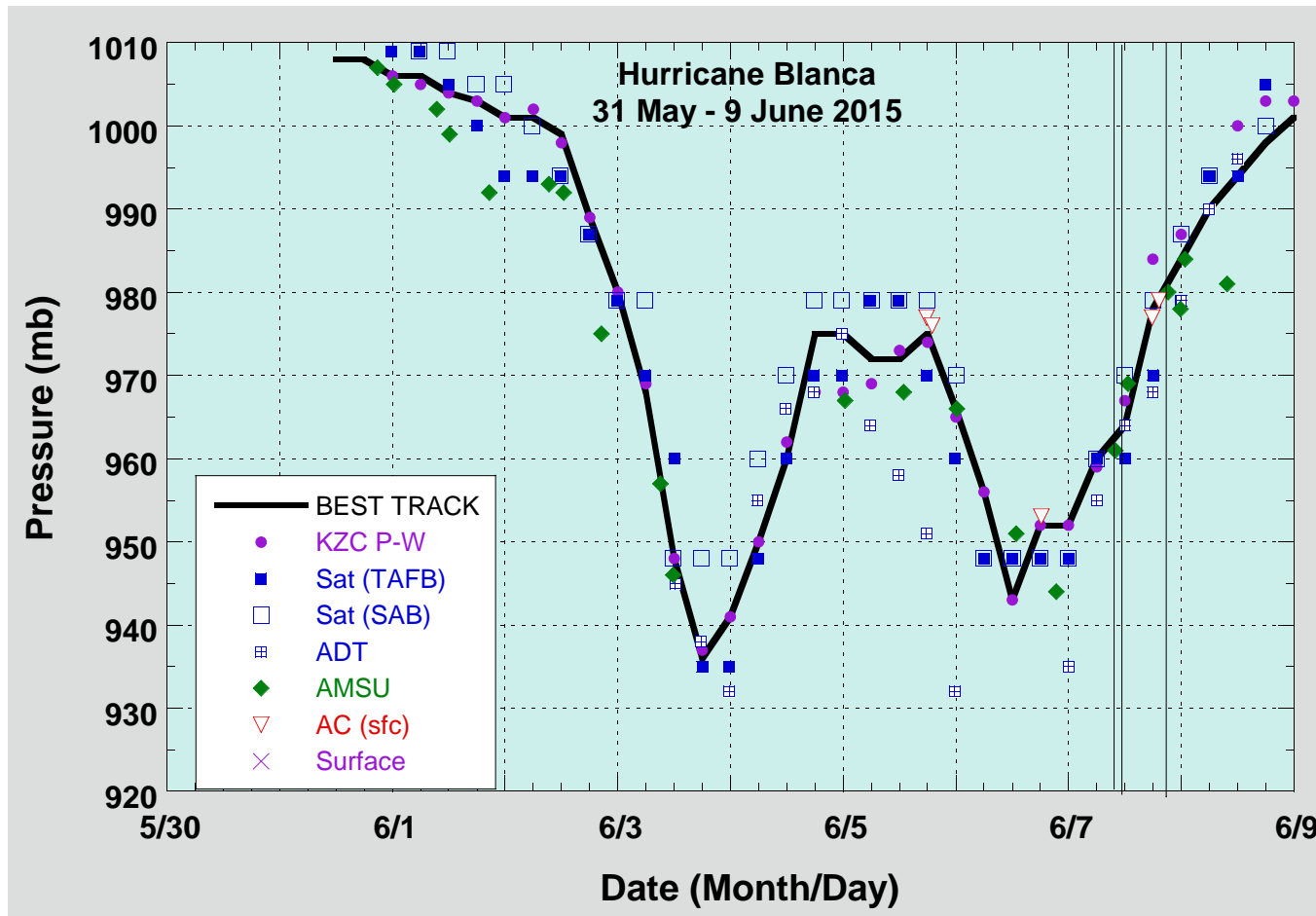


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Blanca, 31 May – 9 June 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological 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, and solid vertical lines correspond to landfalls.