

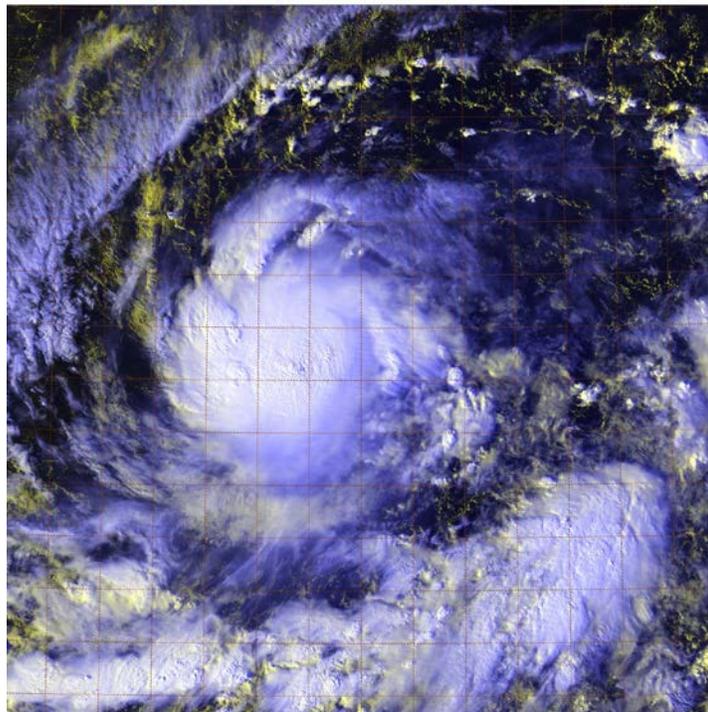


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT¹

HURRICANE IGNACIO (EP122015)

25 August – 5 September 2015

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National Hurricane Center
20 January 2016



NPP VIIRS LUNAR REFLECTANCE IMAGE OF IGNACIO AT 1035 UTC 27 AUGUST 2015. IMAGE COURTESY OF NRL MONTEREY.

Ignacio was part of a multiple cyclone outbreak in the central and eastern North Pacific basin in late August and early September. It became a major hurricane in the central Pacific basin.

¹ This report focuses on Ignacio's history in the National Hurricane Center's area of responsibility (east of 140°W longitude). The report will be updated once the Central Pacific Hurricane Center completes its analysis of the storm for the time the cyclone spent west of 140°W.

Hurricane Ignacio

25 AUGUST – 5 SEPTEMBER 2015

SYNOPTIC HISTORY

The origin of Ignacio is a bit obscure. The cyclone appears to have formed from a cloud cluster first seen near 10°N 110°W on 17 August at the eastern end of a segment of the Intertropical Convergence Zone (ITCZ). At the time, the ITCZ was re-forming in the wake of a disruption caused by Tropical Depression Eleven-E, which dissipated on 18 August west of the Baja California peninsula. Due to the influence of the depression, the cloud cluster from which Ignacio developed cannot be reliably traced to a tropical wave or any other disturbance farther east. After the depression dissipated, the cloud cluster moved slowly westward along the ITCZ with little development for a couple of days. Subsequently, an eastward-moving Kelvin wave created a large-scale environment more favorable for convection and tropical cyclogenesis, and this likely aided the formation of a low pressure area in association with the disturbance on 21 August. The low became better defined late on 23 August, and shortly thereafter the associated convection first showed signs of organization. Continued slow development led to the formation of Tropical Depression Twelve-E near 0000 UTC 25 August about 1285 n mi west-southwest of the southern tip of the Baja California peninsula. 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 1². It should be noted that a post-storm analysis has not yet been completed for the portion of the track west of 140°W longitude, and all data for this portion of the storm’s history reflect near real-time estimates from the Central Pacific Hurricane Center.

The depression moved westward on the south side of the subtropical ridge until it became a tropical storm about 18 h after genesis. A southward reformation of the center occurred between 1800 UTC 25 August and 0000 UTC 26 August, and this started an overall west-southwestward motion. The steadily strengthening cyclone became a hurricane near 0000 UTC 27 August, at which time it turned west-northwestward. After that, Ignacio crossed 140°W into the Central Pacific basin just before 1800 UTC that day with estimated maximum winds of 80 kt.

Once over the central Pacific, Ignacio continued west-northwestward until 29 August, when it turned northwestward. Intensification on 29 August brought the cyclone to major hurricane strength, and it reached a peak intensity of 125 kt near 0600 UTC 30 August about 440 n mi east-southeast of Hilo, Hawaii. Gradual weakening occurred during the next several days as Ignacio continued moving northwestward, and by 2 September the system had weakened to a tropical storm. For the next couple of days, the intensity fluctuated between 60-65 kt. Ignacio turned northward on 4 September, and late that day the deep convection dissipated. This led to

² 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 *bt*k directory, while previous years’ data are located in the *archive* directory.

Ignacio becoming a storm-force post-tropical low near 0000 UTC 5 September about 875 n mi north-northwest of Honolulu, Hawaii. The low merged with a cold front south of the eastern Aleutian Islands on 7 September.

METEOROLOGICAL STATISTICS

Observations in Ignacio (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 in the central Pacific basin include satellite intensity estimates from the Central Pacific Hurricane Center (PHFO) and the Joint Typhoon Warning Center (JTWC). Observations over the central Pacific 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. 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 Ignacio.

There were no observations of tropical-storm force or greater winds from Ignacio in the eastern Pacific basin.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Ignacio in the eastern Pacific basin.

FORECAST AND WARNING CRITIQUE

The genesis forecasts for Ignacio were of mixed quality. The system was first mentioned in the Tropical Weather Outlook about 108 h before genesis, at which time it was given a low (less than 40%) chance of development during the 5-day forecast period (Table 2). This probability was raised to a medium (40-60%) chance 6 h later. However, the chance of development in the 5-day period was not raised to the high (greater than 60%) category until 30 hours before genesis. The system was given a low chance of development in the 2-day period 96 h prior to genesis. It was given a medium chance of development in that category 24 h before genesis and a high chance 12 h before genesis. One possible reason for the relatively slow increase in the probabilities was that the shower activity associated with the precursor disturbance was limited and disorganized on 21-22 August.



A verification of NHC official track forecasts for Ignacio is given in Table 3a. Official forecast track errors were greater than the mean official errors for the previous 5-yr period through 48 h, but were lower than the 5-yr mean for 72-120 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The consensus model TCON had lower errors than the official forecasts at all forecast times except 120 h, and the variable consensus model TVCE was also better than the official forecasts at all times except 12 h. Examination of individual official forecasts (not shown) indicate that the larger forecast errors at 12-48 h resulted from an incorrectly forecast westward motion on 26 August. The actual motion was west-southwestward.

A verification of NHC official intensity forecasts for Ignacio is given in Table 4a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period through 48 h, then greater than the 5-yr mean for 72-120 hr. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The Florida State Superensemble had the overall best performance of the intensity guidance, and its errors were lower than those of the official forecasts at all times except 48 h. The large errors at the longer forecast time resulted from an underestimation of how much strengthening would occur on 29-30 August.

There were no coastal watches or warning for Ignacio in the eastern Pacific basin.



Table 1. Best track for Hurricane Ignacio, 25 August – 5 September 2015. A post-storm analysis has not yet been completed for the portion of the track west of 140°W longitude, and all data for this portion of the storm’s history reflect near real time estimates from the Central Pacific Hurricane Center.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
23 / 1800	12.3	129.3	1009	25	low
24 / 0000	12.3	129.5	1008	25	"
24 / 0600	12.5	129.9	1008	25	"
24 / 1200	12.8	130.3	1007	25	"
24 / 1800	13.0	130.6	1007	30	"
25 / 0000	13.1	131.1	1007	30	tropical depression
25 / 0600	13.1	131.6	1006	30	"
25 / 1200	13.0	132.2	1005	30	"
25 / 1800	12.8	132.8	1004	35	tropical storm
26 / 0000	12.4	133.3	1003	40	"
26 / 0600	12.2	134.1	1001	45	"
26 / 1200	12.0	135.0	999	50	"
26 / 1800	11.8	135.9	998	55	"
27 / 0000	12.0	136.9	992	65	hurricane
27 / 0600	12.3	137.9	985	75	"
27 / 1200	12.6	139.0	982	80	"
27 / 1800	12.7	140.3	982	80	"
28 / 0000	13.1	141.4	982	80	"
28 / 0600	13.7	142.7	982	80	"
28 / 1200	14.1	143.5	982	80	"
28 / 1800	14.5	144.2	982	80	"
29 / 0000	15.0	144.9	981	80	"
29 / 0600	15.4	145.6	974	80	"
29 / 1200	15.7	146.2	961	100	"
29 / 1800	16.1	146.6	951	120	"
30 / 0000	16.7	147.3	952	120	"
30 / 0600	17.1	147.7	942	125	"



30 / 1200	18.0	148.2	948	120	"
30 / 1800	18.6	148.7	960	100	"
31 / 0000	19.4	149.3	959	100	"
31 / 0600	20.1	149.8	963	100	"
31 / 1200	20.6	150.5	966	90	"
31 / 1800	21.3	151.2	966	90	"
01 / 0000	21.9	151.9	972	85	"
01 / 0600	22.6	152.6	980	75	"
01 / 1200	23.2	153.3	984	70	"
01 / 1800	23.8	154.4	985	65	"
02 / 0000	24.3	155.2	988	60	tropical storm
02 / 0600	24.9	155.8	988	60	"
02 / 1200	25.7	156.7	988	60	"
02 / 1800	26.4	157.7	986	60	"
03 / 0000	27.1	159.0	982	65	hurricane
03 / 0600	27.8	160.1	982	65	"
03 / 1200	28.4	161.1	983	65	"
03 / 1800	29.1	162.1	983	60	tropical storm
04 / 0000	29.9	162.9	983	60	"
04 / 0600	30.9	163.3	980	65	hurricane
04 / 1200	31.8	164.0	980	65	"
04 / 1800	33.3	164.1	983	60	tropical storm
05 / 0000	34.8	164.4	985	55	low
05 / 0600					dissipated
30 / 0600	17.1	147.7	942	125	maximum wind and minimum pressure



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%)	96	108
Medium (40%-60%)	24	102
High (>60%)	12	30

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Ignacio, 25 August - 5 September 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	32.2	51.5	58.6	79.3	82.4	74.7	117.2
OCD5	33.8	77.7	116.8	147.7	204.5	238.4	287.7
Forecasts	11	11	11	11	11	11	11
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 Ignacio, 25 August – 5 September 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	29.9	49.0	60.3	70.0	57.5	58.8	135.1
OCD5	40.6	69.2	103.0	136.0	184.6	238.9	322.9
GFSI	26.4	42.2	44.3	46.1	44.5	102.0	178.1
GHMI	31.9	52.2	63.2	74.1	73.8	64.4	96.5
HWFI	38.9	61.1	68.6	71.8	100.9	185.4	252.4
EGRI	29.0	47.4	67.6	96.1	124.0	105.2	175.7
EMXI	37.4	63.0	84.2	101.8	97.0	94.7	155.6
NVGI	35.4	53.8	68.9	83.8	121.7	153.8	154.9
GFNI	30.6	50.4	76.9	104.5	151.0	185.5	223.5
CMCI	42.1	72.2	101.9	140.6	187.6	163.7	105.2
TCON	29.0	46.5	54.2	57.9	45.0	56.4	135.7
TVCE	30.2	46.7	55.6	63.2	46.5	55.6	134.2
FSSE	31.8	52.6	65.6	73.2	56.0	59.6	156.0
AEMI	28.3	40.9	46.6	57.8	80.0	104.8	173.5
BAMS	51.2	93.4	121.6	134.7	115.1	181.5	326.9
BAMM	26.5	41.5	60.4	81.5	74.1	75.5	167.0
BAMD	35.6	43.0	58.6	69.6	108.9	176.4	197.1
LBAR	36.3	69.4	107.5	141.6	203.7	259.9	321.0
Forecasts	8	8	8	8	8	8	8



Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Ignacio, 25 August - 5 September 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	3.6	6.8	11.4	10.9	15.9	25.9	29.1
OCD5	5.2	9.7	15.4	16.6	26.6	39.0	36.1
Forecasts	11	11	11	11	11	11	11
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 Ignacio, 25 August - 5 September 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	4.4	8.1	12.5	8.8	16.9	26.9	16.3
OCD5	5.4	10.5	13.3	12.8	27.9	42.9	26.0
HWFI	4.1	4.5	6.0	9.6	20.5	23.9	16.1
GHMI	6.4	11.8	14.8	11.1	16.3	21.8	9.9
DSHP	6.1	11.6	14.5	11.5	20.6	27.0	16.5
LGEM	6.0	12.8	16.6	13.8	19.8	29.3	17.8
ICON	4.5	8.9	12.0	9.5	17.6	25.0	14.4
IVCN	4.5	8.9	12.0	9.5	17.6	25.0	14.4
GFNI	7.5	15.6	21.6	20.5	35.4	40.3	25.9
GFSI	7.5	14.3	17.8	15.9	26.9	30.0	22.0
EMXI	10.3	18.5	22.8	25.3	44.8	48.4	26.1
FSSE	4.0	6.8	12.0	13.9	15.6	18.4	7.8
Forecasts	8	8	8	8	8	8	8

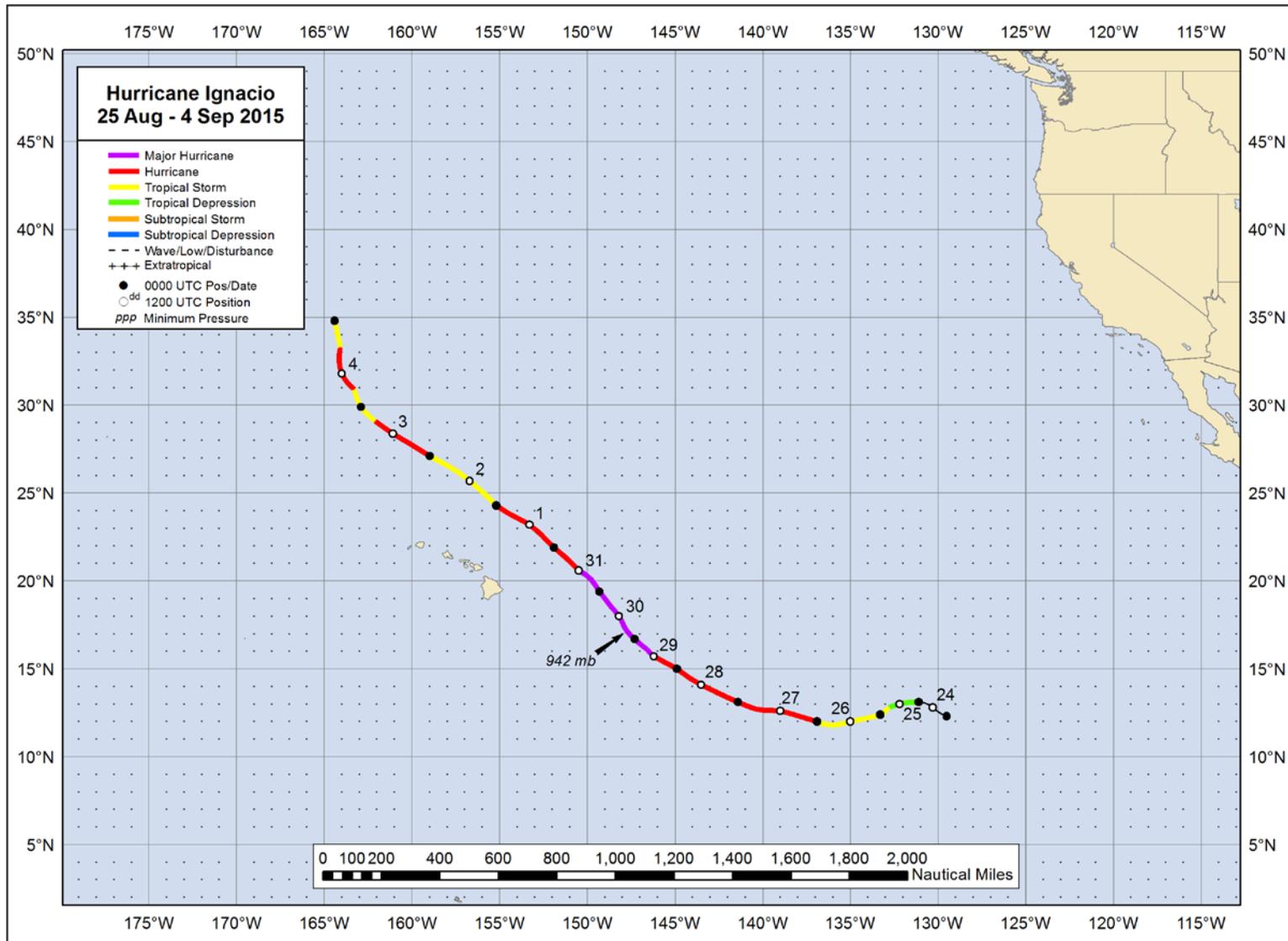


Figure 1. Best track positions for Hurricane Ignacio, 25 August – 5 September 2015. A post-storm analysis has not yet been completed for the portion of the track west of 140°W longitude, and all data for this portion of the storm’s history reflect near real-time estimates from the Central Pacific Hurricane Center.

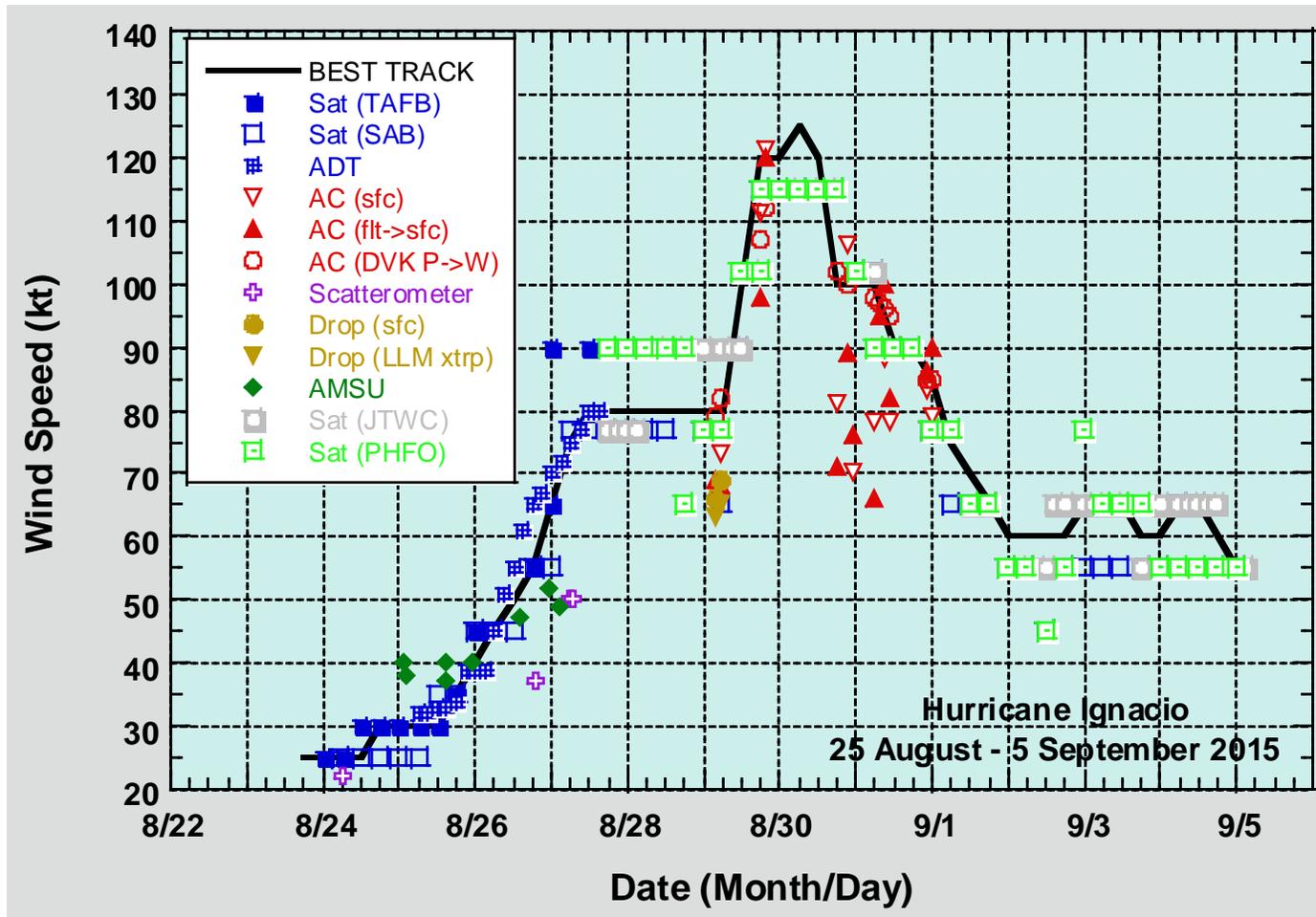


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Ignacio, 25 August – 5 September 2015. Aircraft observations have been adjusted for elevation using a 90% adjustment factor for observations from 700 mb. Dropwindsonde observations include actual 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. A post-storm analysis has not yet been completed for the portion of the track west of 140°W longitude, and all data for this portion of the storm’s history reflect near real-time estimates from the Central Pacific Hurricane Center.

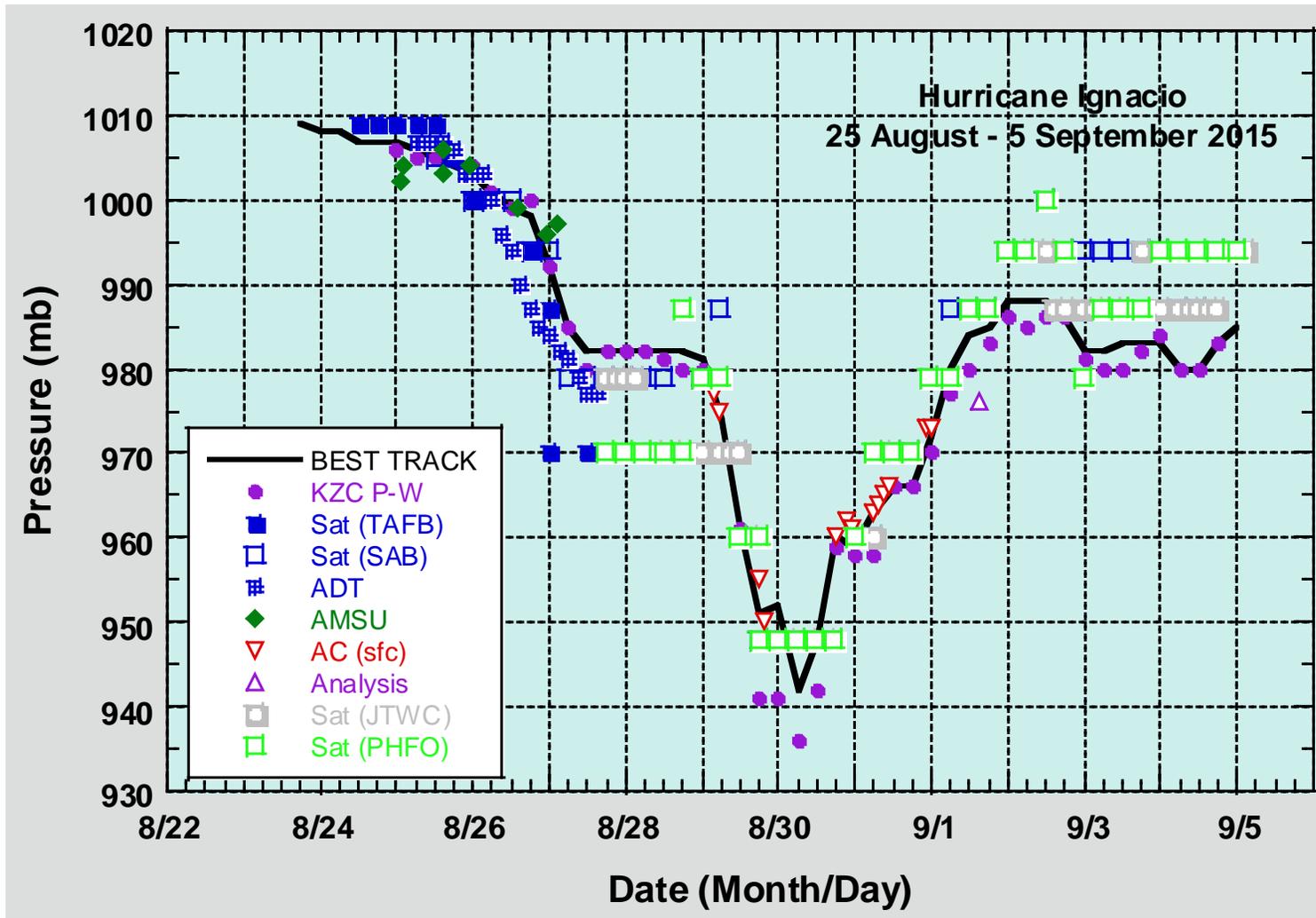


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Ignacio, 25 August – 5 September 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute 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. A post-storm analysis has not yet been completed for the portion of the track west of 140°W longitude, and all data for this portion of the storm’s history reflect near real-time estimates from the Central Pacific Hurricane Center.