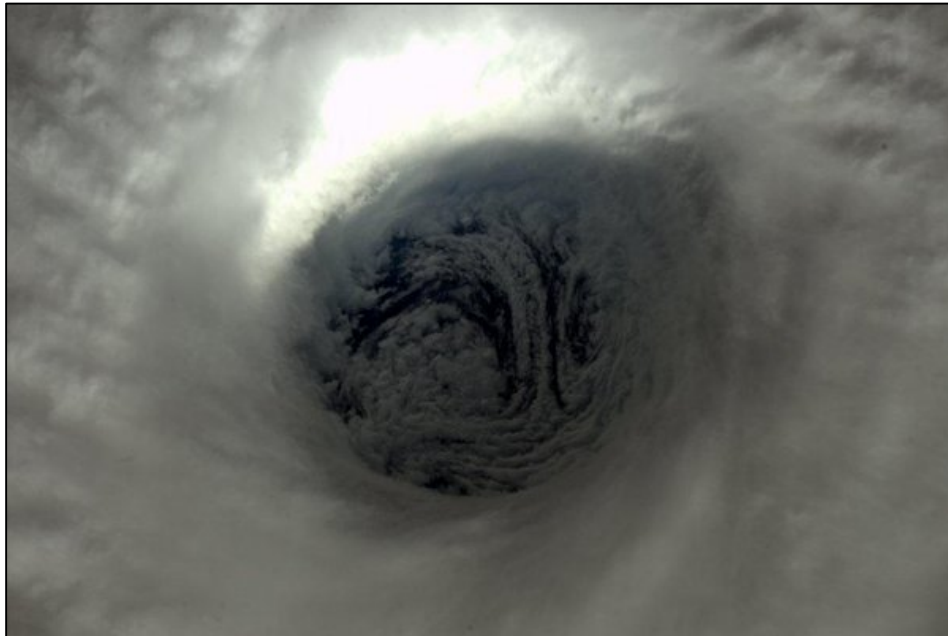# NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

HURRICANE JIMENA
(EP132015)
26 August – 9 September 2015

Stacy R. Stewart
National Hurricane Center
Jeffrey Powell
Central Pacific Hurricane Center
18 March 2016[1]

CLOSE-UP VIEW OF JIMENA AS SEEN FROM THE INTERNATIONAL SPACE STATION (ISS) SHOWING MULTIPLE VORTICES INSIDE THE EYE ON 29 AUGUST. IMAGE CREDIT, KIMIYA YUI, ISS ASTRONAUT, JAPAN AEROSPACE EXPLORATION AGENCY (JAXA).

Jimena was a strong category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that remained over the open eastern and central North Pacific during its lifetime. Jimena weakened to a tropical storm and eventually dissipated while passing well north of the Hawaiian Islands. Jimena was the fifth tropical cyclone in 2015 to cross into the central Pacific from the eastern North Pacific basin.

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[1] Original report date 4 February 2016. Updated 18 March 2016 to include best track analysis from CPHC.

Hurricane Jimena

26 AUGUST – 9 SEPTEMBER 2015

SYNOPTIC HISTORY

Jimena originated from a tropical wave that moved off of the west coast of Africa on 13 August and moved westward across the tropical Atlantic, producing only sporadic convection for the next week. The low-latitude wave reached the eastern North Pacific late on 20 August and convection began to gradually increase as the disturbance interacted with the Intertropical Convergence Zone. By 22 August, a broad low pressure area had formed along the wave axis when the system was located several hundred miles south of the Gulf of Tehuantepec. Showers and thunderstorms began to develop into narrow curved bands, although they were well removed from the center but within the large circulation of the disturbance. The westward-moving low steadily contracted and a well-defined low-level circulation center became evident by 1200 UTC 25 August. The system turned toward the west-northwest early on 26 August, and convection increased and became sufficiently organized for the low to be considered a tropical depression around 1200 UTC later that day when it was located about 640 n mi 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[2].

The depression turned back toward the west and steadily strengthened over the next 24 h, becoming a tropical storm by 0600 UTC 26 August as the cyclone moved into a region of light vertical wind shear of 5-10 kt. Now possessing a tighter inner-core wind field with a radius of maximum winds (RMW) of 35 n mi, Jimena experienced a period of explosive deepening over the next 48 h and rapidly strengthened by 100 kt, reaching its peak intensity of 135 kt – just below category 5 status – at 0600 UTC 29 August when the hurricane was located about 1050 n mi southwest of the southern tip of Baja California. During this rapid intensification phase, Jimena's eye diameter decreased from about 30 n mi down to less than 10 n mi.

Shortly after reaching its peak intensity, Jimena underwent an eyewall replacement cycle (ERC) and began a slight weakening trend when the cyclone turned back toward the west-northwest as it rounded the southwestern periphery of a deep-layer subtropical ridge. Jimena completed the ERC around 1200 UTC 30 August and began to re-intensify, strengthening to an intensity of 130 kt by 0000 UTC 31 August with an eye diameter of 35-40 n mi. About 12 h later, a second ERC began, along with the entrainment of drier mid-level dry air and significant upwelling of colder water beneath the powerful cyclone (Fig. 4). The combination of these three unfavorable parameters induced a steady weakening trend, despite the very low 850-200 mb vertical wind shear of less than 5 kt, by 1800 UTC 31 August when the category 4 hurricane was

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[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 *btk* directory, while previous years' data are located in the *archive* directory.

located about 1100 n mi east-southeast of the Hawaiian Islands. Jimena continued its west-northwestward motion, weakened to a category 3 hurricane, and crossed 140°W longitude and moved into the Central Pacific hurricane basin shortly after 1200 UTC 1 September with an intensity of 105 kt.

After crossing into the Central Pacific, westerly vertical wind shear in excess of 20 kt caused Jimena to maintain its slow weakening trend, and the cyclone became a tropical storm by 1800 UTC 5 September. Jimena turned westward and became a depression by 1200 UTC 9 September as it passed several hundred miles northeast of the main Hawaiian Islands. Now moving west-southwestward, the low- level circulation center decoupled from the deep convection and Jimena degenerated into a remnant low pressure system by 0000 UTC 10 September, about 200 n mi north-northeast of Honolulu, Hawaii. The remnant low dissipated 6 h later about 180 n mi northeast of the island of Kauai.

METEOROLOGICAL STATISTICS

Observations in Jimena (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) east of 140°W longitude, and WFO Honolulu (PHFO), the Satellite Analysis Branch (SAB), and the Joint Typhoon Warning Center (JTWC) west of 140° W. Objective Advanced Dvorak Technique (ADT) estimates were obtained from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison (CIMSS-UW). 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 Jimena.

Only one ship report of tropical-storm-force winds was received, which occurred at 1800 UTC 8 September when the cargo ship *Maui* (call sign **WSLH**) reported a sustained wind of 51 kt.

Winds and Pressure

The estimated peak intensity of 135 kt at 0600 UTC 29 August is based on an ADT intensity estimate of T6.8/135 kt from CIMSS-UW. The minimum central pressure of 932 mb, which was coincident with the Jimena's peak intensity, is based on the Knaff-Zehr-Courtney (KZC) pressure-wind relationship.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Jimena was reasonably well forecast (Table 2), but mainly in the 5-day forecast period. The cyclone's precursor disturbance was first introduced into the Tropical Weather Outlook (TWO) with a 20% (low) chance of formation in five days at 0000 UTC 21 August, which is an unusually long lead time of 132 h prior to genesis. The disturbance was introduced in the 48-h forecast period at 0000 UTC 24 August with a 10% (low) chance of development. The 5-day and 48-h formation probabilities were increased to the medium chance category (30-50%) 96 h and 24 h, respectively, before genesis occurred. The 5-day genesis probability reached the high ($\geq$ 70%) chance category 72 h before genesis occurred, but the 48-h probability only reached the high chance category 12 h before Jimena formed into a tropical cyclone.

A verification of NHC official track forecasts for Jimena is given in Table 3a. Official forecast track errors were noticeably lower than the mean official errors for the previous 5-yr period at all forecast times, ranging from 20% to 30% lower than average. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. OFCL forecasts were comparable to or outperformed most of the available track model guidance at most forecast times. There were, however, two noticeable exceptions – the consensus models TCON and TVCE were superior to OFCL at all forecast times.

A verification of NHC official intensity forecasts for Jimena is given in Table 4a. OFCL intensity errors compared to the mean official errors for the previous 5-yr period were mixed, with above-average errors at 12, 24, and 36 h and below-average errors at 48, 72, 96 and 120 h. More specifically, intensity errors at 12-36 h ranged from 20%-25% worse than average, but errors at 72-120 h were about 40%-55% better than average. Although the timing and magnitude of Jimena's peak intensity was missed due to not anticipating the rapid intensification phase, the hurricane's weakening phase was forecast extremely well (Fig. 5), which explains the better-than-average OFCL intensity errors in the 72-120 h period. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. NHC official intensity forecasts outperformed all available intensity guidance at all forecast periods, except for the LGEM model at 12 h and 24 h and the Florida State Superensemble Model (FSSE) at 24h and 36 h.

A verification of CPHC official track forecasts for Jimena is given in Table 5. CPHC track errors for this system were smaller than the mean official errors for the previous 5-yr period at all forecast times. In general, the ECMWF (EMXI) and NOAA GFS (GFSI) models performed best for track forecasts in the central Pacific basin for this storm, while the Canadian (CMCI), GFDL and shallow Beta Advection models were the worst performing models. The NWS Global Ensemble Forecast System (AEMI) was the top performing guidance model in the later forecast periods.

A verification of CPHC official intensity forecasts for Jimena is given in Table 6. CPHC intensity errors were lower than mean official errors for the previous 5-yr period at all forecast times. Overall, the ICON and IVCN consensus models performed the best, while the regional dynamical models HWFI and GHMI were the worst performing intensity models, especially at 72-120 h.

No tropical cyclone coastal watches or warnings were associated with Jimena, and no tropical-storm-force winds were recorded across the Hawaiian Islands.

Table 1.   Best track for Hurricane Jimena, 26 August – 9 September 2015.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 1200	9.7	104.9	1008	25	low
25 / 1800	9.9	106.1	1008	25	"
26 / 0000	10.0	107.5	1008	25	"
26 / 0600	10.1	109.2	1008	25	"
26 / 1200	10.4	110.9	1007	25	tropical depression
26 / 1800	10.8	112.6	1007	25	"
27 / 0000	11.5	114.1	1006	30	"
27 / 0600	12.2	115.7	1005	35	tropical storm
27 / 1200	12.4	117.1	1003	40	"
27 / 1800	12.4	118.3	1000	50	"
28 / 0000	12.3	119.4	998	60	"
28 / 0600	12.2	120.5	989	70	hurricane
28 / 1200	12.3	121.5	979	80	"
28 / 1800	12.3	122.6	968	95	"
29 / 0000	12.3	123.6	952	115	"
29 / 0600	12.2	124.4	932	135	"
29 / 1200	12.4	125.1	935	130	"
29 / 1800	12.7	125.9	940	125	"
30 / 0000	13.0	126.9	945	120	"
30 / 0600	13.4	127.8	945	120	"
30 / 1200	14.0	129.0	945	120	"
30 / 1800	14.5	130.3	941	125	"
31 / 0000	14.9	131.8	936	130	"
31 / 0600	15.2	133.3	936	130	"
31 / 1200	15.4	134.7	936	130	"
31 / 1800	15.8	136.2	940	125	"
01 / 0000	16.1	137.5	944	120	"
01 / 0600	16.3	138.7	948	115	"
01 / 1200	16.6	139.6	954	105	"

01 / 1800	16.8	140.4	955	105	"
02 / 0000	17.1	141.2	959	100	"
02 / 0600	17.4	141.9	959	100	"
02 / 1200	17.6	142.4	961	95	"
02 / 1800	17.9	142.9	965	90	"
03 / 0000	18.2	143.3	965	90	"
03 / 0600	18.4	143.5	965	90	"
03 / 1200	18.6	143.7	965	90	"
03 / 1800	18.9	144.0	965	90	"
04 / 0000	19.2	144.4	968	85	"
04 / 0600	19.4	144.6	971	80	"
04 / 1200	19.6	144.9	975	75	"
04 / 1800	19.9	145.2	978	70	"
05 / 0000	20.2	145.5	981	65	"
05 / 0600	20.6	145.8	978	70	"
05 / 1200	21.0	146.1	982	65	"
05 / 1800	21.5	146.5	985	60	tropical storm
06 / 0000	22.1	146.9	988	55	"
06 / 0600	22.9	147.3	991	50	"
06 / 1200	23.7	147.7	991	50	"
06 / 1800	24.5	148.2	994	45	"
07 / 0000	25.3	148.8	995	45	"
07 / 0600	25.9	149.4	995	45	"
07 / 1200	26.1	149.8	995	45	"
07 / 1800	26.2	150.2	995	45	"
08 / 0000	26.3	150.6	995	45	"
08 / 0600	26.3	151.2	996	45	"
08 / 1200	26.3	152.1	995	50	"
08 / 1800	26.2	152.8	995	50	"
09 / 0000	26.0	153.6	998	45	"
09 / 0600	25.8	154.5	1000	40	"
09 / 1200	25.5	155.2	1004	30	tropical depression
09 / 1800	25.0	156.0	1005	30	"

10 / 0000	24.7	156.8	1005	30	low
10 / 0600					dissipated
29 / 0600	12.2	124.4	932	135	minimum pressure and maximum intensity

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 (<30%)	60	132
Medium (30%-50%)	24	96
High (>50%)	6	72

Table 3a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Jimena. 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	**17.0**	**27.1**	**37.9**	**45.6**	**60.0**	**83.0**	**109.1**
OCD5	29.4	65.2	103.7	138.3	196.8	232.7	254.7
Forecasts	24	24	24	24	24	24	24
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 Jimena. 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	15.6	27.8	39.6	47.7	62.1	83.4	105.2
OCD5	28.9	67.3	107.2	141.7	200.0	243.5	267.5
GFSI	**14.4**	**24.7**	**34.0**	48.3	71.6	92.3	124.1
EMXI	20.2	34.7	46.7	56.7	73.2	90.9	105.5
EGRI	16.7	30.8	47.0	62.4	72.4	**75.9**	117.7
CMCI	22.2	34.5	47.7	63.2	105.5	150.7	199.9
NVGI	27.8	53.1	74.1	89.5	93.2	87.1	107.5
GHMI	15.9	**25.6**	**34.4**	48.2	79.2	133.7	190.4
HWFI	16.2	27.9	**39.4**	52.9	71.3	**82.1**	108.9
GFNI	22.7	42.4	56.0	65.5	91.3	116.0	144.2
AEMI	**14.2**	**27.3**	**36.8**	**47.0**	63.8	89.5	122.5
FSSE	**15.3**	**25.3**	**38.3**	48.0	62.7	92.3	128.9
TCON	**13.9**	**24.1**	**34.2**	**43.6**	**51.2**	**70.4**	**100.2**
TVCE	**14.4**	**25.4**	**35.5**	**43.6**	**52.9**	**72.5**	**99.3**
LBAR	23.8	50.1	81.5	109.3	129.2	98.3	107.6
BAMD	21.5	34.1	52.3	65.0	78.9	92.5	114.5
BAMM	24.7	40.3	52.7	64.1	66.5	**72.9**	111.9
BAMS	27.8	47.2	63.3	80.4	95.1	109.9	140.0
Forecasts	22	22	22	22	22	22	22

Table 4a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Jimena. 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	8.1	12.9	14.0	**12.7**	**8.8**	**7.3**	**6.3**
OCD5	10.1	18.6	24.4	29.3	32.4	34.4	25.7
Forecasts	24	24	24	24	24	24	24
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 Jimena. 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	8.6	13.2	13.2	10.2	5.9	5.5	5.2
OCD5	10.9	19.3	24.5	27.7	30.4	32.0	22.6
HWFI	11.1	16.4	18.3	19.0	15.6	11.1	8.9
GHMI	14.5	23.4	25.7	22.6	16.2	14.6	13.7
GFNI	17.2	28.6	34.8	35.5	32.3	25.5	17.0
DSHP	10.3	14.9	14.6	10.5	6.9	5.7	7.5
LGEM	**8.1**	**12.0**	13.5	13.4	9.4	12.5	14.0
FSSE	9.0	**12.7**	**12.3**	10.3	7.6	10.3	12.5
GFSI	11.0	18.9	21.5	21.5	23.0	25.7	30.7
EMXI	12.8	22.4	26.7	30.3	34.7	37.7	41.3
NVGI	14.6	22.5	23.5	23.1	26.0	29.4	31.3
ICON	10.5	15.4	15.9	13.8	10.6	9.5	8.3
IVCN	10.5	15.4	15.9	13.8	10.6	9.5	8.3
Forecasts	22	22	22	22	22	22	22

Table 5.   Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Jimena. Errors smaller than the CPHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (CPHC)	18.3	28.9	42.6	56.7	78.0	94.1	135.0
OCD5	29.3	65.9	110.5	153.0	208.5	241.2	270.9
GFSI	**15.9**	**26.7**	**39.8**	57.6	78.2	115.7	175.8
GHMI	**18.1**	32.0	46.7	60.9	78.4	100.4	137.7
HWFI	**17.4**	**28.5**	**38.0**	57.2	90.5	124.2	158.5
EMXI	**14.2**	**20.5**	**31.7**	**45.4**	**75.5**	95.3	**134.9**
CMCI	22.5	38.0	52.6	73.2	123.9	126.9	**120.2**
TVCE	**14.6**	**25.1**	**39.5**	56.9	79.3	**91.3**	**99.1**
AEMI	**16.5**	**28.2**	**41.8**	57.8	**68.0**	**88.0**	**111.9**
BAMS	43.5	85.9	123.8	156.9	186.0	194.6	174.6
BAMM	28.4	44.3	56.6	68.5	**73.1**	**80.8**	123.7
BAMD	50.2	91.1	128.1	159.9	210.7	234.8	264.8
Forecasts	31	29	27	25	21	17	13

Table 6.   Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Jimena. Errors smaller than the CPHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (CPHC)	4.7	5.2	6.9	6.6	7.9	7.6	6.5
OCD5	6.3	9.7	12.1	8.9	14.8	12.3	**4.8**
HWFI	5.2	6.0	6.9	9.1	12.6	14.2	15.2
GHMI	5.2	6.5	9.7	11.9	17.4	21.0	18.8
DSHP	4.7	6.9	8.3	8.4	9.5	11.7	13.0
LGEM	4.9	7.4	8.8	8.2	10.0	11.2	13.2
ICON	**4.5**	5.5	**6.2**	6.7	8.5	8.3	9.4
IVCN	**4.5**	5.5	**6.2**	6.7	8.6	8.1	9.4
Forecasts	31	29	27	25	21	17	13
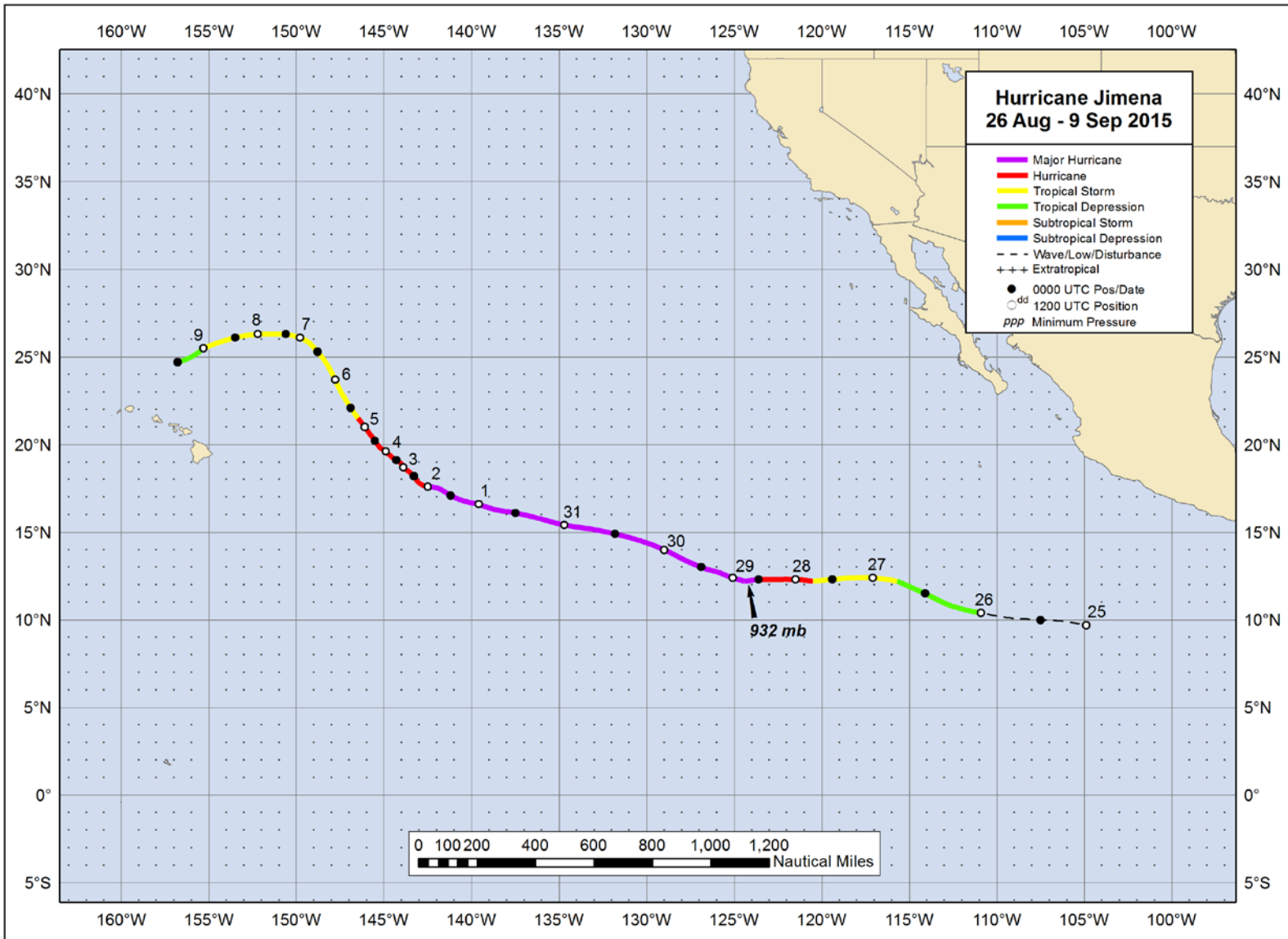
Figure 1.   Best track positions for Hurricane Jimena, 26 August – 9 September 2015.
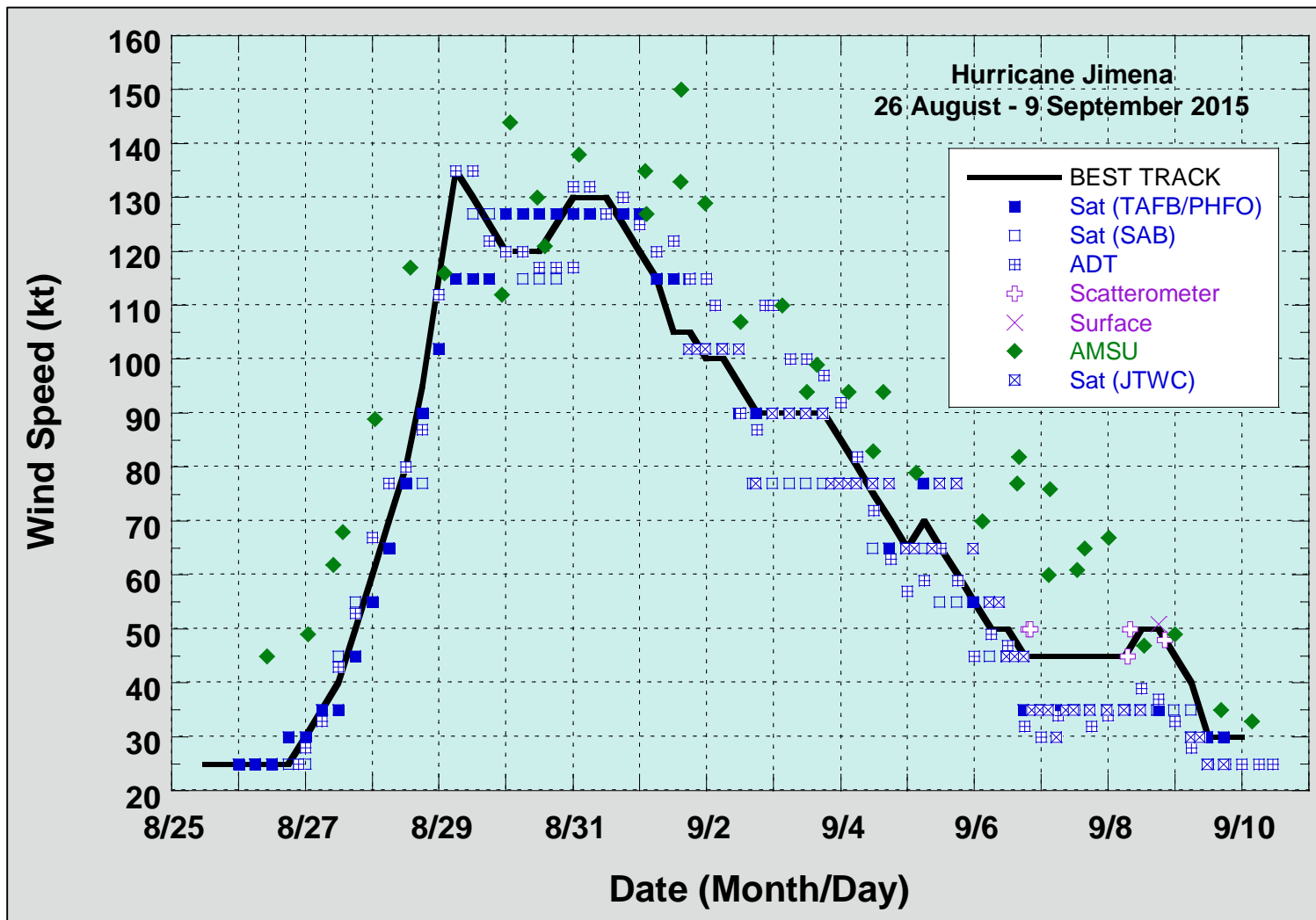
Figure 2.   Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Jimena, 26 August – 9 September 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.
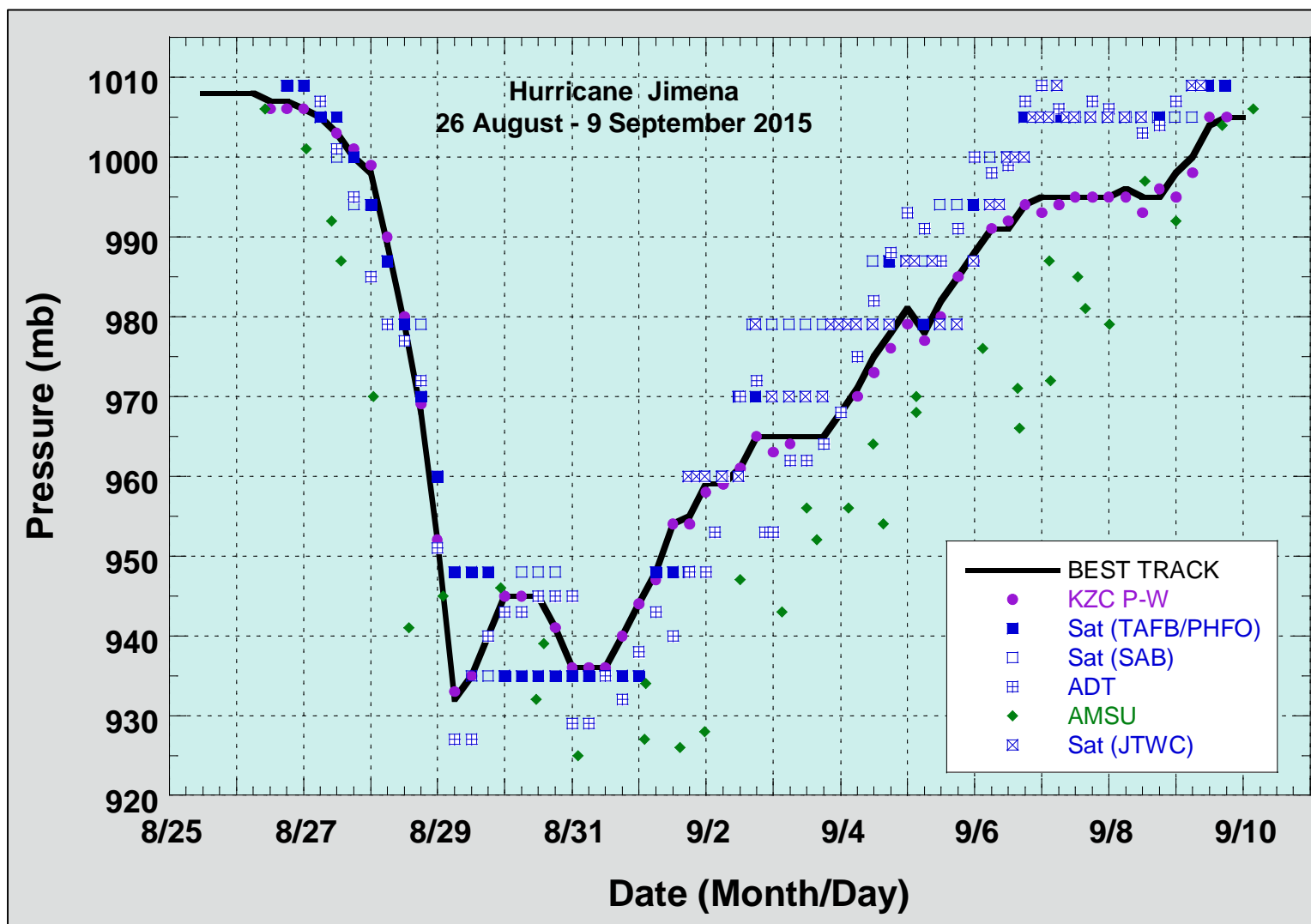
Figure 3.   Selected pressure observations and best track minimum central pressure curve for Hurricane Jimena, 26 August – 9 September 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute 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.
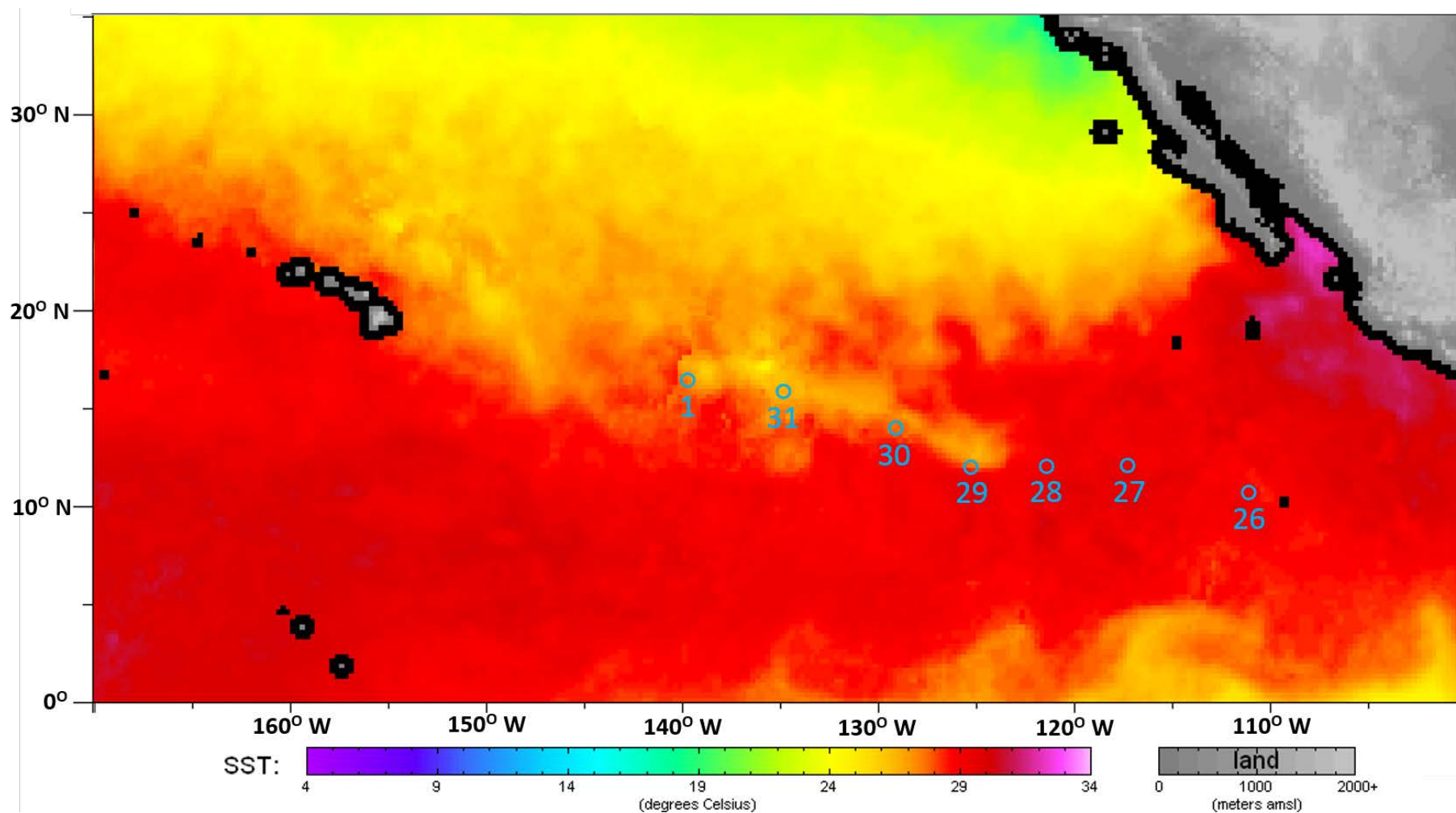
Figure 4.   Sea-surface temperature (SST) analysis at 1200 UTC 1 September 2015. Open circles indicate 1200 UTC best track positions for the days indicated. Ocean cooling can be seen along and just north of the track beginning on 29 August. Image courtesy of Remote Sensing Systems, Santa Rosa, CA.
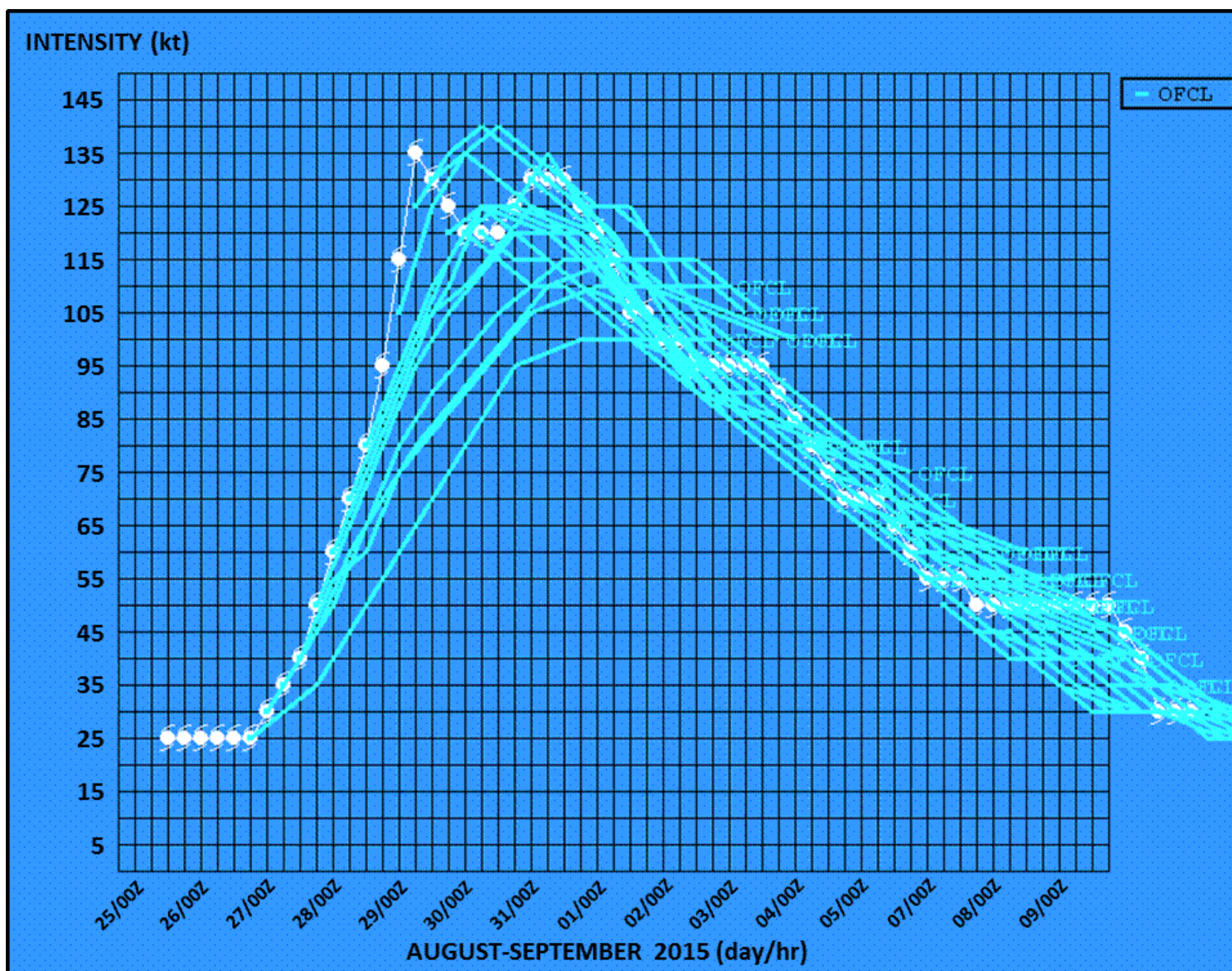
Figure 5.   NHC official intensity forecasts (solid light blue lines) plotted against official intensity 'best track' (solid white line with tropical cyclone symbols given at 6 h interval) for Hurricane Jimena, 26 August-9 September 2015.