

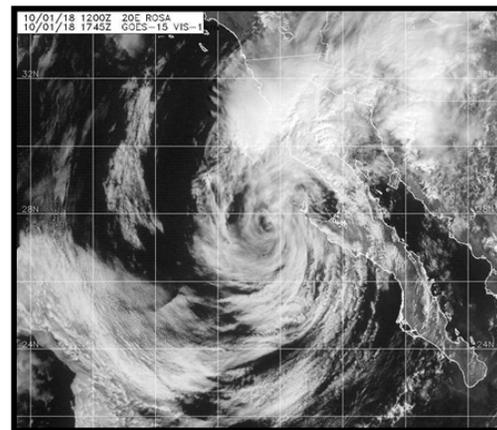
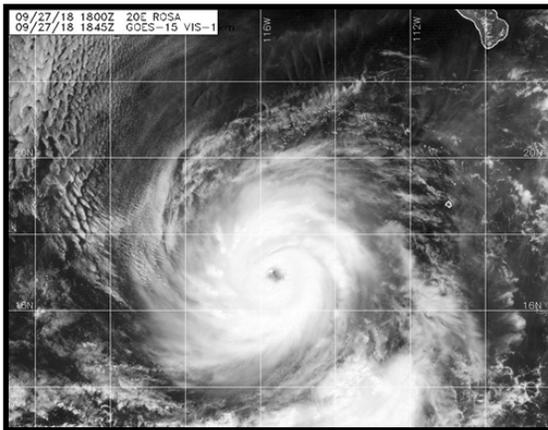


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE ROSA (EP202018)

25 September–2 October 2018

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National Hurricane Center
23 July 2019¹



GOES 15 VISIBLE SATELLITE IMAGES OF ROSA NEAR ITS PEAK INTENSITY (LEFT) AND AS A TROPICAL STORM (RIGHT) APPROACHING THE BAJA CALIFORNIA PENINSULA. IMAGES COURTESY FNMOC TC WEBPAGE.

Rosa was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that weakened significantly due to wind shear and cold waters by the time it reached the Baja California peninsula. It caused minimal damage.

¹ Original report dated 30 January 2019. This version corrects best track information in Table 1.

Hurricane Rosa

25 SEPTEMBER–2 OCTOBER 2018

SYNOPTIC HISTORY

Hovmöeller diagrams of conventional infrared satellite imagery showed a large and vigorous tropical wave moving off the west coast of Africa on 6 September, and Hurricane Helene formed from this system and moved northwestward over the Atlantic. The parent wave continued westward with little associated weather across the tropical Atlantic while trailing the remnants of Tropical Storm Isaac. Once in the central Caribbean Sea, the wave interacted with a large mid-level trough and was very difficult to track. However, extrapolation suggests that the disturbance moved westward and reached the area just south of the Gulf of Tehuantepec on 22 September, when a marked increase in the convective organization occurred accompanied by the formation of a surface circulation, and a tropical depression developed at 0600 UTC 25 September about 350 n mi south-southwest of Manzanillo, Mexico. The “best track” chart of the 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.

Although there was some modest northeasterly shear impinging on the northeast side of the cyclone, the cloud pattern became better organized with impressive convective banding features, and it is estimated that the depression became a tropical storm by 1200 UTC 25 September while moving slowly toward the west-northwest. Rosa’s cloud pattern continued to organize and microwave data showed a small low-level eye feature, suggesting that rapid intensification (RI) could occur. Indeed, RI did occur as the inner core of the cyclone consolidated, and it is estimated that Rosa became a hurricane at 1200 UTC 26 September while moving away from the southwestern coast of Mexico. Rosa turned westward, steered by a strong subtropical ridge to the north, and continued to rapidly intensify, and by 0600 UTC 28 September the hurricane reached its peak intensity of 130 kt and a minimum pressure of 936 mb. After that time, weakening began, apparently in association with an eyewall replacement cycle. Rosa reached the southwestern edge of the subtropical ridge and began to turn northwestward toward a less conducive environment as a mid-level trough approached from the west and induced shear. Rosa fluctuated in intensity for the next 24 to 36 h, but with a general weakening trend. On 30 September, Rosa turned northeastward toward the Baja California peninsula and weakened significantly before it made landfall about 60 n mi southeast of Punta San Antonio on the west-central coast of the peninsula, as a tropical depression just before 1200 UTC on 2 October. Rosa dissipated by 1800 UTC 20 October as the circulation interacted with the high terrain of the peninsula.

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.

METEOROLOGICAL STATISTICS

Observations in Rosa (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 and Satellite Consensus (SATCON) 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 one mission of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command, which was flown on 30 September, when the cyclone was heading toward the Baja California peninsula. 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 Rosa.

Rosa's peak intensity of 130 kt at 0600 UTC 28 September was based on a blend of both objective and subjective Dvorak estimates from different agencies.

An automatic station operated by the Mexican Navy on Isla Cedros reported a wind gust of 40 kt around 2100 UTC 1 October, and Isla Guadalupe reported a wind gust of 46 kt around 1500 UTC 1 October. Rosa produced heavy rains over the northern portion of the Baja California peninsula as indicated in Fig 4. The highest amount reported was reported in the town of Percebu with 6.50 inches (166 mm).

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Rosa was adequately forecast. The system was introduced in the 5-day Tropical Weather Outlook (TWO) with a low chance (<40%) of formation about 132 h prior to genesis, and the 5-day probability was raised to medium (40–60%) about 108 h beforehand, and to the high category (>60%) 54 h before formation (Table 2). However, the 2-day probability was raised to the high category only 18 h before genesis.

A verification of NHC official track forecasts for Hurricane Rosa is given in Table 3a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period, except at 36 h. A homogeneous comparison of the official track errors with selected guidance



models is given in Table 3b. The HFIP Corrected Consensus (HCCA) as well as the TVCE multi-model consensus performed better than the NHC forecast at several forecast lead times.

A verification of NHC official intensity forecasts for Hurricane Rosa is given in Table 4a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period at the 48 h period and beyond. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The intensity consensus models ICON and IVCN performed better than the official forecast at all time periods.

Watches and warnings associated with Hurricane Rosa are given in Table 5.



Table 1. Best track for Hurricane Rosa, 25 September–2 October 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 0600	14.4	106.9	1006	30	tropical depression
25 / 1200	14.6	107.7	1004	40	tropical storm
25 / 1800	14.8	108.5	1000	45	"
26 / 0000	15.0	109.3	997	50	"
26 / 0600	15.4	110.0	994	55	"
26 / 1200	16.0	110.8	990	65	hurricane
26 / 1800	16.4	111.7	982	75	"
27 / 0000	16.8	112.6	982	75	"
27 / 0600	17.0	113.6	979	75	"
27 / 1200	17.0	114.6	971	90	"
27 / 1800	17.0	115.5	957	105	"
28 / 0000	16.9	116.4	940	125	"
28 / 0600	16.9	117.1	936	130	"
28 / 1200	17.0	117.5	942	120	"
28 / 1800	17.4	117.8	955	105	"
29 / 0000	17.9	118.0	964	95	"
29 / 0600	18.8	118.2	971	85	"
29 / 1200	19.7	118.4	971	85	"
29 / 1800	20.7	118.7	968	90	"
30 / 0000	21.8	118.9	969	85	"
30 / 0600	22.8	118.9	972	80	"
30 / 1200	23.8	118.8	982	70	"
30 / 1800	24.7	118.4	982	65	"
01 / 0000	25.6	117.9	989	55	tropical storm
01 / 0600	26.3	117.3	994	45	"
01 / 1200	27.1	116.7	1000	40	"
01 / 1800	27.8	116.3	1001	35	"
02 / 0000	28.3	115.7	1002	30	tropical depression
02 / 0600	28.9	115.1	1003	30	"
02 / 1200	29.3	114.4	1005	30	"



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
02 / 1800					dissipated
02 / 1100	29.2	114.6	1005	30	landfall 60 n mi southeast of Punta San Antonio
28 / 0600	16.9	117.1	936	130	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%)	54	132
Medium (40%-60%)	30	108
High (>60%)	18	54



Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Rosa. 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	20.1	31.5	43.4	52.0	64.2	94.4	146.4
OCD5	28.8	72.6	125.9	181.9	283.8	409.8	470.9
Forecasts	28	26	24	22	18	14	10
OFCL (2013-17)	21.8	33.2	43.0	53.9	80.7	111.1	150.5
OCD5 (2013-17)	34.9	70.7	109.1	146.1	213.8	269.0	339.7

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Rosa. 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	20.9	32.2	42.9	50.7	66.0	97.9	138.8
OCD5	30.5	76.7	132.8	192.7	306.5	467.2	526.9
GFSI	20.3	39.0	60.5	73.8	77.9	111.9	169.1
HMNI	25.5	39.0	47.4	63.6	64.3	102.9	231.5
HWFI	22.9	32.5	43.2	52.1	99.4	154.6	118.4
EMXI	23.7	36.6	45.7	61.1	103.7	161.1	246.9
CMCI	24.0	35.5	45.6	63.3	94.0	155.5	277.4
NVGI	27.5	45.9	58.0	66.3	100.2	147.9	236.2
AEMI	19.9	38.0	54.1	60.2	78.5	97.0	101.0
HCCA	20.6	31.5	39.8	49.2	76.7	120.5	160.3
TVCX	18.3	27.8	34.8	43.9	71.3	107.7	138.8
GFEX	18.7	30.2	40.4	50.5	70.5	109.2	119.4
TVCE	19.8	29.2	37.8	44.7	66.4	99.8	116.7
TABD	34.5	69.4	95.9	111.1	111.7	133.3	172.3
TABM	25.6	49.7	74.0	89.1	92.0	121.7	180.2
TABS	28.8	55.1	76.5	94.5	106.9	135.4	191.8
FSSE	20.5	32.2	39.1	44.9	79.2	115.7	117.8
Forecasts	26	24	22	20	16	12	8



Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Rosa. 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	8.2	11.9	11.9	8.9	14.2	11.8	16.0
OCD5	9.9	17.3	19.2	18.9	24.4	20.9	12.6
Forecasts	28	26	24	22	18	14	10
OFCL (2013-17)	5.8	9.6	11.8	13.2	15.1	15.1	14.6
OCD5 (2013-17)	7.6	12.4	15.6	17.7	19.8	20.8	19.6

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Rosa. 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	8.1	12.2	11.5	9.0	16.3	11.9	16.1
OCD5	10.0	17.2	19.3	17.7	25.3	19.9	12.7
HWFI	8.9	10.4	11.3	9.4	13.5	12.5	21.3
HCCA	6.9	9.6	9.4	8.8	13.0	13.2	14.9
DSHP	9.0	12.9	13.9	12.4	16.3	17.6	19.7
LGEM	8.8	12.2	12.3	8.5	8.1	7.8	8.2
GFSI	8.6	14.2	16.7	16.0	16.3	15.7	16.1
EMXI	10.4	15.6	19.9	21.0	22.5	13.8	9.2
HMNI	7.1	11.8	14.7	16.2	19.7	12.2	10.4
NVGI	10.6	16.9	21.0	22.6	30.5	26.4	17.3
AEMI	10.1	17.2	24.3	27.4	31.7	30.8	25.8
ICON	7.3	10.0	10.2	7.6	10.0	7.8	12.8
IVCN	6.7	9.5	9.5	7.6	10.1	8.1	12.9
Forecasts	27	25	23	21	15	13	9



Table 5. Watch and warning summary for Hurricane Rosa, 25 September–2 October, 2018.

Date/Time (UTC)	Action	Location
29 / 1200	Tropical Storm Watch issued	Punta Abreojos to Cabo San Quintin
30 / 0000	Tropical Storm Watch changed to Tropical Storm Warning	Punta Abreojos to Cabo San Quintin
30 / 0000	Tropical Storm Watch issued	Bahia de Los Angeles to San Felipe
2 / 0600	Tropical Storm Watch discontinued	All
2 / 0600	Tropical Storm Warning discontinued	All

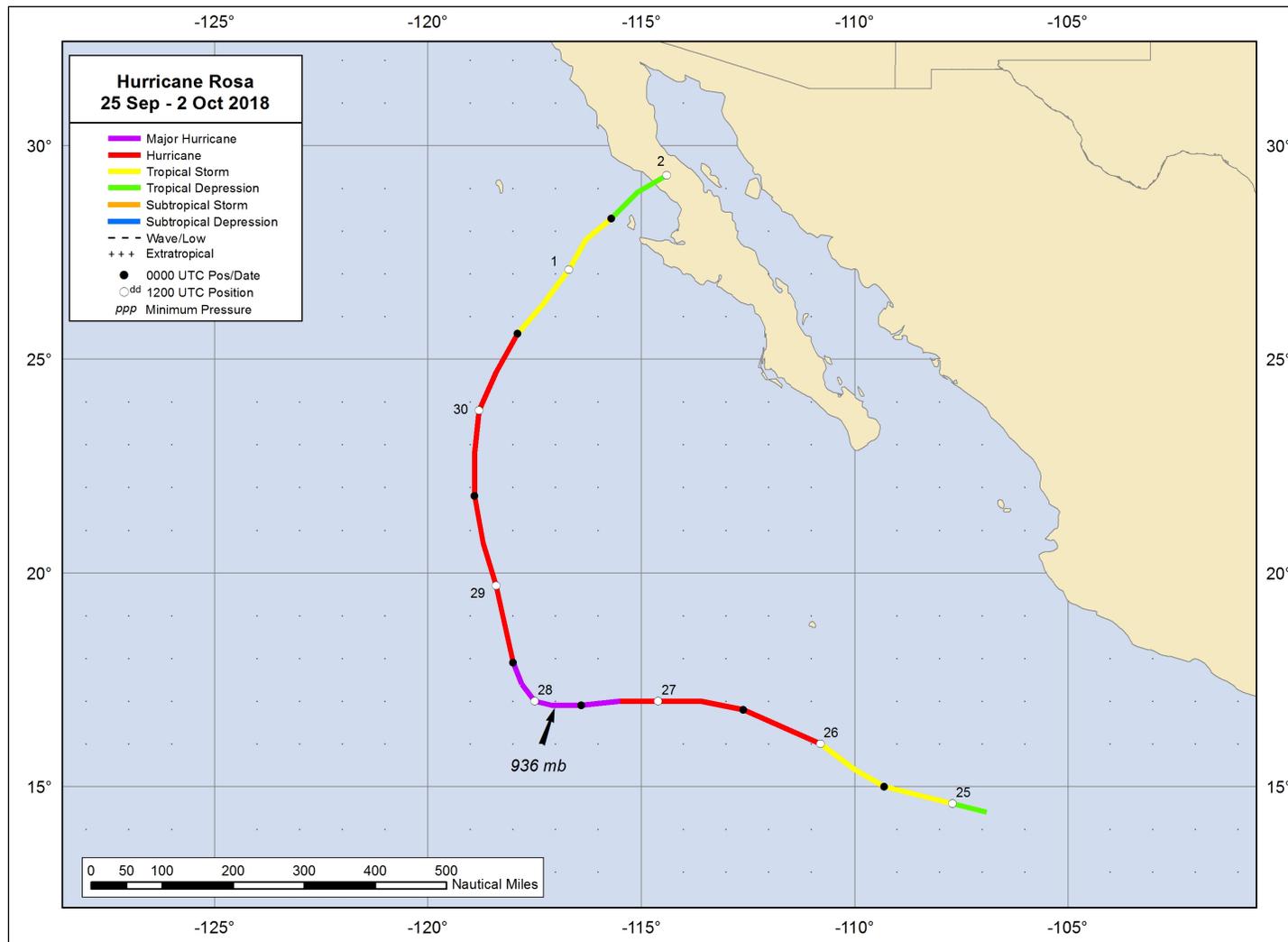


Figure 1. Best track positions for Hurricane Rosa 25 September–2 October 2018.

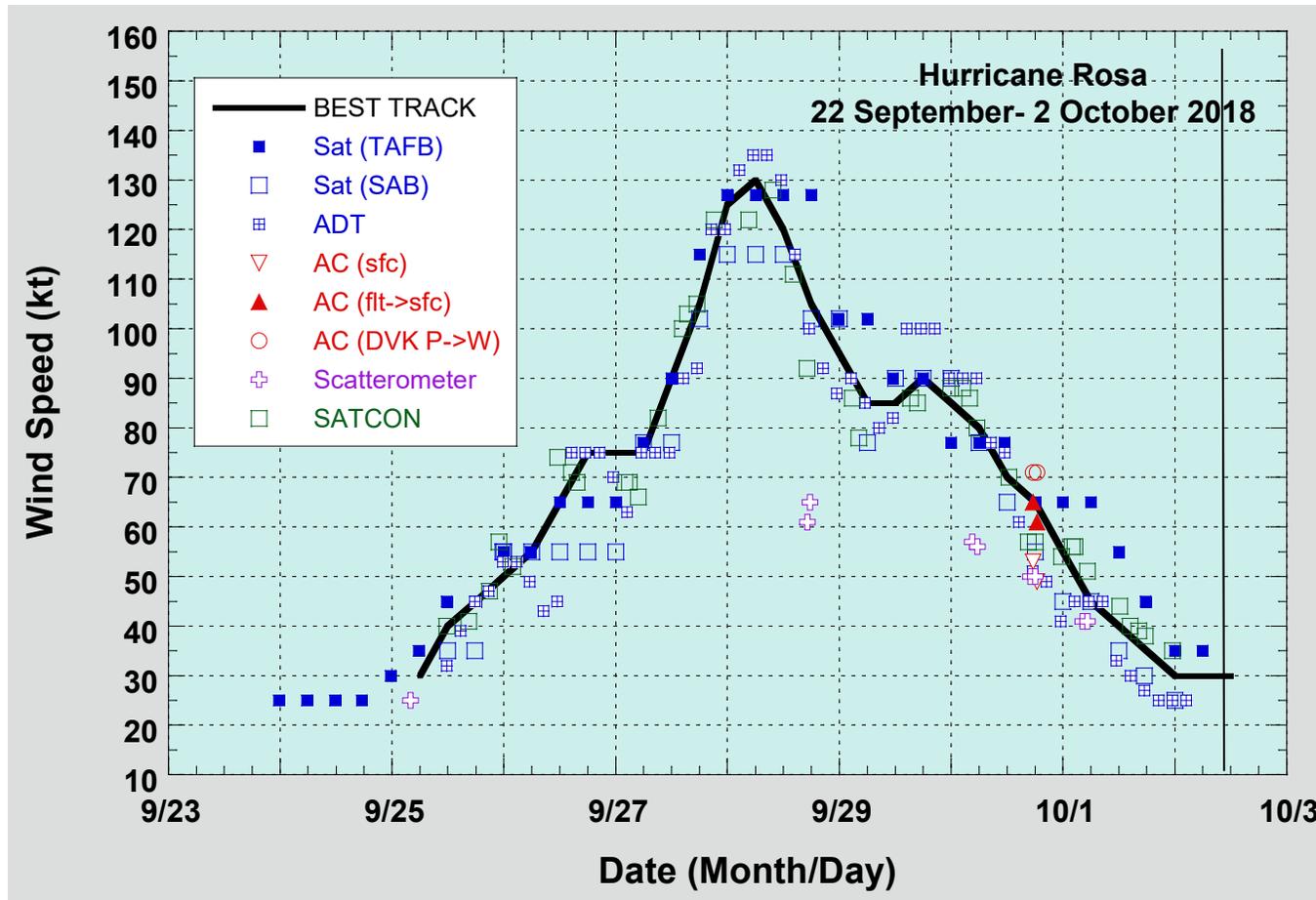


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Rosa, 25 September–2 October 2018. Aircraft observations have been adjusted for elevation using 90% adjustment factor for observations from 700 mb. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC, and the solid vertical line corresponds to landfall.

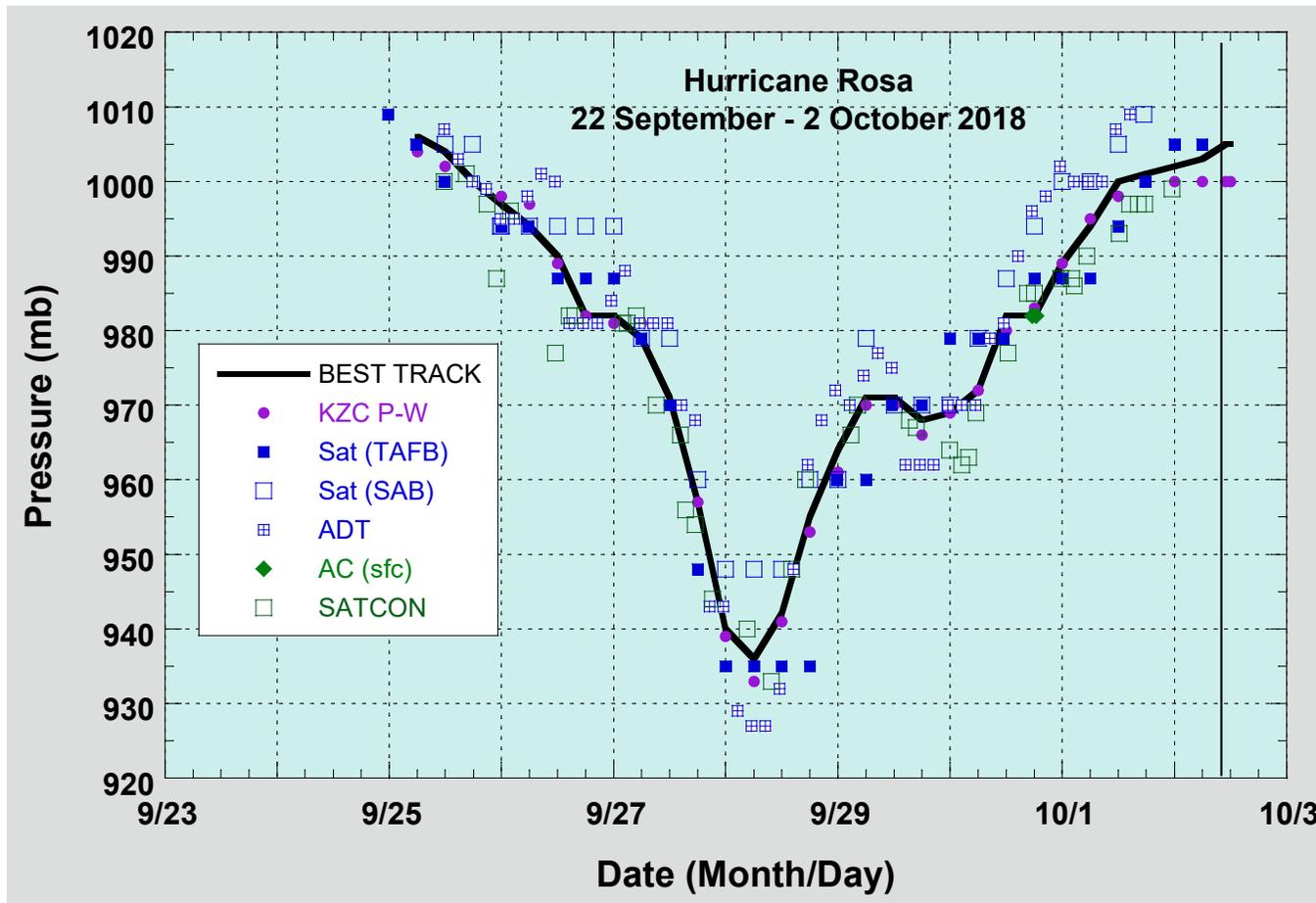


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Rosa, 25 September–2 October 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. 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.

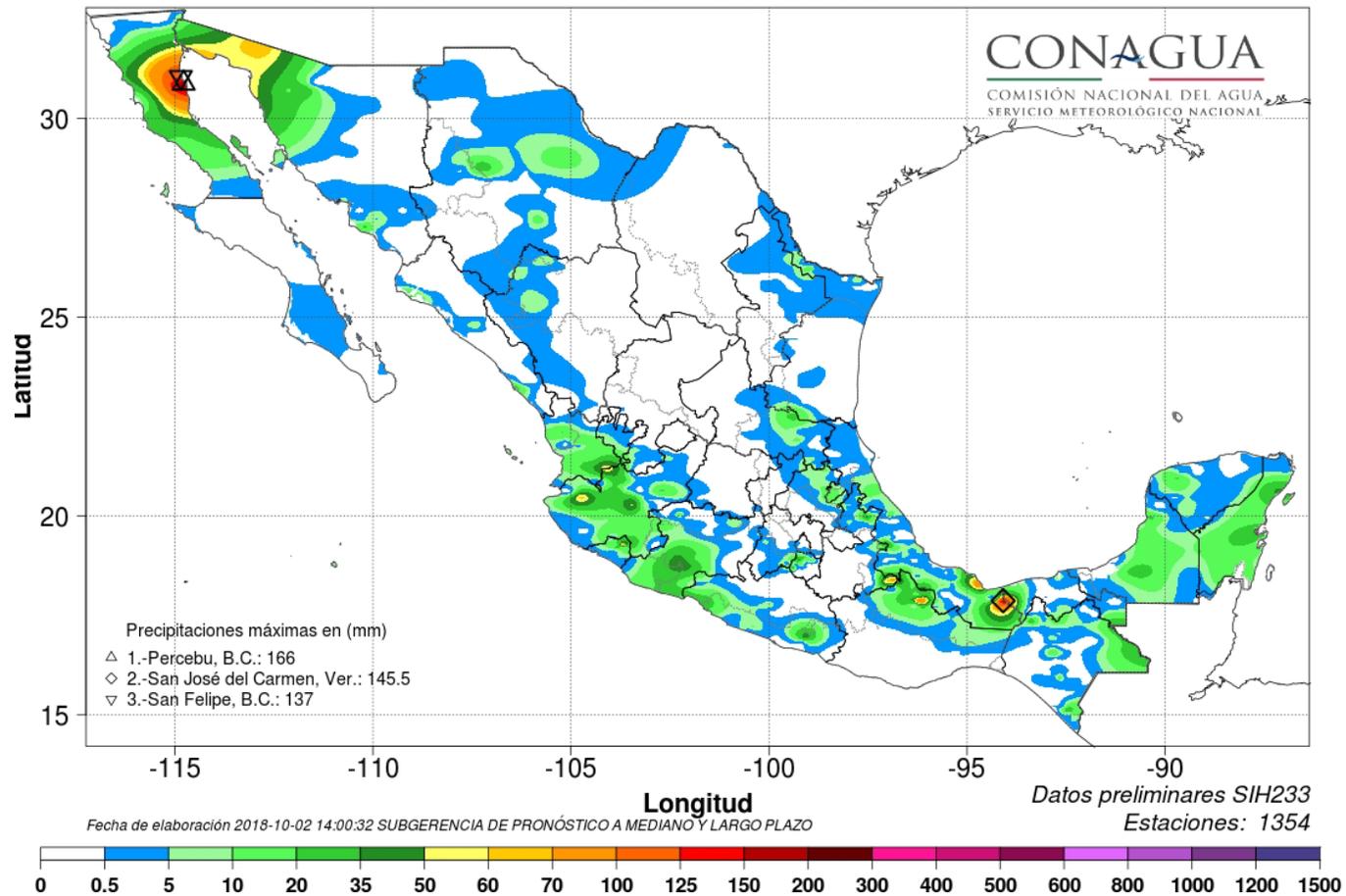


Figure 4. Total rainfall (mm) in the 24 hours from 1200 UTC 1 October to 1200 UTC 2 October 2018 associated with Rosa. The area of maximum rainfall on the northern portion of the Baja California peninsula coincides with the region of deep convection in the cover photo. Figure provided by the Servicio Meteorológico Nacional de México, CONAGUA.