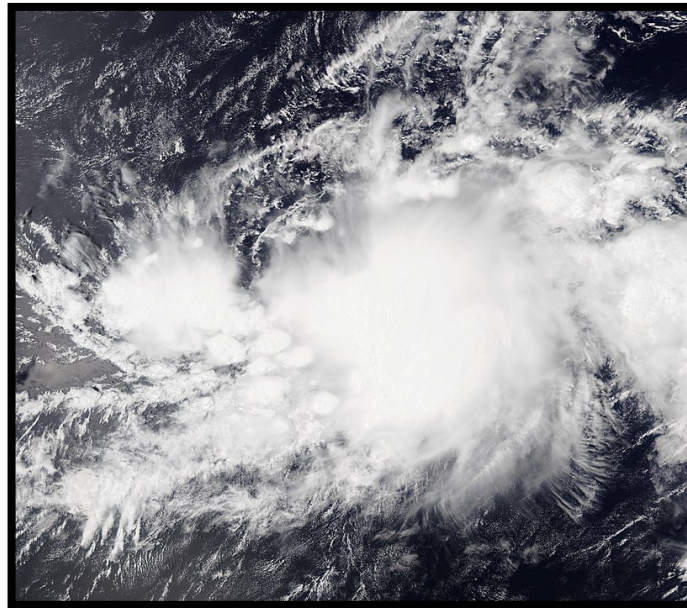# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT[1]

TROPICAL STORM AKONI
(EP122019)
4–6 September 2019

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GOES-17 VISIBLE SATELLITE IMAGE OF TROPICAL STORM AKONI AROUND THE TIME OF ITS PEAK INTENSITY AT 2306 UTC 5 SEPTEMBER.

Akoni was a tropical storm that developed along 140°W and moved into the central Pacific basin shortly after genesis. The storm weakened to a remnant low well southeast of the Hawaiian Islands.

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[1] Original report date 29 November 2019. Updated 28 April 2020 to include best track analysis, summary, verification, impacts and damages from the Central Pacific Hurricane Center.

Tropical Storm Akoni

4–6 SEPTEMBER 2019

SYNOPTIC HISTORY

The disturbance that became Akoni was first identifiable in satellite images on 1 September around 125°W as a cluster of showers and thunderstorms within the monsoon trough. The disturbance moved westward during the next couple of days, and a weak area of low pressure formed by 0600 UTC 3 September about 1200 n mi east-southeast of the Big Island of Hawaii. Satellite images indicate that deep convection gradually increased, and the low developed sufficiently organized deep convection to be classified a tropical depression by 1200 UTC 4 September, when it was located along 140°W. 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].

After genesis, deep convection increased in intensity and coverage as the cyclone moved across the far eastern portion of the central Pacific basin. While moving west-southwestward in the low- to mid-level flow, the depression strengthened to a 35-kt tropical storm by 1800 UTC 5 September, around 750 n mi southeast of Hilo, Hawaii. This was the peak intensity that Akoni reached throughout its lifecycle, and the tropical cyclone only maintained that strength for the next 12 h. The convective pattern of Akoni became ragged early on 6 September and the cyclone weakened, likely due to intrusions of dry air. The system became a remnant low by 1200 UTC that day when the cyclone's convection became quite disorganized and limited. The low opened up into a sharp trough 12 h later, when it was located about 500 n mi south-southeast of the Big Island of Hawaii.

METEOROLOGICAL STATISTICS

Observations in Akoni (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB), the Central Pacific Hurricane Center (CPHC/PHFO), and the Joint Typhoon Warning Center (JTWC). Objective Advanced Dvorak Technique (ADT) estimates and Satellite Consensus (SATCON) estimates were available 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),

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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.

and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Akoni.

The genesis of Akoni occurred along 140°W, the border between NHC's and CPHC's areas of responsibility. The cyclone reached its peak intensity of 35 kt, based on unanimous subjective Dvorak intensity estimates of T2.5/35 kt from PHFO, SAB, and JTWC, around 1800 UTC 5 September in the central Pacific basin.

There were no ship or surface observations that reported winds of tropical storm force associated with Akoni.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Akoni was not expected. The disturbance that became Akoni was never introduced in the Tropical Weather Outlook (Table 2).   Prior to genesis, all of the global models showed this system remaining in the monsoon trough; therefore, NHC forecasters believed that the disturbance would not become a tropical cyclone. Furthermore, the models only showed a weak and broad low pressure area moving westward in generally unfavorable environmental conditions for tropical cyclone formation.

A comprehensive verification of the NHC track and intensity forecasts is not provided since only one forecast was made by NHC. The one track forecast had errors of 38 n mi at 12 h, 31 n mi at 24 h, and 118 n mi at 36 h. The intensity errors were 5 kt at 12 and 36 h, and there was no error at 24 h.

A verification of CPHC official track forecasts for Akoni is given in Table 3a. The official forecast track errors were much higher than the mean official errors for the previous 5-yr period at all verifying forecast times. A homogenous comparison of the official track errors with selected guidance models is given in Table 3b. The official forecast beat most of the models at all forecast times, including the TVCN and TVCE consensus guidance. However, EGRI, TABS, and OCD5 performed better than the official forecast at all forecast times, while AEMI beat the official forecast at 24 h and 36 h. It is worth noting that the EMXI, HCCA, GFEX, FSSE and CTCI were omitted from the verification, as these models had difficulty identifying and tracking the weak circulation of Akoni.

A verification of the CPHC official intensity forecasts for Akoni is given in Table 4a. The official forecast intensity errors were quite low, and lower than the mean official errors for the previous 5-yr period at all forecast periods. A homogenous comparison of the official track errors with selected intensity guidance models is given in Table 4b. Several models beat the official

forecast at 24 h, otherwise the official intensity forecast was the top performer. The one exception was HWFI, which beat the official forecast at 12 and 24 h.

There were no coastal watches and warnings associated with Akoni.

Table 1.   Best track for Tropical Storm Akoni, 4–6 September 2019.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
03 / 0600	14.6	134.7	1009	20	low
03 / 1200	14.4	135.7	1009	20	"
03 / 1800	14.2	136.8	1009	20	"
04 / 0000	14.0	138.0	1009	20	"
04 / 0600	13.7	139.1	1009	20	"
04 / 1200	13.5	140.0	1009	25	tropical depression
04 / 1800	13.1	140.9	1009	25	"
05 / 0000	12.9	142.2	1009	25	"
05 / 0600	12.6	143.0	1008	25	"
05 / 1200	12.3	143.8	1006	30	"
05 / 1800	12.1	144.6	1004	35	tropical storm
06 / 0000	11.7	146.0	1004	35	"
06 / 0600	11.4	147.4	1005	35	"
06 / 1200	11.4	148.8	1007	30	low
06 / 1800	11.4	150.3	1007	30	"
07 / 0000					dissipated
05 / 1800	12.1	144.6	1004	35	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%)	0	0
Medium (40%-60%)	0	0
High (>60%)	0	0

Table 3a.   CPHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Akoni, 4–6 September 2019. 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	77.6	104.5	137.3				
OCD5	71.9	101.1	83.9				
Forecasts	5	3	1				
OFCL (2014-18)	26.7	40.8	53.9	68.8	106.5	144.0	185.2
OCD5 (2014-18)	41.2	89.9	144.7	207.5	333.8	475.1	614.4

Table 3b.   Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Akoni, 4–6 September 2019. Errors smaller than the CPHC 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	77.6	104.5	137.3				
OCD5	**71.9**	**101.1**	**83.9**				
GFSI	92.6	143.4	201.2				
EGRI	**69.0**	**88.9**	**104.3**				
HWFI	90.3	134.2	181.9				
HMNI	80.7	112.0	**117.8**				
TVCN	80.5	108.6	145.5				
TVCE	80.3	108.5	138.4				
TVCX	79.8	106.6	**132.7**				
AEMI	82.5	**103.0**	**113.8**				
TABS	**69.2**	**94.5**	**70.8**				
TABM	84.3	132.0	146.9				
TABD	95.0	147.6	178.2				
Forecasts	5	3	1				

Table 4a.   CPHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Akoni, 4–6 September 2019. 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.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**3.8**	**3.3**	**0.0**				
OCD5	4.4	2.7	0.0				
Forecasts	5	3	1				
OFCL (2014-18)	5.8	9.2	11.8	13.3	15.7	17.4	18.4
OCD5 (2014-18)	7.9	12.6	17.2	18.5	29.0	30.0	22.9

Table 4b.   Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Akoni, 4–6 September 2019. Errors smaller than the CPHC 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.

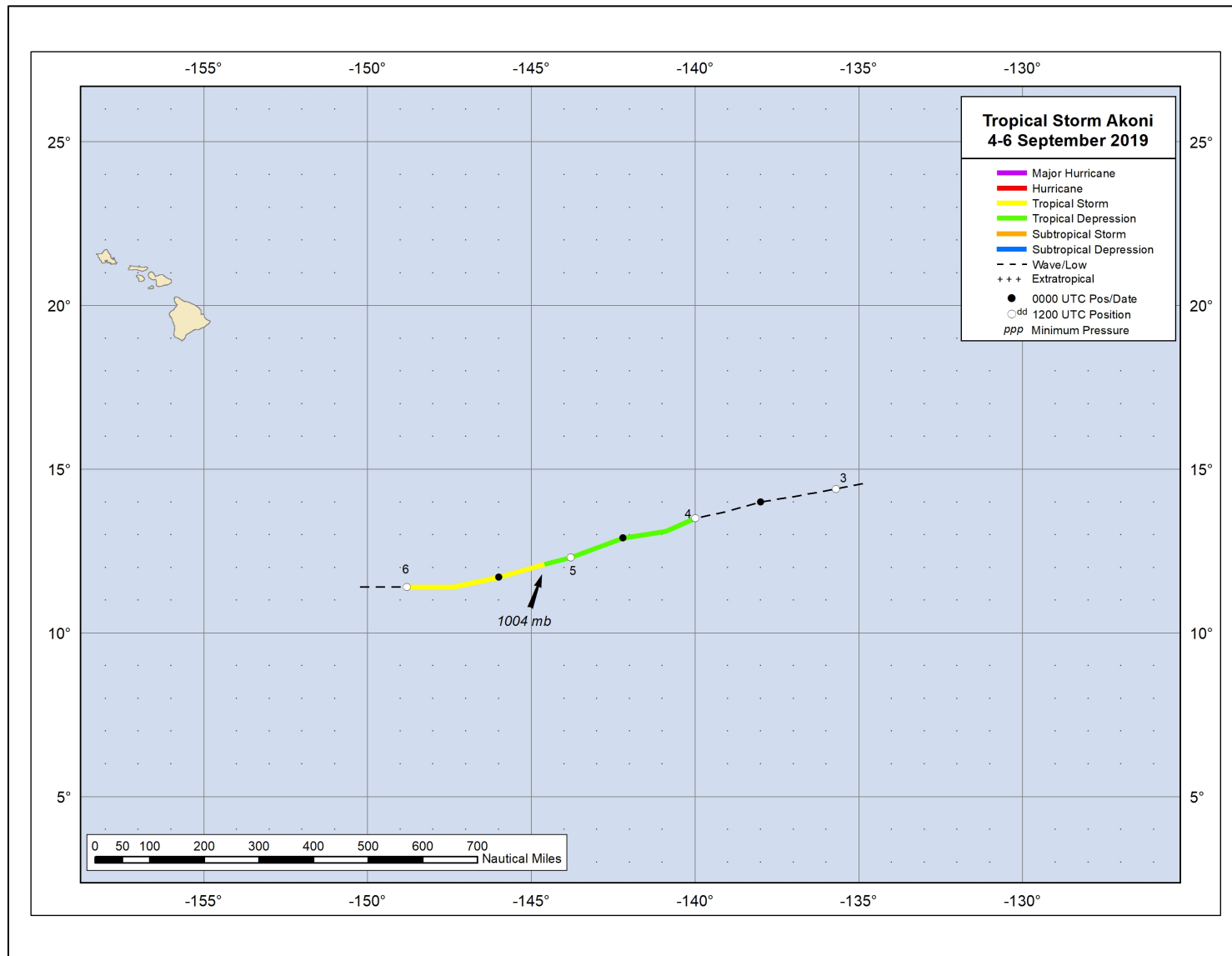| Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	3.8	3.3	0.0				
OCD5	4.4	**2.7**	0.0				
DSHP	5.6	**1.7**	6.0				
LGEM	6.8	7.7	5.0				
HWFI	**1.8**	**2.0**	3.0				
HMNI	3.8	**1.3**	2.0				
ICON	4.2	**1.7**	0.0				
IVCN	4.2	**1.7**	0.0				
GFSI	5.4	6.7	1.0				
Forecasts	5	3	1				

Figure 1.   Best track positions for Tropical Storm Akoni, 4–6 September 2019.

Figure 2.   Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Akoni, 4–6 September 2019. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. Dashed vertical lines correspond to 0000 UTC.
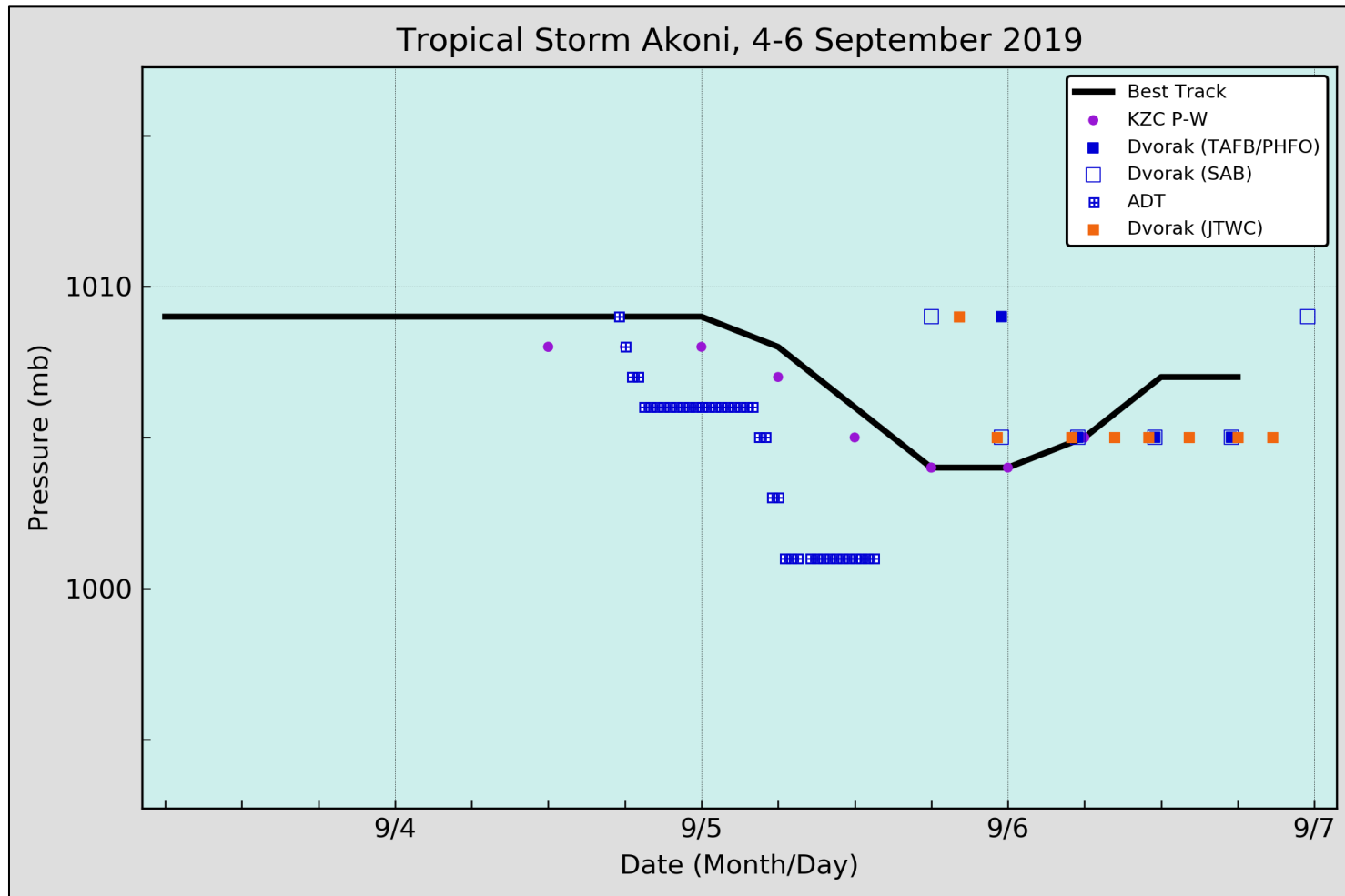
Figure 3.   Selected pressure observations and best track minimum central pressure curve for Tropical Storm Akoni, 4–6 September 2019. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.