NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE NORA

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25–30 August 2021

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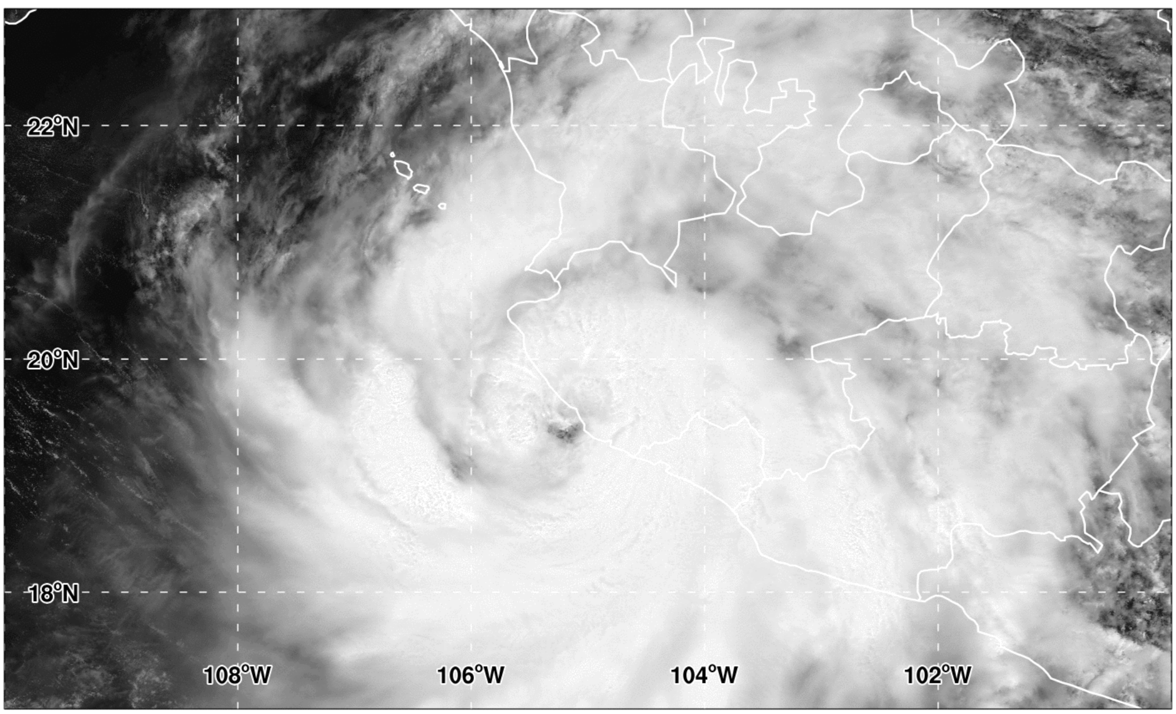

GOES-17 VISIBLE SATELLITE IMAGE AT 1900 UTC 28 AUGUST 2021, SHOWING HURRICANE NORA NEAR PEAK INTENSITY. DATA USED TO CREATE THIS SATELLITE IMAGE COURTESY OF THE NOAA BIG DATA PROJECT.

Nora was a category 1 hurricane on the Saffir-Simpson Hurricane Wind Scale that made landfall in Mexico in the state of Jalisco. The hurricane then moved northward, skirting the western mainland Mexican coastline while rapidly weakening. Nora resulted in 3 fatalities and substantial structural damage occurred in Jalisco related to widespread flooding, landslides, and fallen trees across coastal municipalities.

Hurricane Nora

25–30 AUGUST 2021

SYNOPTIC HISTORY

Nora's origins can be partially traced back to an easterly wave that emerged off the west coast of Africa on 13 August. Over the next 5 days, this low-amplitude wave moved quickly westward, steered by a poleward subtropical ridge that built westward with the system. While initially devoid of convection, the wave axis started to produce more diurnal convection as it crossed the Lesser Antilles and moved into the Caribbean Sea on 19 August, though this activity remained poorly organized. On 22 August, the wave axis reached Central America, and by 23 August it was beginning to interact with the pre-existing monsoon trough located in the far eastern Pacific. This interaction resulted in enhanced moisture convergence that aided in the formation of a broad area of deep convection. While this activity remained disorganized, it helped to spawn a well-defined, albeit broad, area of low pressure by 0600 UTC 24 August several hundred n mi south of the Gulf of Tehuantepec. The initial system was embedded in a very moist mid-level environment over warm 29°C sea surface temperatures. However, convection only slowly became better organized around the area of low pressure due to the broad structure of the incipient system and persistent 15–20 kt deep-layer (200–850 mb) easterly vertical wind shear that prevented more organized deep convection near the center. Finally, by 1200 UTC 25 August, this convective activity became sufficiently organized, marking the formation of a tropical depression about 300 n mi south-southeast of Acapulco, Mexico. Scatterometer data indicated that the depression intensified into Tropical Storm Nora 6 h later. The "best track" chart of Nora'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].

Over the next day or so, Nora changed little in intensity in an environment of moderate (20–25 kt) deep-layer northeasterly vertical wind shear while maintaining a sprawling structure with a large radius of maximum wind and multiple embedded mesovortices. During this period, the tropical cyclone maintained a general west-northwest heading, steered by a large deep-layer ridge located well poleward of the system over the central and eastern United States. On 27 August, Nora began to intensify as the shear subsided, enabling convection to develop in curved bands east of the center (Fig. 4a) as the radius of maximum wind started to contract. This strengthening coincided with the system turning to the north-northwest as the deep-layer ridging was eroded from an upper-level cutoff low over the western Gulf of Mexico. This rightward turn resulted in Nora approaching the southwestern Mexican coastline. Satellite imagery early on 28 August suggested that an eye was developing, and Nora is estimated to have reached hurricane intensity at 1200 UTC 28 August that day, about 100 n mi south-southwest of

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[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.

Manzanillo, Mexico. Intensification continued, and a GMI microwave image at 1559 UTC that day indicated Nora had developed a closed eyewall (Fig. 4b) while the hurricane accelerated northward towards the Mexican coast. An Air Force Reserve reconnaissance mission in combination with satellite imagery on the afternoon of 28 August indicated that Nora reached a peak intensity of 75 kt by 1800 UTC (cover photo). The hurricane then made landfall at that intensity near Chola, Mexico, in the state of Jalisco at 2100 UTC 28 August.

Weakening commenced shortly thereafter as Nora was disrupted by the high, rugged terrain near the coastline of southwestern Mexico. This land interaction also made it challenging to track the surface center of Nora as it skirted the coast of Mexico, but it is estimated that it moved back offshore by 0000 UTC 29 August, passing near Puerto Vallarta, Mexico, roughly consistent with microwave imagery available around that time (Fig. 4c). Nora weakened to a tropical storm by 0600 UTC 29 August as it maintained a north-northwest motion along the Mexican coastline. Further weakening took place on 29 August due to continued land interaction as the storm remained near high terrain. Nora's center is estimated to have crossed land again at 1600 UTC 29 August, about 20 n mi southeast of Mazatlán, Mexico. The convective structure continued to deteriorate that afternoon (Fig. 4d), and Nora rapidly weakened to a tropical depression by 0600 UTC 30 August. At this juncture, the surface circulation was becoming increasingly diffuse as its motion slowed and bended back towards the northwest. Finally, scatterometer data and visible satellite imagery on 30 August indicated that Nora's surface circulation dissipated by 1800 UTC that day along the Mexican coast about 20 n mi southwest of Culiacan, Mexico. However, residual convective activity resulting in additional heavy rainfall continued along the mainland Mexican coast for another day or so after dissipation.

METEOROLOGICAL STATISTICS

Observations in Nora (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), 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 flight of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command, which provided two center fixes. 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 Nora.

Ship reports of winds of tropical storm force associated with Nora are given in Table 2.

Winds and Pressure

Nora's peak intensity of 75 kt from 1800–2100 UTC 28 August is based on a combination of satellite intensity estimates and wind data from a single Air Force Reserve reconnaissance mission. Subjective Dvorak peak satellite estimates from TAFB and SAB were both T4.5/77 kt from 1800–0000 UTC 28–29 August. SATCON estimates also ranged between 71–77 kt during this period. In addition, the final leg of the Air Force Reconnaissance mission measured a peak wind of 86 kt at 632 mb to the northeast of Nora's center at 2203 UTC 28 August, shortly before the aircraft began its return to base. While this value is a bit higher than the typical 700 mb flight-level used, a 90% wind reduction from at this level roughly equates to 77 kt at the surface, supporting the estimated peak intensity. The same aircraft also measured a peak SFMR wind of 64 kt at 1941 UTC 28 August. However, it should be noted that Nora was already near or crossing the coast at the time the aircraft was sampling the hurricane, and the eastern portion of the system was not as well sampled due to constraints that prevented the aircraft from flying near high terrain along the coast of Mexico.

Nora's estimated minimum pressure of 976 mb is also based on a combination of satellite and aircraft observations. A dropsonde that was released in the flight-level (700 mb) center of Nora measured a sea level pressure of 980 mb at 2125 UTC 28 August. Although wind speed data at the ocean surface was not reported, a strong northwest wind of 66 kt was reported at 15 m above sea level. These strong winds suggest that the dropsonde did not splash down in the surface center, but in strong winds in the southwestern eyewall due to vortex tilt between the surface and 700-mb centers after Nora made landfall. Therefore, the surface pressure is estimated to be lower than this surface dropsonde observation. The 976 mb minimum pressure estimate closely matches the Knaff-Zehr-Courtney pressure-wind relationship between 1800–2100 UTC 28 August, in addition to slightly lower estimates from SATCON and ADT during this time.

There were only a few wind and pressure observations near and along the Mexican coast where Nora passed, and many of these stations had incomplete records. A Servicio Meteorologico Nacional (SMN) automatic weather station at Chamela-Cuixmala, Jalisco (elevation 92 m), reported a peak sustained wind of 67 kt at 1840 UTC 28 August. In Manzanillo, a station (elevation 8 m) reported a sustained wind of 30 kt and a gust to 50 kt at 1540 UTC 28 August, while in San Blas, a station (elevation 5 m) reported a sustained wind of 22 kt with a gust to 50 kt at 0445 UTC 29 August. While Puerto Vallarta experienced significant impacts related to Nora, the weather station at the airport (elevation 6 m) stopped reporting after 2245 UTC 28 August, with peak winds of only 21 kt with a gust to 32 kt, though the pressure at the time of the last observation was 992.6 mb and rapidly dropping. The lowest land-based surface pressure observed was from a personal weather station in Puerto Vallarta in Versalles which reported a minimum pressure of 988.4 mb at 2300 UTC 29 August as the cyclone passed nearby.

Rainfall and Flooding

Heavy rainfall associated with Nora resulted in several different coastal areas of Mexico observing totals greater than 10 inches (~250 mm) in the states of Colima, Michoacán, and

Sinaloa (Fig. 5). The highest rainfall total was measured in Michoacán in Lazaro Cardenas at 20.59 inches (523 mm), with a nearby town in Jose Maria Morelos y Pavón reporting 17.51 inches (444.8 mm). In Sinaloa, a peak rainfall total of 16.58 inches (421.2 mm) was observed in Mazatlán, with San Lorenzo reporting 13.58 inches (345 mm). In Colima, the peak rainfall total was measured at 13.50 inches (343 mm) in Peñitas. Rainfall totals of 5–10 inches (~125–250 mm) were reported in the Mexican states of Guerrero, Jalisco, and Nayarit. This excessive rainfall resulted in substantial freshwater floods, river flooding, and landslides across these coastal areas of Mexico.

CASUALTY AND DAMAGE STATISTICS

As of this writing, there are 3 direct casualties[2] attributed to Hurricane Nora. Media reports indicated that heavy rainfall resulted in river flooding in Chiapas, which caused a member of the Mexican Air Force to be swept away and drowned in the river currents. A construction worker died in a landslide that occurred on a road between Guzmán and San Gabriel in Jalisco. Finally, a teenager died after the collapse of a hotel in Puerto Vallarta, Jalisco due to structural damage caused by Nora induced flooding and landslides. Several other people were reported missing that have not been accounted for, including a woman that was swept away by floodwaters in a vehicle.

Severe damage occurred in Jalisco primarily due to substantial rainfall which resulted in flash and river flooding. Several bridges and roads across the region collapsed or were impassable due to flooding or mudslides near river basins. According to the Jalisco government, at least 500 houses were damaged in the state by the combination of overflowing rivers, fallen trees, and landslides associated with the flooding rainfall. Puerto Vallarta was particularly hard hit (Fig. 6) with significant structural damage, including the partial collapse of a hotel in the city. At least three other homes were swept away due to river flooding, with many others damaged. In particular, the river flooding and damage along the Pitillar and Cuale Rivers were considered the worst in 50 years per the newspaper *El Universal*. Heavy rain and flooding were also reported in Nayarit, Colima, Sinaloa, Michoacan, and Guerrero, and more than 260,000 customers lost power as Nora traversed the area. Per the September 2021 global catastrophe report from Aon, Nora resulted in at least $125 million (USD) of estimated economic losses in Mexico with thousands of structures affected.

FORECAST AND WARNING CRITIQUE

Nora's genesis was well anticipated, though its development occurred farther east than originally expected. Table 3 provides the number of hours in advance of formation with the first Tropical Weather Outlook (TWO) forecast in each likelihood category, and Figure 7 shows the

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[2] Deaths occurring as a direct result of the forces of the tropical cyclone are referred to as "direct" deaths. These would include those persons who drowned in storm surge, rough seas, rip currents, and freshwater floods. Direct deaths also include casualties resulting from lightning and wind-related events (e.g., collapsing structures). Deaths occurring from such factors as heart attacks, house fires, electrocutions from downed power lines, vehicle accidents on wet roads, etc., are considered indirect" deaths.

spatial distribution of the 5-day TWO areas for each category. A low (<40%) chance of genesis during the next 5 days was first introduced 126 h before development occurred. The 5-day probabilities were increased to the medium (40–60%) and high (>60%) categories 114 h and 66 h before Nora developed, respectively. However, many of these earlier forecasts in the low and medium categories focused on the genesis area being farther offshore from the Mexican coastline (Fig. 7a–c) and it was only when 5-day probabilities shifted into the high category (Fig. 7d) that the correct area was better highlighted with a hit rate above 90%[3]. For the 2-day probabilities, the system that became Nora was given a low, medium, and high chance of genesis at 66 h, 42 h, and 30 h before formation, respectively.

A verification of NHC official track forecasts for Nora is given in Table 4a. Official track forecast errors were greater than the mean official errors for the previous 5-yr period at all forecast times. Climatology-persistence (OCD5) track errors were also much higher than their respective 5-yr means, suggesting that Nora's track was harder to forecast than a typical eastern Pacific tropical cyclone. An investigation into these track errors revealed that most of the official track forecasts were too far west (Fig. 8a), keeping Nora offshore of the mainland Mexican coastline. A homogeneous comparison of the official track errors with selected guidance models is given in Table 4b. Of the deterministic guidance, official forecasts were outperformed by the HWRF (HWFI) at 24–72 h, the HMON (HMNI) at 48–60 h, and the Canadian model (CMCI) at 60–96 h. A larger subset of the consensus aids also beat the official track forecast, with the HFIP corrected consensus approach (HCCA) outperforming it at every lead time. Right after Nora developed, much of the deterministic guidance struggled with Nora's track (Fig. 8b–d), possibly related to the cyclone's large sprawling nature with smaller vortices rotating around a broader circulation. There was large spread in the forecast track solutions, with the GFS (GFSI) tracking Nora too far east initially (Fig. 8c) and the ECMWF (EMXI) tracking Nora too far west at longer lead times (Fig. 8d). However, the HWFI, after exhibiting larger track spread early on, appeared to better capture Nora's track along the Mexican coast in the medium range (Fig. 8b), likely contributing to its reduced track errors in forecast days 1–3.

A verification of NHC official intensity forecasts for Nora is given in Table 5a. Official intensity forecast errors were higher than the mean official errors for the previous 5-yr period at all forecast lead times, and especially at 96 h where intensity errors were more than twice as high as climatology. These higher-than-usual intensity errors were likely linked to Nora's westward track bias (Fig. 8a), which kept the center of the tropical cyclone farther offshore. As a result, Nora's intensity forecast on 26–28 August showed the system maintaining hurricane intensity on 29–30 August, rather than the rapid weakening that transpired on 29 August due to land interaction (Figs. 4d, 9a). A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 5b. Both the HWFI and HMNI outperformed the NHC intensity forecast at most lead times, while statistical-dynamical aids such as Decay SHIPS (DSHP) and LGEM struggled like the NHC intensity forecast. The intensity consensus aids also beat the NHC intensity forecast at all lead times. Notably, the more accurate HWFI intensity forecasts are linked to the model forecasting rapid weakening on 29 August (Fig. 9b) since it correctly indicated Nora would move close enough to Mexico (Fig. 8b) for its circulation to be severely disrupted by the higher terrain. The slow or lack of weakening in many NHC and LGEM intensity forecasts (which

[3] The fraction of outlooks where the tropical cyclone genesis location was captured within the TWO genesis area.

uses the NHC track as an input) for Nora after 28 August (Fig. 9a, c), is largely responsible for the significant high intensity errors in Nora overall.

Coastal watches and warnings associated with Nora are given in Table 6. Because Nora was originally forecast to remain offshore of the mainland Mexican coastline (Fig. 8a) Hurricane Warnings were not issued until 0600–0900 UTC 28 August, only 12–15 hours before impacts were felt in coastal Mexico from Lazaro Cardenas to San Blas later that afternoon. A portion of this area had previously been under a Hurricane Watch issued a couple of days earlier on 1500 UTC 26 August.

ACKNOWLEDGMENTS

Special thanks to Senior Hurricane Specialist John Cangialosi for constructing the Nora "best track" map (Fig. 1).

Table 1. Best track for Hurricane Nora, 25–30 August 2021.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 0600	12.2	95.0	1007	25	low
24 / 1200	12.3	95.7	1007	25	"
24 / 1800	12.4	96.5	1006	30	"
25 / 0000	12.4	97.2	1006	30	"
25 / 0600	12.3	97.8	1006	30	"
25 / 1200	12.2	98.4	1006	30	tropical depression
25 / 1800	12.3	98.9	1004	35	tropical storm
26 / 0000	12.4	99.3	1004	35	"
26 / 0600	12.5	99.7	1004	35	"
26 / 1200	12.7	100.3	1003	35	"
26 / 1800	13.1	101.0	1003	35	"
27 / 0000	13.6	101.9	1001	40	"
27 / 0600	14.3	102.9	999	45	"
27 / 1200	14.9	103.9	994	50	"
27 / 1800	15.3	104.7	991	55	"
28 / 0000	16.0	105.0	989	55	"
28 / 0600	16.8	105.1	987	60	"
28 / 1200	17.8	105.2	980	70	hurricane
28 / 1800	19.1	105.3	976	75	"
28 / 2100	19.8	105.3	976	75	"
29 / 0000	20.6	105.4	984	65	"
29 / 0600	21.9	105.7	989	60	tropical storm
29 / 1200	22.7	106.0	995	50	"
29 / 1600	23.0	106.2	997	45	"
29 / 1800	23.2	106.3	999	40	"
30 / 0000	23.6	106.7	1002	35	"
30 / 0600	24.0	107.1	1005	30	tropical depression
30 / 1200	24.3	107.4	1007	25	"
30 / 1800					dissipated

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
28 / 1800	19.1	105.3	976	75	maximum wind speed and minimum pressure
28 / 2100	19.8	105.3	976	75	landfall at Chola in Jalisco, Mexico
29 / 1600	23.0	106.2	997	45	landfall near Mazatlán in Sinaloa, Mexico

Table 2. Selected ship reports with winds of at least 34 kt for Hurricane Nora, 25–30 August 2021.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
26 / 2100	9VFV4	15.9	99.3	120 / 38	1007.0
27 / 1600	OUJK2	17.4	102.2	090 / 42	1012.0
27 / 1700	TBWUK6	17.7	101.9	250 / 37	1007.6
27 / 2000	OUJK2	17.2	101.7	100 / 38	1007.1
28 / 0300	OUJK2	16.3	100.2	140 / 35	1017.0

Table 3. 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%)	66	126
Medium (40%-60%)	42	114
High (>60%)	30	66

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Nora, 25–30 June 2021. 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	60	72	96	120
OFCL	34.7	43.2	54.9	61.9	88.0	124.1	176.3	
OCD5	65.0	112.1	164.1	221.7	315.1	388.6	458.7	
Forecasts	18	16	14	12	10	8	4	
OFCL (2016-20)	21.3	33.1	44.0	54.6	65.3	76.0	95.9	116.6
OCD5 (2016-20)	33.1	69.4	107.8	147.0	183.4	219.7	280.2	342.0

Table 4b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Nora, 25–30 August 2021. 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	60	72	96	120
OFCL	28.1	50.4	57.6	67.8	89.3	114.2	222.5	
OCD5	56.3	106.8	167.2	233.7	323.3	373.9	477.1	
GFSI	40.9	60.1	86.8	101.5	108.7	142.1	**96.0**	
EMXI	33.4	60.8	88.9	109.8	143.7	169.4	242.6	
CMCI	42.9	75.4	90.6	104.0	**82.7**	**45.9**	**90.3**	
NVGI	44.2	90.7	127.2	171.3	205.0	189.9	231.6	
HWFI	31.5	**39.7**	**53.7**	**54.6**	**73.0**	**105.3**	253.6	
HMNI	39.4	56.2	60.9	**64.8**	**83.0**	116.9	456.7	
HCCA	**25.8**	**43.5**	**51.7**	**63.0**	**83.3**	**109.0**	**204.8**	
AEMI	30.8	61.4	78.5	90.0	108.2	141.8	249.2	
GFEX	**26.9**	**49.6**	59.9	77.0	92.1	**106.6**	**176.2**	
TVCA	**27.5**	**41.5**	**54.6**	69.7	**77.2**	**82.6**	**164.1**	
TVCX	**26.8**	**41.6**	**52.9**	67.9	**77.0**	**88.7**	**179.5**	
TVDG	29.2	**45.1**	58.3	75.8	**85.0**	**90.6**	**167.2**	
TABS	45.7	99.3	159.9	217.8	253.2	280.0	295.0	
TABM	39.1	69.4	104.0	139.7	159.6	176.7	244.9	
TABD	41.8	65.0	97.1	128.5	154.0	199.3	445.2	
Forecasts	16	11	11	10	8	5	1	

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Nora, 25–30 August 2021. 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	60	72	96	120
OFCL	8.1	12.5	15.7	18.8	24.0	26.2	40.0	
OCD5	4.6	7.6	12.8	20.8	21.1	25.4	42.5	
Forecasts	18	16	14	12	10	8	4	
OFCL (2016-20)	5.6	9.0	10.9	12.6	14.0	15.3	16.0	16.7
OCD5 (2016-20)	7.2	12.0	15.3	17.6	19.0	20.4	21.2	20.8

Table 5b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Nora, 25–30 August 2021. 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 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	7.5	10.0	15.9	21.0	28.1	27.5	35.0	
OCD5	**4.3**	**9.4**	**14.4**	23.3	**24.2**	**23.5**	39.0	
HWFI	**5.4**	**5.5**	**6.8**	**14.0**	**19.4**	**9.5**	43.0	
HMNI	**4.6**	**4.5**	**7.8**	**14.3**	**19.0**	**16.5**	**13.0**	
DSHP	7.9	12.6	17.5	**18.2**	**13.1**	**13.8**	**25.0**	
LGEM	8.3	13.1	20.5	22.3	**18.4**	**23.5**	**0.0**	
ICON	**4.8**	**7.5**	**11.5**	**15.8**	**16.6**	**15.5**	**23.0**	
IVCN	**4.3**	**6.3**	**10.8**	**14.6**	**14.6**	**14.2**	**21.0**	
IVDR	**4.8**	**5.4**	**9.4**	**13.6**	**14.8**	**13.5**	**18.0**	
HCCA	**4.2**	**6.3**	**10.6**	**12.6**	**14.0**	**12.2**	**17.0**	
GFSI	7.5	10.4	17.2	**20.6**	**23.0**	**19.0**	**13.0**	
EMXI	**6.6**	12.1	19.8	30.1	33.6	32.0	**12.0**	
CMCI	9.5	14.3	19.1	25.0	**22.9**	**24.0**	**30.0**	
NVGI	**6.8**	10.5	19.2	28.1	34.0	34.2	42.0	
Forecasts	16	11	11	10	8	4	1	

Table 6. Watch and warning summary for Hurricane Nora, 25–30 August 2021.

Date/Time (UTC)	Action	Location
26 / 1500	Tropical Storm Watch issued	Tecpan de Galeana to Lazaro Cardenas
26 / 1500	Hurricane Watch issued	Lazaro Cardenas to Cabo Corrientes
26 / 2100	Tropical Storm Watch discontinued	All
26 / 2100	Tropical Storm Warning issued	Tecpan de Galeana to Manzanillo
27 / 0300	Tropical Storm Watch issued	Cabo Corrientes to San Blas
27 / 0300	Tropical Storm Warning modified to	Tecpan de Galeana to Cabo Corrientes
27 / 1500	Tropical Storm Watch modified to	San Blas to Mazatlan
27 / 1500	Tropical Storm Warning modified to	Tecpan de Galeana to San Blas
28 / 0600	Tropical Storm Warning modified to	Tecpan de Galeana to Manzanillo
28 / 0600	Hurricane Watch modified to	Lazaro Cardenas to Manzanillo
28 / 0600	Hurricane Warning issued	Manzanillo to Cabo Corrientes
28 / 0900	Tropical Storm Watch changed to Tropical Storm Warning	San Blas to Mazatlan
28 / 0900	Tropical Storm Watch changed to Hurricane Watch	San Blas to Mazatlan
28 / 0900	Tropical Storm Warning modified to	San Blas to Mazatlan
28 / 0900	Hurricane Warning modified to	Manzanillo to San Blas
28 / 1500	Hurricane Watch changed to Tropical Storm Warning	Lazaro Cardenas to Manzanillo
28 / 1500	Tropical Storm Watch issued	Cabo San Lucas to La Paz
28 / 1500	Tropical Storm Warning modified to	Lazaro Cardenas to Manzanillo
28 / 1500	Tropical Storm Warning modified to	San Blas to Altata
28 / 1500	Hurricane Watch modified to	San Blas to Topolobampo
28 / 2100	Tropical Storm Warning discontinued	San Blas to Altata
28 / 2100	Hurricane Watch modified to	Altata to Topolobampo
28 / 2100	Hurricane Warning modified to	Manzanillo to Altata
29 / 0000	Tropical Storm Warning discontinued	All
29 / 0300	Tropical Storm Warning issued	Altata to Topolobampo
29 / 0300	Hurricane Warning modified to	Playa Perula to Altata
29 / 1800	Tropical Storm Warning modified to	Escuinapa to Topolobampo
29 / 1800	Hurricane Watch discontinued	All
29 / 1800	Hurricane Warning discontinued	All
29 / 2100	Tropical Storm Watch discontinued	Cabo San Lucas to La Paz

Date/Time (UTC)	Action	Location
29 / 2100	Tropical Storm Watch issued	Topolobampo to Huatabampito
29 / 2100	Tropical Storm Warning modified to	Mazatlán to Topolobampo
30 / 0300	Tropical Storm Watch discontinued	All
30 / 0300	Tropical Storm Warning modified to	Bahia Tempehuaya to Topolobampo
30 / 0600	Tropical Storm Warning discontinued	All

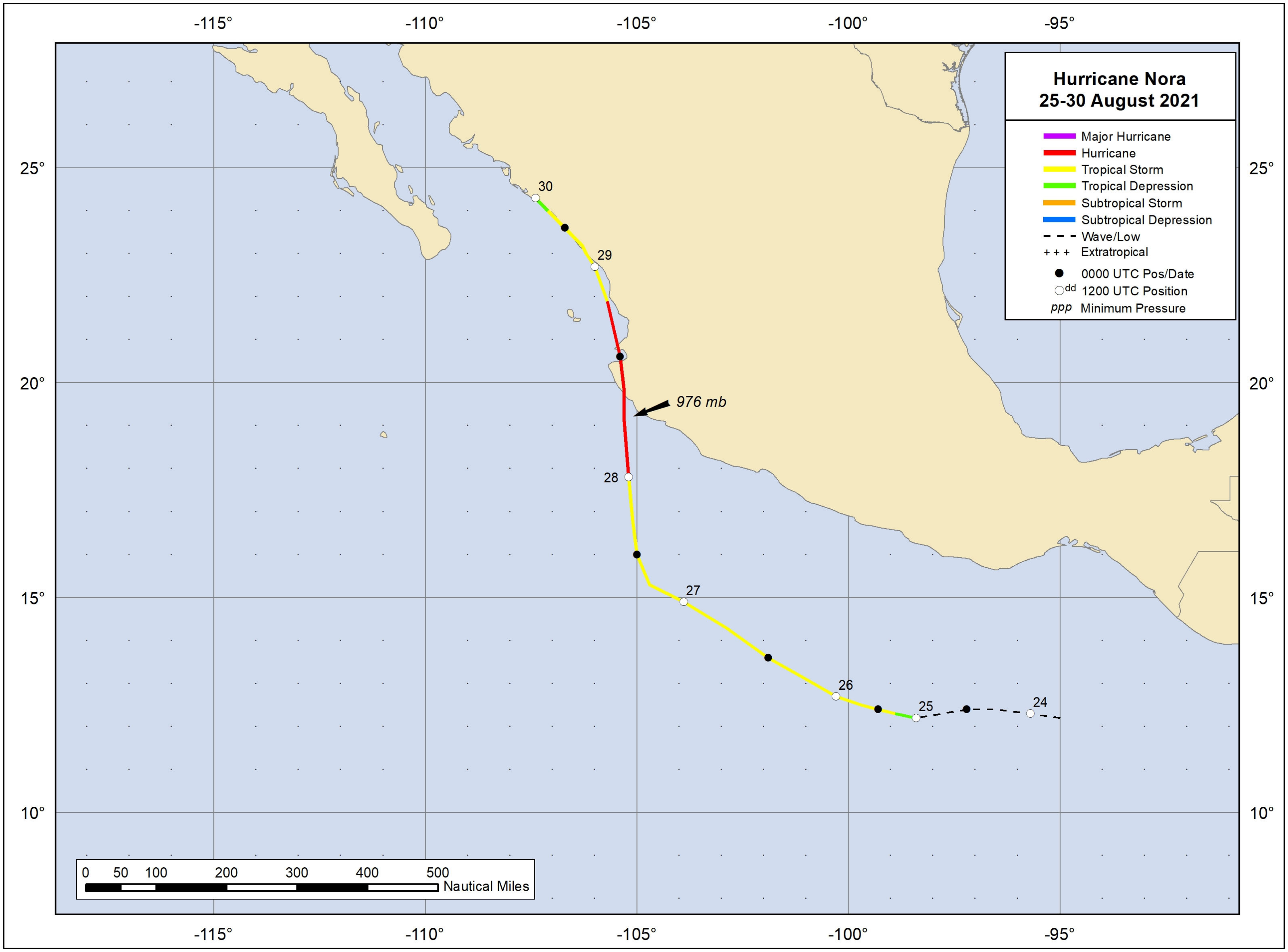

Figure 1. Best track positions for Hurricane Nora, 25–30 August 2021.

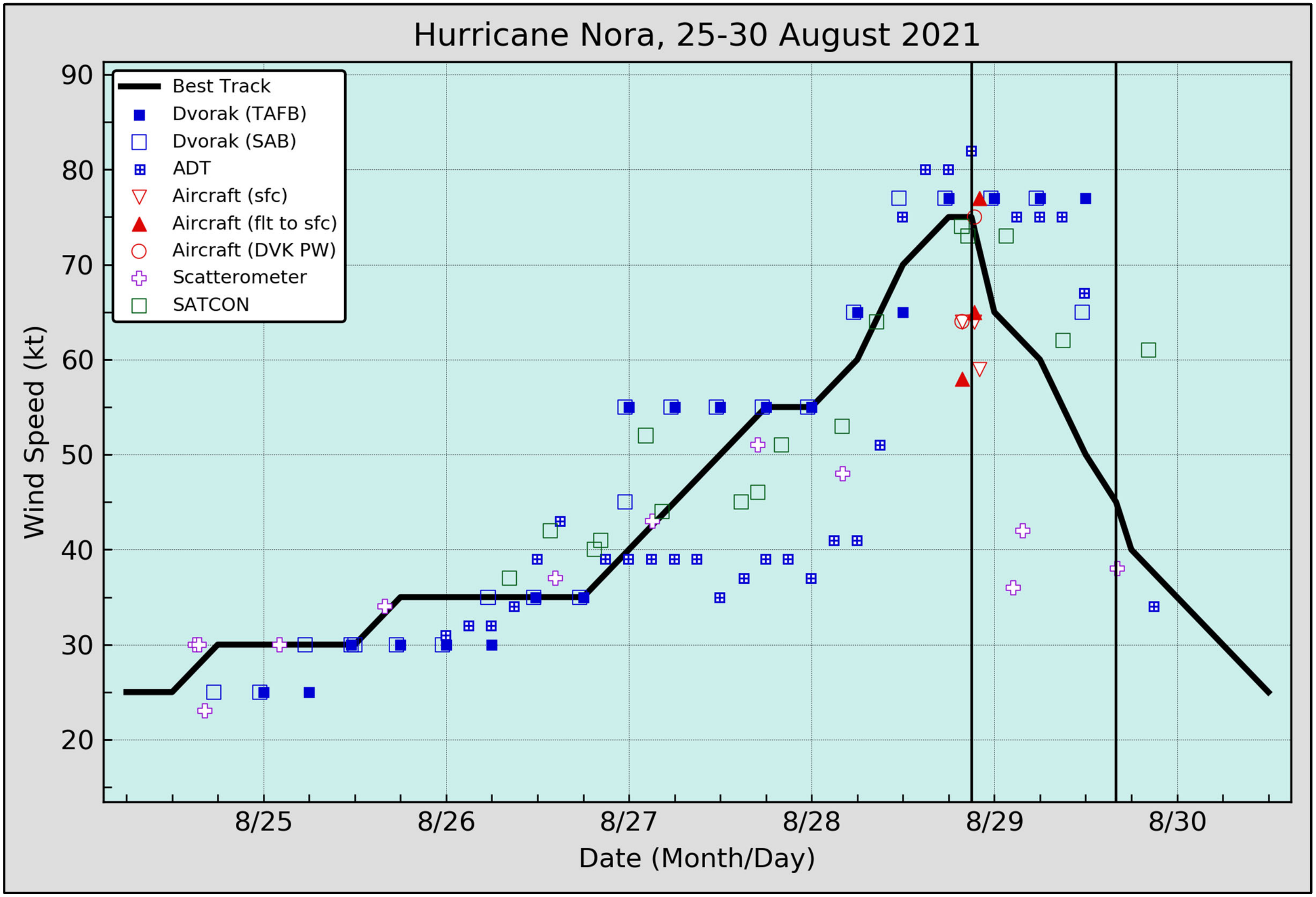

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Nora, 25–30 August 2021. Aircraft observations have been adjusted for elevation using 90% adjustment factor for observations at or just above 700 mb. Advanced Dvorak Technique estimates represent 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 lines corresponds to landfalls.

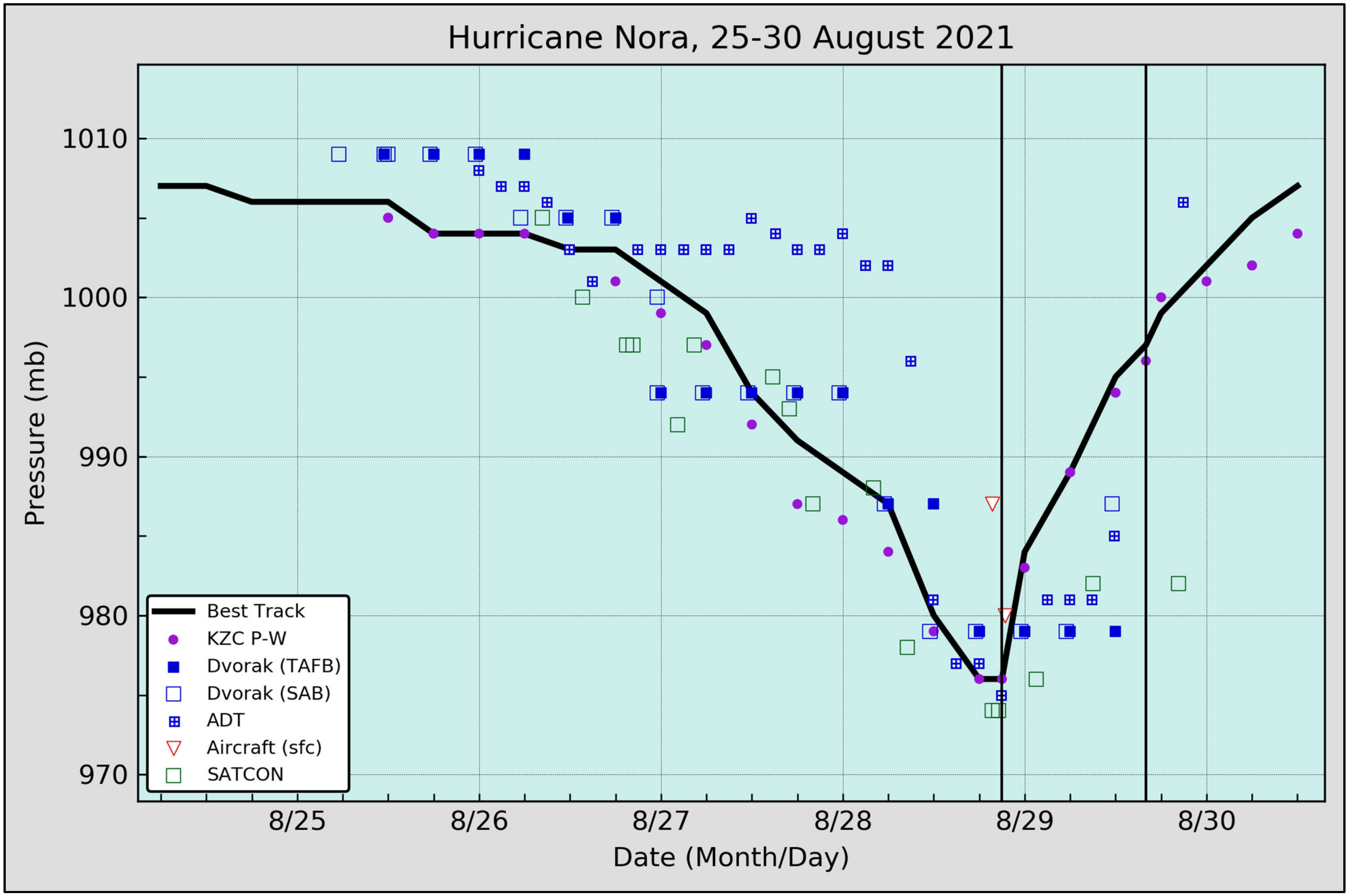

Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Nora, 25–30 August 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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 the solid vertical lines correspond to landfalls.

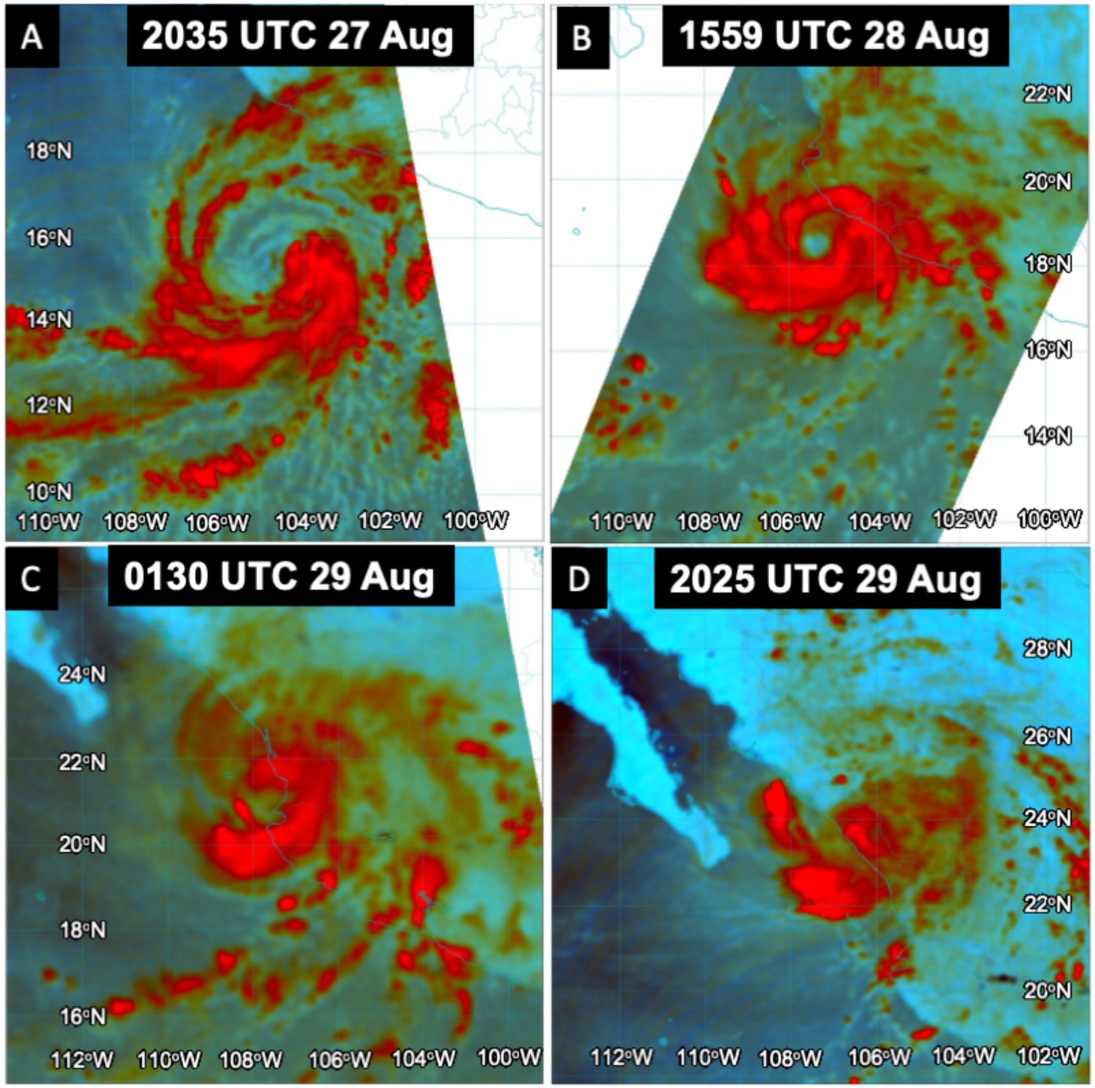

Figure 4. Passive microwave satellite 89–91-GHz color composite imagery showing Nora's structural evolution from 27–29 August 2021. (a) 2035 UTC 27 August AMSR2 pass showing prominent banding wrapping into the eastward side of the circulation when Nora was an intensifying tropical storm. (b) 1559 UTC 28 August GMI pass showing an eye feature just prior to Nora's peak intensity. (c) 0130 UTC 29 August SSMIS pass showing Nora's structure degrading after interacting with the higher terrain of Mexico. (d) 2025 UTC 29 August AMSR2 pass showing Nora's continued rapid weakening due to land interaction.

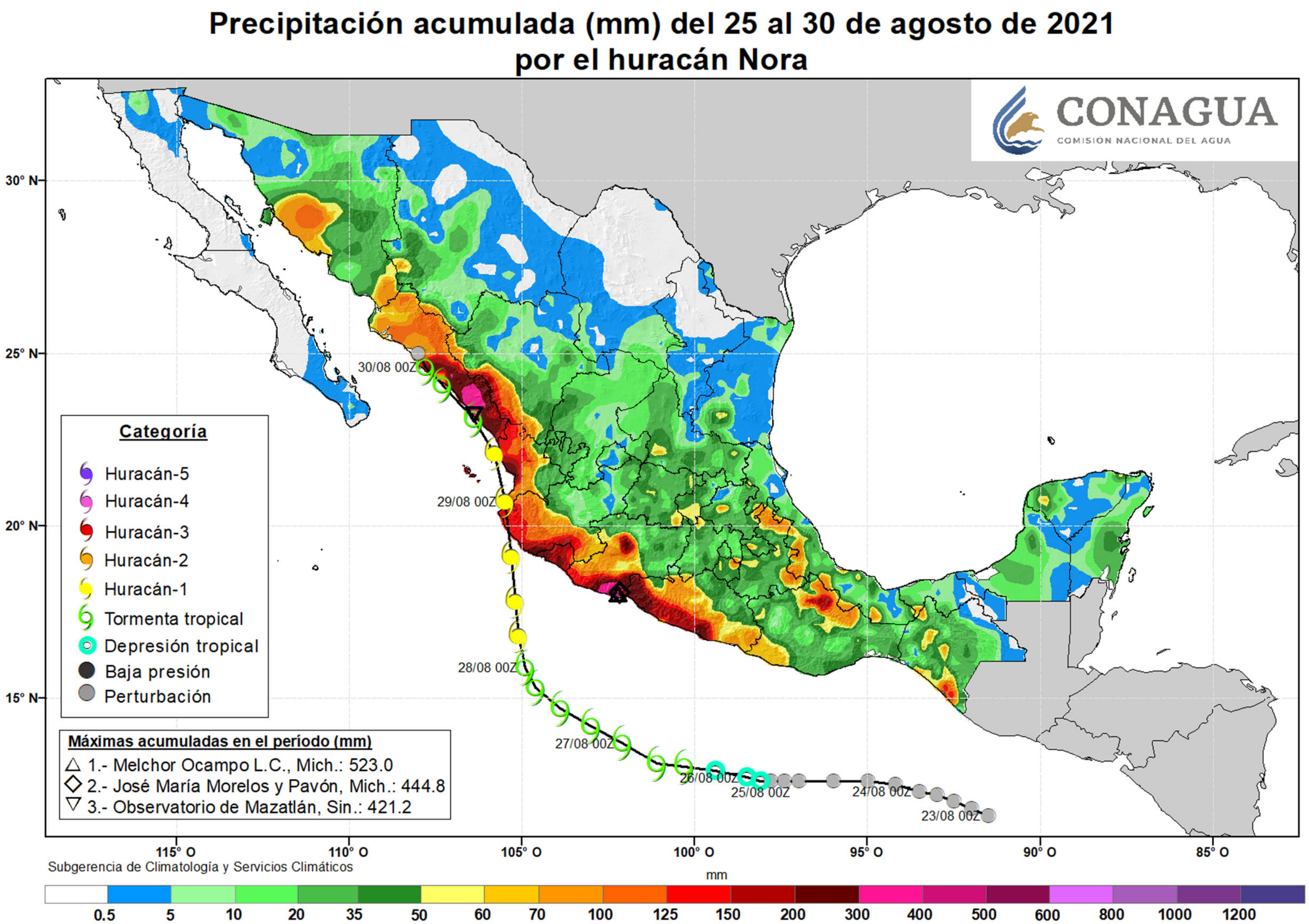

Figure 5. Total rainfall (mm) during the period 25–30 August 2021 when Nora was a tropical cyclone. Map courtesy of Conagua–Comisión Nacional Del Agua. Track and intensities on the map are based on the NHC operational assessments.

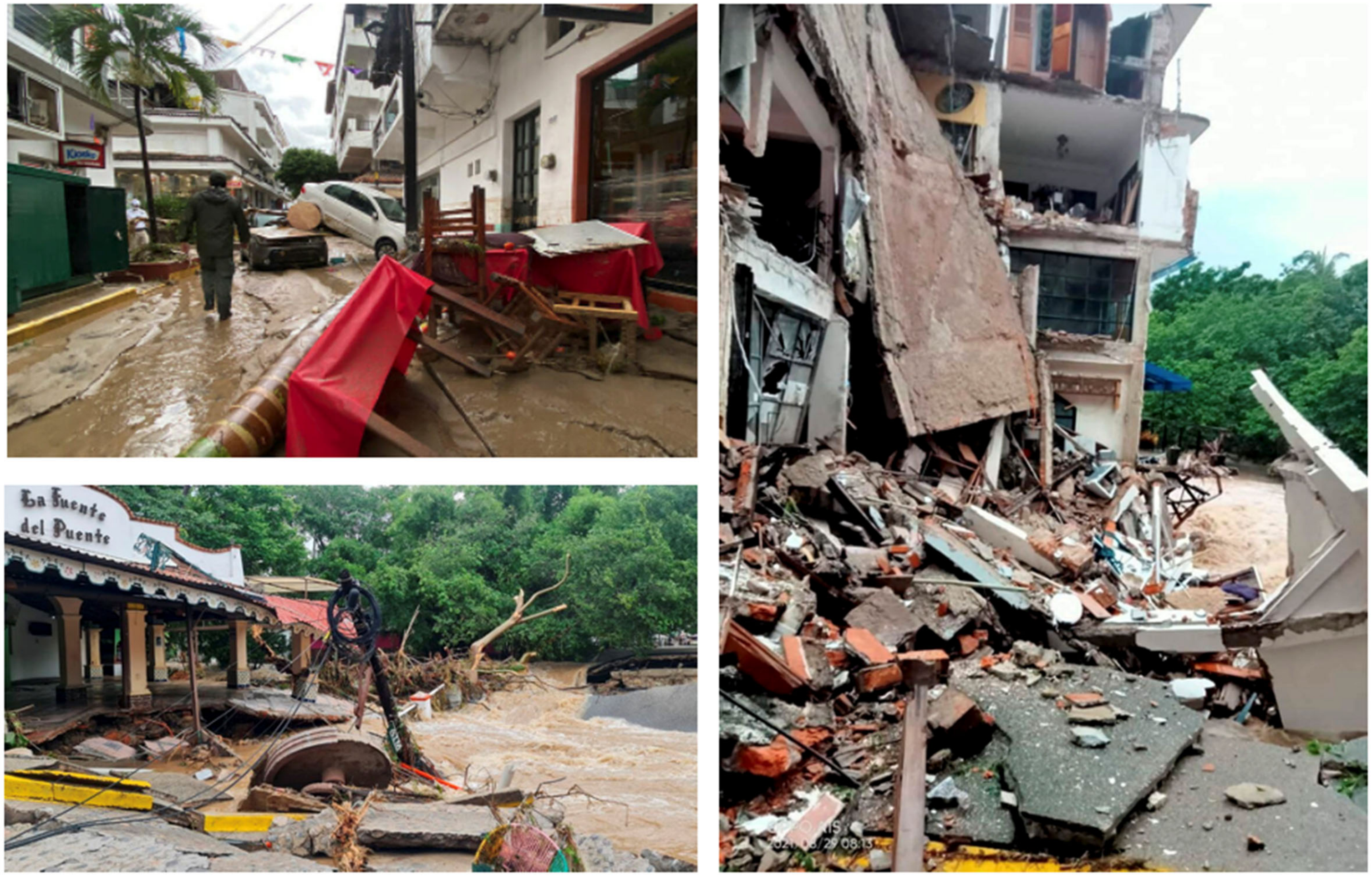

Figure 6. Select images illustrating damage associated with Hurricane Nora in Puerto Vallarta in Jalisco, Mexico, including the partial collapse of a hotel (right image) leading to one fatality. Images courtesy of Reuters.

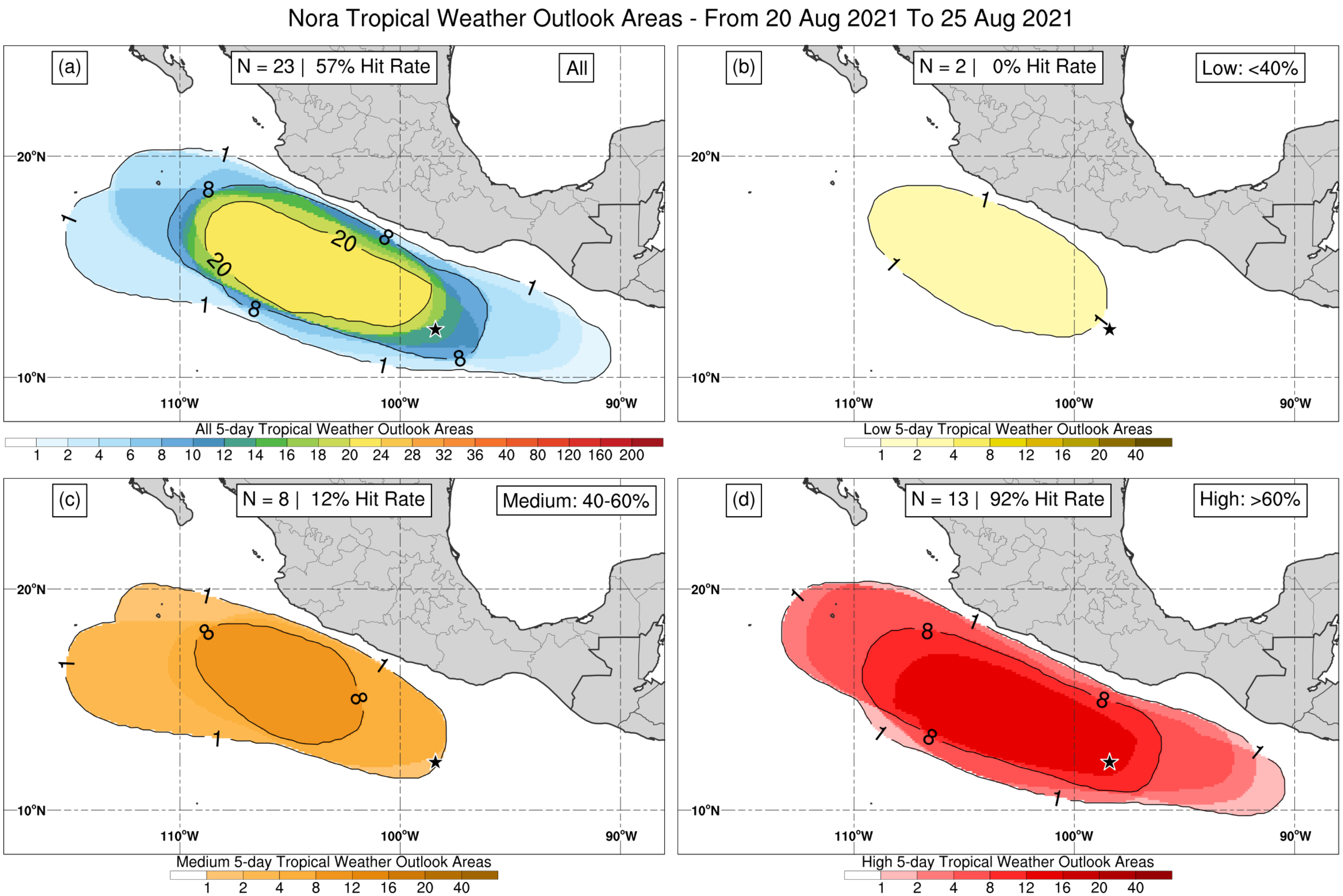

Figure 7. Composite of 5-day Tropical Weather Outlook areas associated with the disturbance that developed into Hurricane Nora for (a) all probability areas (10–100%, multi-color shading), (b) low probability areas (< 40%, yellow shading), (c) medium probability areas (40–60%, orange shading), and (d) high probability areas (> 60%, red shading). The black star in each panel indicates the genesis location of Nora. Black contours denote where at least one and eight outlook areas overlap. Hit rate in each plot indicates the percentage of outlook areas that the location of genesis is captured within.

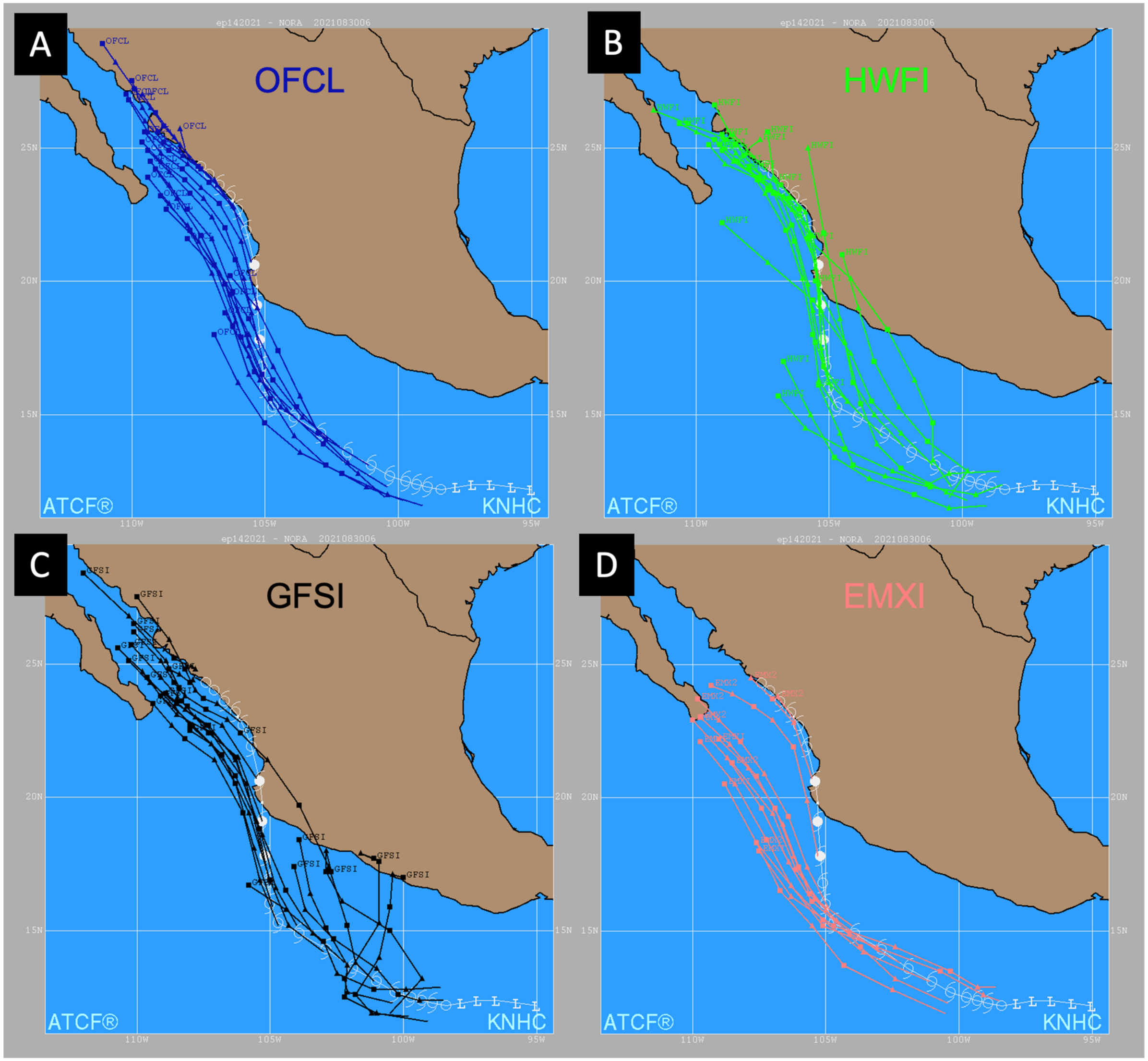

Figure 8. Selected track forecasts (with 0, 12, 24, 36, 48, 60, 72 h positions indicated) for Hurricane Nora, 25–30 August 2021 for official NHC (OFCL) track (panel a, blue lines), HWFI track (panel b, green line), GFSI track (panel c, black line), and EMXI track (panel d, peach line). The best track is given by the white line with positions given at 6-h intervals.

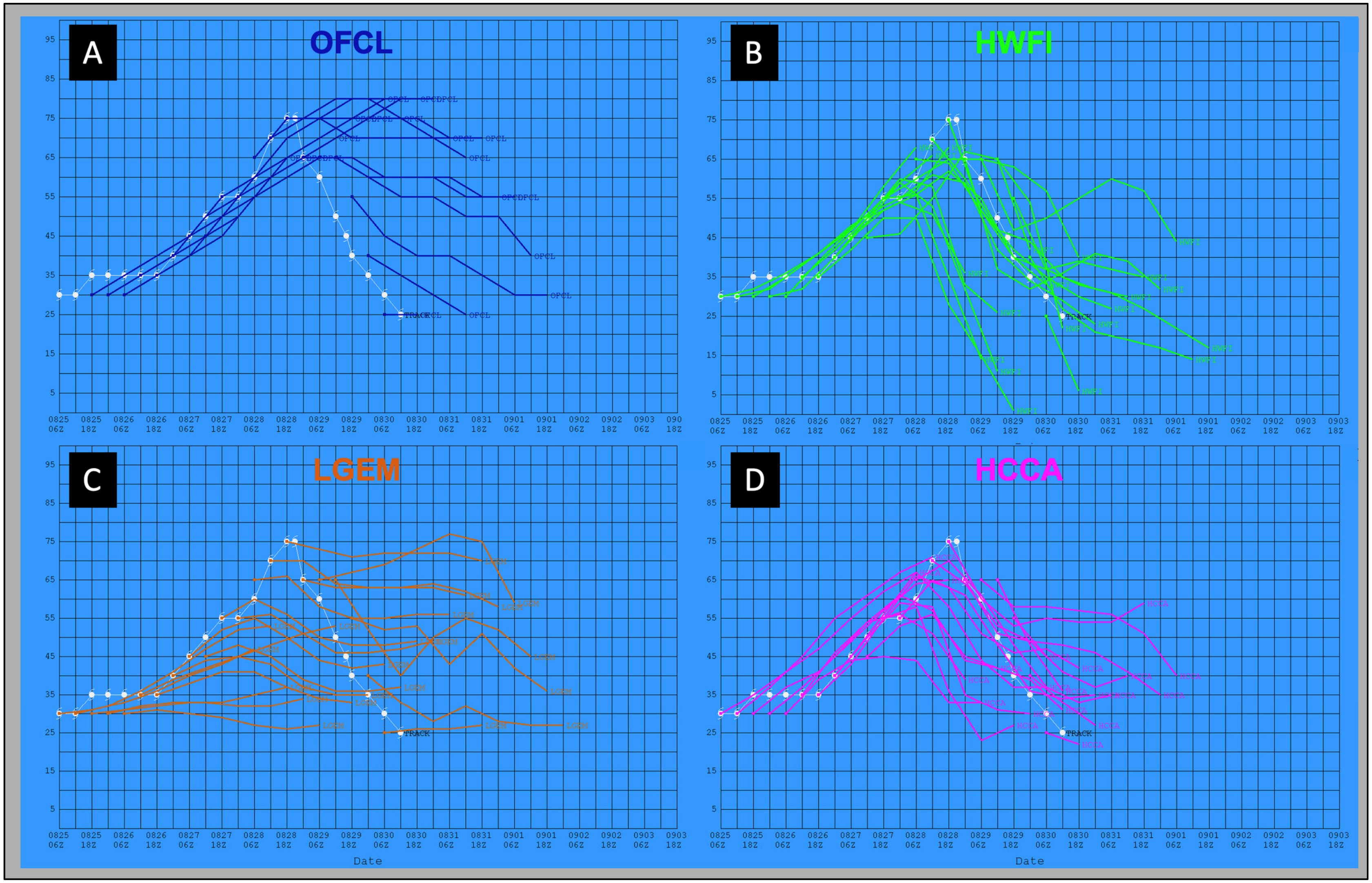

Figure 9. NHC official (OFCL) intensity forecasts (panel a, blue lines), HWFI intensity forecasts (panel b, green lines), LGEM intensity forecasts (panel c, orange lines), and HCCA intensity forecasts (panel d, pink lines) in knots for Hurricane Nora from 0600 UTC 25 August to 0000 UTC 30 August. The best track intensity is given by the solid white line. Note the high intensity bias in the OFCL and LGEM forecasts after Nora made landfall on 28 August compared to the lower intensity bias seen in the HWFI and HCCA guidance.