

## NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT<sup>1</sup>

# **TROPICAL STORM ALVIN**

(EP012025)

28–31 May 2025

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GOES-WEST INFRARED SATELLITE IMAGE OF TROPICAL STORM ALVIN AT 1800 UTC 29 MAY 2025, NEAR THE TIME OF ITS PEAK INTENSITY. IMAGE COURTESY NOAA/NESDIS/STAR.

Alvin was a tropical storm that formed offshore of the coast of southwestern Mexico and did not bring any notable impacts to land.

<sup>&</sup>lt;sup>1</sup> This is an abbreviated Tropical Cyclone Report since there were no coastal watches or warnings issued and no direct fatalities reported in association with Alvin.



## **Tropical Storm Alvin**

28-31 May 2025

### **BEST TRACK**

The "best track<sup>2</sup>" positions and intensities for Tropical Storm Alvin are listed in Table 1. The "best track" chart of Alvin's path is given in Fig. 1, with the wind and pressure histories along with available observations<sup>3</sup> shown in Figs. 2 and 3, respectively. There were no credible ship observations of tropical-storm-force winds associated with Alvin.

A Mexican Navy automated weather station on Socorro Island reported a sustained wind of 23 kt and a gust of 31 kt at 2240 UTC 30 May while Alvin passed well east of the island.

#### Origin

Alvin originated from a large disturbance along the eastern North Pacific monsoon trough. The broad disturbance moved generally westward to west-northwestward on 26–27 May while its shower and thunderstorm activity gradually became better organized. Scatterometer wind data and satellite images indicate that a well-defined circulation center developed later on 28 May, and it is estimated that a tropical depression formed by 1800 UTC that day, about 410 n mi southwest of Acapulco, Mexico.

#### **Peak Intensity and Minimum Pressure**

Alvin's estimated peak intensity of 50 kt from 1800 UTC 29 May to 0000 UTC 30 May is based on scatterometer wind data and UW-CIMSS objective intensity estimates. A 1551 UTC 29 May scatterometer pass over Alvin showed peak winds of 45 kt, which supports a 50-kt intensity given the known resolution limitations of the instrument. The ADT and SATCON estimates during this period ranged from 47–55 kt, while the subjective Dvorak classifications from SAB and TAFB peaked at T3.0/45 kt.

<sup>&</sup>lt;sup>2</sup> 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.

<sup>&</sup>lt;sup>3</sup> Observations 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. 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), the Defense Meteorological Satellite Program (DMSP) satellites, and the Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) satellites, among others, were also useful in constructing the best track of Alvin.



The estimated minimum central pressure of 999 mb 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 Alvin.

## FORECAST AND WARNING VERIFICATION

Table 2 provides the number of hours in advance of formation with the first NHC Tropical Weather Outlook (TWO) forecast in each likelihood category. Overall, NHC genesis forecasts provided excellent lead time for Alvin's formation in both the 2- and 7-day outlooks. Figure 4 shows composites of 7-day TWO genesis areas for each category prior to the formation of Alvin. While most of the genesis areas correctly captured the location of Alvin's formation, some of the high-category areas were farther north of where genesis ultimately occurred.

A verification of NHC official track forecasts for Alvin is given in Table 3a. Official track forecast errors were lower than or comparable to the mean official errors for the previous 5-yr period at all forecast times. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b.

A verification of NHC official intensity forecasts for Alvin is given in Table 4a. Official intensity forecast errors were lower than the mean official errors for the previous 5-yr period at all forecast times. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b.

There were no coastal watches or warnings issued for Alvin.

## ACKNOWLEDGEMENTS

Dr. Philippe Papin (NHC) created the Graphical TWO verification figure.



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
28 / 1800	11.5	104.4	1006	30	tropical depression
29 / 0000	12.4	104.9	1006	30	"
29 / 0600	13.0	105.6	1005	30	"
29 / 1200	13.7	106.2	1003	40	tropical storm
29 / 1800	14.6	106.9	999	50	"
30 / 0000	15.4	107.6	999	50	"
30 / 0600	16.1	108.3	1000	45	"
30 / 1200	16.9	108.7	1001	45	"
30 / 1800	17.7	108.9	1001	45	"
31 / 0000	18.7	109.0	1003	40	"
31 / 0600	19.6	109.2	1005	35	low
31 / 1200	20.4	109.5	1006	30	"
31 / 1800	21.1	109.7	1006	30	"
01 / 0000	21.8	109.7	1007	25	"
01 / 0600	22.4	109.4	1007	25	"
01 / 1200					dissipated
29 / 1800	14.6	106.9	999	50	minimum pressure & maximum winds

Table 1.Best track for Tropical Storm Alvin, 28–31 May 2025.



Table 2. Number of hours in advance of formation of Alvin 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	168-Hour Outlook			
Low (<40%)	78	198			
Medium (40%-60%)	54	168			
High (>60%)	48	120			

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Alvin, 28–31 May 2025. 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	16.8	25.4	44.4	50.7	61.1				
OCD5	41.2	90.7	147.4	210.3	415.0				
Forecasts	9	7	5	3	1				
OFCL (2020-24)	22.4	33.6	43.5	53.2	65.1	79.4	108.6	135.2	
OCD5 (2020-24)	38.2	75.3	117.2	161.0	206.0	252.0	340.7	422.7	



Table 3b.Homogeneous comparison of selected track forecast guidance models (in n mi)<br/>for Tropical Storm Alvin, 28–31 May 2025. Errors smaller than the NHC official<br/>forecast are shown in boldface type.

	Forecast Period (h)										
Model ID	12	24	36	48	60	72	96	120			
OFCL	16.8	25.4	44.4	50.7	61.1						
OCD5	41.2	90.7	147.4	210.3	415.0						
GFSI	26.9	44.0	67.8	90.0	122.7						
HWFI	20.6	28.9	50.7	66.0	168.3						
HMNI	21.1	32.6	57.6	79.7	136.0						
HFAI	19.6	31.1	55.6	78.6	148.0						
HFBI	19.8	28.2	56.7	83.5	154.8						
EMXI	17.9	28.9	51.6	77.7	111.7						
CMCI	29.2	50.4	67.7	83.2	108.6						
TVCE	17.7	24.1	51.1	69.5	136.3						
тусх	16.3	25.0	50.4	68.9	128.0						
GFEX	19.2	33.0	49.1	70.4	114.1						
TVDG	17.5	27.1	52.0	71.4	129.2						
HCCA	17.7	26.6	46.5	58.4	104.5						
AEMI	29.6	48.3	74.2	102.0	168.4						
TABS	38.6	73.8	126.9	170.1	182.7						
ТАВМ	34.5	68.9	110.5	151.8	179.6						
TABD	44.8	94.4	132.7	167.8	180.6						
Forecasts	9	7	5	3	1						



Table 4a.NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity<br/>forecast errors (kt) for Tropical Storm Alvin, 28–31 May 2025. Mean errors for the<br/>previous 5-yr period are shown for comparison. Official errors that are smaller<br/>than the 5-yr means are shown in boldface type.

	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	5.0	2.9	7.0	8.3	5.0			
OCD5	8.2	9.0	9.6	11.0	20.0			
Forecasts	9	7	5	3	1			
OFCL (2020-24)	5.7	8.9	10.8	12.9	14.4	15.5	17.0	18.6
OCD5 (2020-24)	7.4	12.4	16.2	19.2	21.0	21.3	21.5	21.6



Table 4b.Homogeneous comparison of selected intensity forecast guidance models (in kt)<br/>for Tropical Storm Alvin, 28–31 May 2025. Errors smaller than the NHC official<br/>forecast are shown in boldface type.

	Forecast Period (h)										
Model ID	12	24	36	48	60	72	96	120			
OFCL	5.0	2.9	7.0	8.3	5.0						
OCD5	8.2	9.0	9.6	11.0	20.0						
HWFI	5.8	4.0	7.2	4.0	0.0						
HMNI	4.7	2.1	5.2	7.0	6.0						
HFAI	5.4	3.0	1.8	7.7	13.0						
HFBI	5.7	3.3	2.2	4.3	8.0						
DSHP	7.6	6.6	13.4	23.0	34.0						
LGEM	8.3	6.4	11.8	12.3	26.0						
ICON	6.4	2.9	7.6	8.7	17.0						
IVCN	5.7	1.7	5.8	7.7	15.0						
IVDR	5.2	1.7	4.4	6.3	11.0						
GFSI	5.6	3.3	3.8	4.0	4.0						
EMXI	6.0	6.7	5.6	7.0	6.0						
HCCA	7.4	4.3	8.0	9.0	13.0						
Forecasts	9	7	5	3	1						





Figure 1. Best track positions for Tropical Storm Alvin, 28–31 May 2025.





Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Alvin, 28–31 May 2025. 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.





Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Alvin, 28–31 May 2025. 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.





**Alvin 7-day Tropical Weather Outlook Areas** 

From: 1200 UTC 20 May 2025 to 1800 UTC 28 May 2025

Figure 4. Composites of 7-day tropical cyclone genesis areas depicted in NHC's Tropical Weather Outlooks prior to the formation of Alvin for (a) all probabilistic genesis categories, (b) the low (<40%) category, (c) medium (40-60%) category, and (d) high (>60%) category. The location of genesis is indicated by the black star.