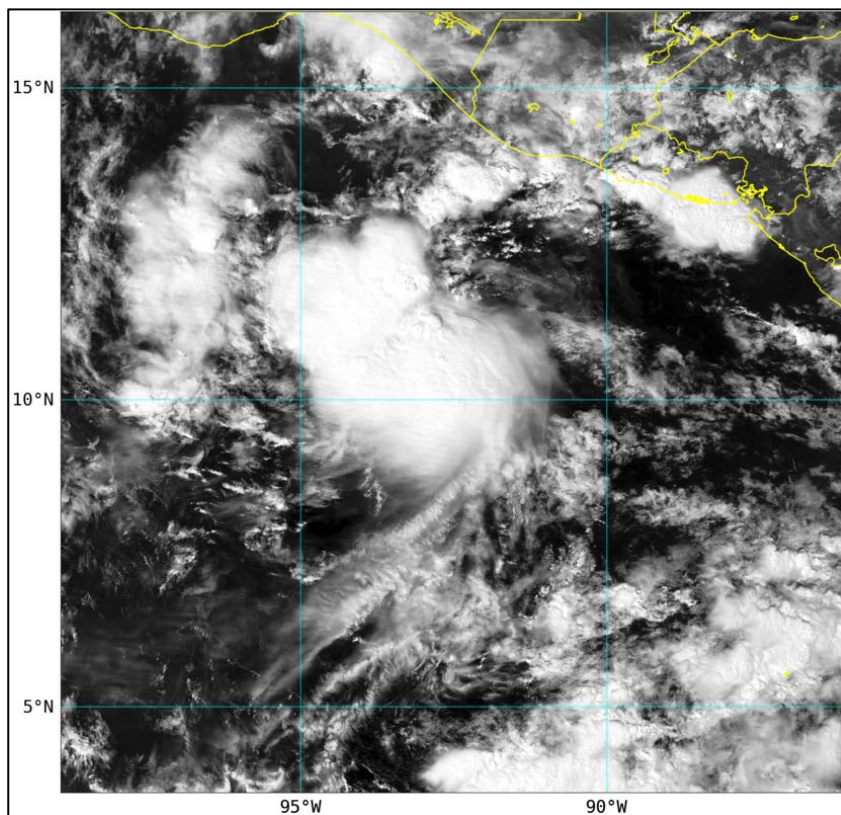# NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM ADRIAN
(EP012017)

9-10 May 2017

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National Hurricane Center
22 November 2017

SUOMI NPP VIIRS DAY/NIGHT BAND IMAGE OF ADRIAN AT 0745 UTC 10 MAY 2017. IMAGE COURTESY OF CIRA/RAMMB.

Tropical Storm Adrian was a short-lived tropical cyclone that formed southeast of the Gulf of Tehuantepec and dissipated offshore. Adrian marked the earliest formation of a named storm on record in the eastern North Pacific basin.

Tropical Storm Adrian

9-10 MAY 2017

SYNOPTIC HISTORY

Adrian formed in association with a tropical wave and a Gulf of Tehuantepec gap wind event that occurred on 5–6 May. To the east of the core of the gap winds, low-level cyclonic vorticity increased south of Central America. A tropical wave that was first detected over Panama on 5 May moved slowly westward during the next several days and merged with the area of pre-existing vorticity associated with the gap wind outflow. Shower and thunderstorm activity gradually increased in coverage and organization on 8 May, and by 1600 UTC 9 May, an ASCAT-A overpass showed that a low-level circulation had become better defined. It is estimated that a tropical depression formed around 1800 UTC that day, centered about 275 n mi south-southwest of the El Salvador/Guatemala border. The depression strengthened to a tropical storm 6 h later. The "best track" chart of Adrian'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].

Adrian moved slowly west-northwestward and northwestward during its life span under the influence of a mid-level ridge centered to the north of the tropical cyclone over the southern Gulf of Mexico. Microwave imagery showed that the mid-level circulation and convective structure increased in organization early on 10 May (Fig. 4) and the tropical cyclone reached a peak intensity of 40 kt around 0600 UTC that day. By that time, however, mid-level southeasterly vertical wind shear over Adrian was around 20 kt according to satellite analyses from UW-CIMSS (Fig. 5), and Adrian began to weaken. The southeasterly shear subsequently increased through a deeper layer of the troposphere (not shown), and the deep convection was removed from the low-level circulation by 1200 UTC 10 May. By 0000 UTC 11 May, no organized deep convection remained in association with Adrian, and the system became a post-tropical remnant low while centered about 245 n mi south of the Mexico/Guatemala border. The remnant low moved northwestward at 5 to 10 kt and produced some disorganized convection before dissipating about 140 n mi south of Puerto Angel, Mexico, by 1200 UTC 12 May.

METEOROLOGICAL STATISTICS

Observations in Adrian (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). Data and imagery from NOAA polar-orbiting satellites including the

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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.

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 Adrian.

Adrian's analyzed peak intensity of 40 kt is based on the highest reliable winds from a pair of ASCAT-A and ASCAT-B passes between 0300 and 0400 UTC on 10 May. There were some higher winds noted in the ASCAT-B pass, but they appeared to be rain-inflated and were not considered valid.

There were no ship reports of tropical-storm-force winds in association with Adrian.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of the Adrian was generally well anticipated in the 5-day forecast period, but the cyclone formed sooner than expected. A Special Tropical Weather Outlook was first issued for this out-of-season disturbance 96 h prior to genesis, and the system was given a medium chance (40–60%) of formation during the next 5 days (Table 2). The 5-day genesis probability was raised to the high (> 60%) category 2 days before genesis, at which time the system was first given a low (< 40%) chance of formation in the 48-h period. The 48-h genesis probability was raised to the medium and high categories 24 h and 12 h prior to genesis, respectively.

Given the short life span of Adrian, there were only three verifying NHC official forecasts at 12 h and one at 24 h. NHC average official forecast track errors were 37.3 n mi and 24.4 n mi at 12 and 24 h, respectively. NHC average official intensity forecast errors were 5.0 kt at both 12 and 24 h. Given the small sample size, a homogeneous comparison of track and intensity model errors is not shown.

Much of the intensity guidance had a high bias with Adrian, along with the NHC official forecast (Fig. 6). The SHIPS and LGEM models forecast Adrian to become a hurricane in 3 to 4 days (Fig. 6 a,b). HWRF model forecasts were generally weaker, but a couple of those forecasts also showed Adrian reaching hurricane intensity (Fig. 6c). The official forecasts had a high bias and showed Adrian reaching hurricane intensity in 4-5 days until just prior to dissipation (Fig. 6d), but those forecasts were lower than those from the SHIPS and LGEM models.

The SHIPS and LGEM models were likely unable to fully account for the mid-level vertical shear that affected Adrian. The primary shear predictor in those models is the magnitude of the vector difference between the 850-mb and 200-mb winds, with only a small correction for shear in the mid-levels. Also, early in Adrian's life span the GFS model forecast central pressures below

970 mb for some cycles on 9–10 May (not shown). This strengthening in the GFS model was likely another contributor to the high bias of the statistical guidance for Adrian, as those models use the GFS vortex tendency as a predictor.

No coastal watches or warnings were issued in association with Adrian.

Table 1.   Best track for Tropical Storm Adrian, 9–10 May 2017.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage*
09 / 1800	9.3	91.2	1006	30	tropical depression
10 / 0000	9.5	91.7	1005	35	tropical storm
10 / 0600	9.7	92.0	1004	40	"
10 / 1200	9.9	92.3	1004	35	"
10 / 1800	10.2	92.6	1004	35	"
11 / 0000	10.5	92.9	1006	30	low
11 / 0600	10.8	93.1	1007	25	"
11 / 1200	11.2	93.3	1008	25	"
11 / 1800	11.6	93.8	1008	20	"
12 / 0000	12.3	94.6	1008	20	"
12 / 0600	12.9	95.6	1008	20	"
12 / 1200					dissipated
10 / 0600	9.7	92.0	1004	40	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%)	48	N/A
Medium (40%-60%)	24	96
High (>60%)	12	48
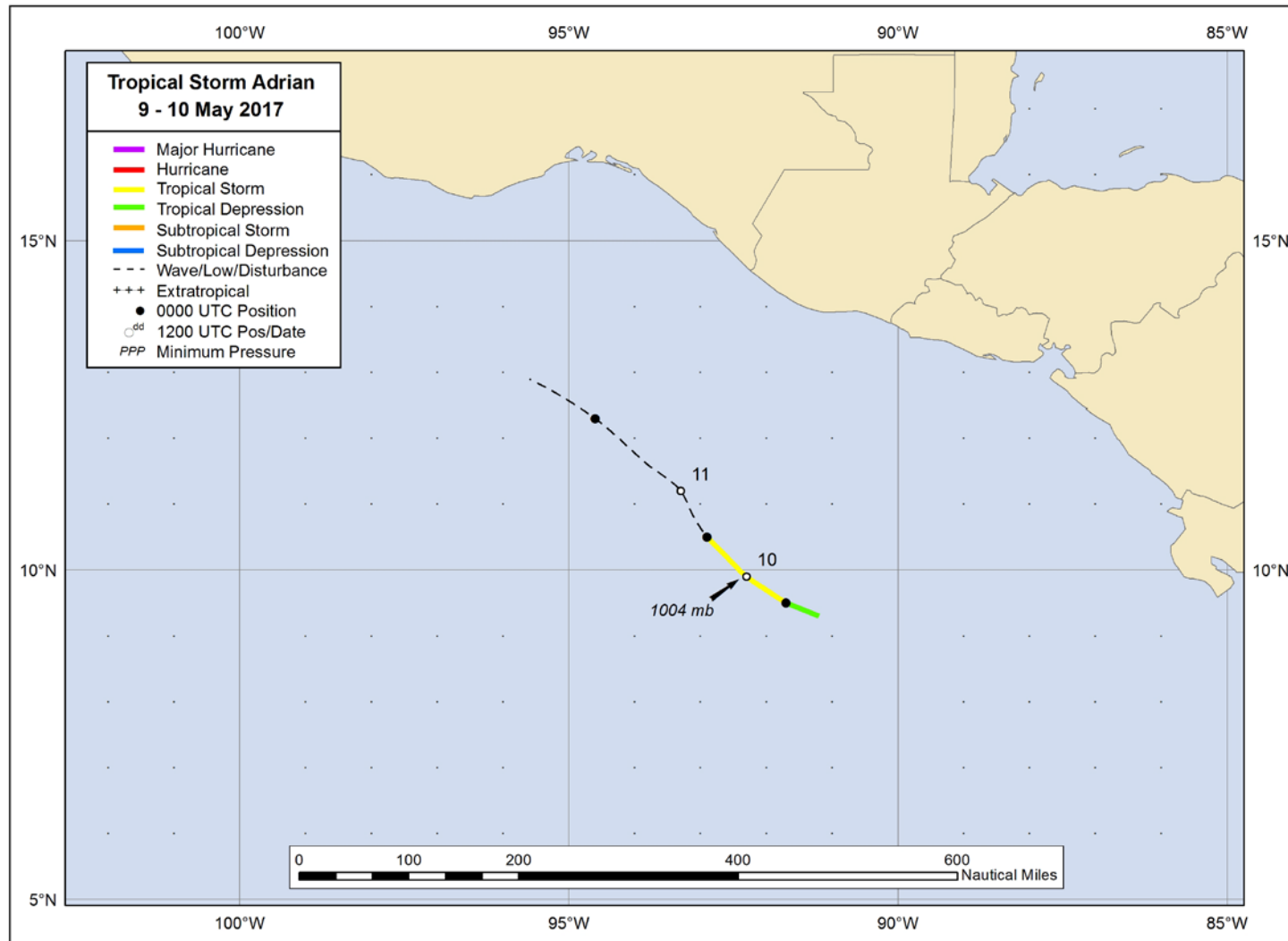
Figure 1.   Best track positions for Tropical Storm Adrian, 9–10 May 2017.
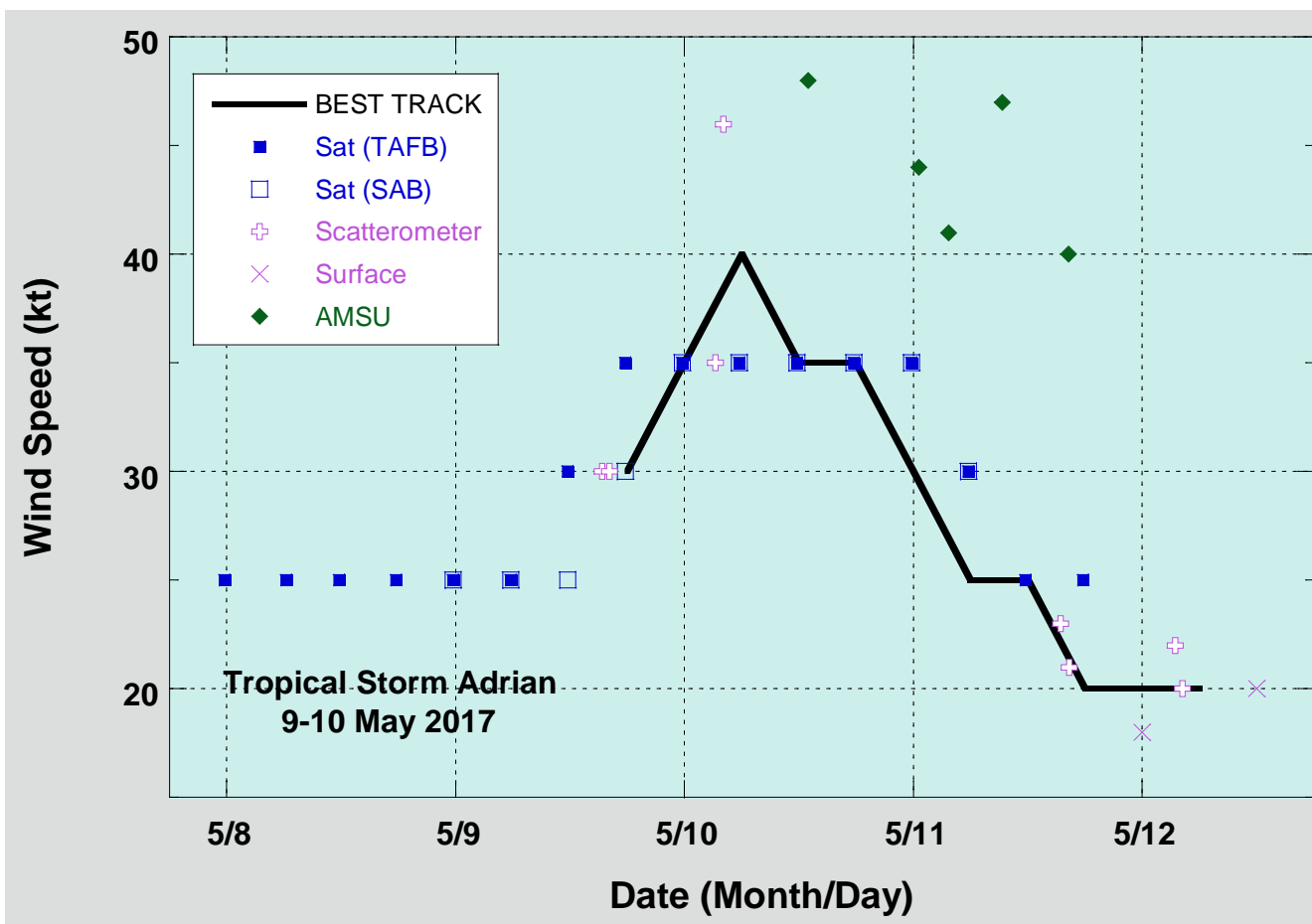
Figure 2.   Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Adrian, 9–10 May 2017. Dashed vertical lines correspond to 0000 UTC.
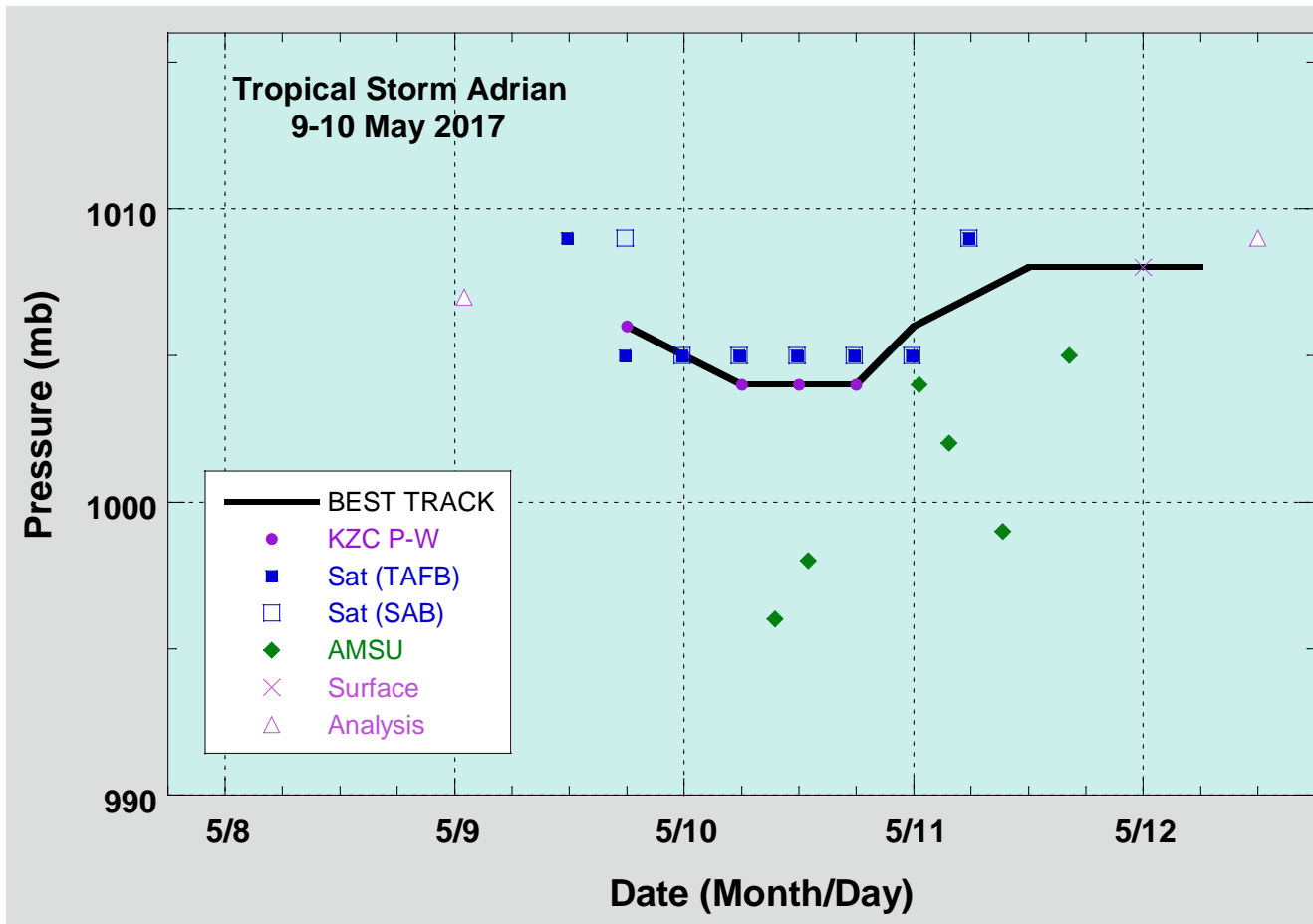
Figure 3.   Selected pressure observations and best track minimum central pressure curve for Tropical Storm Adrian, 9–10 May 2017. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.
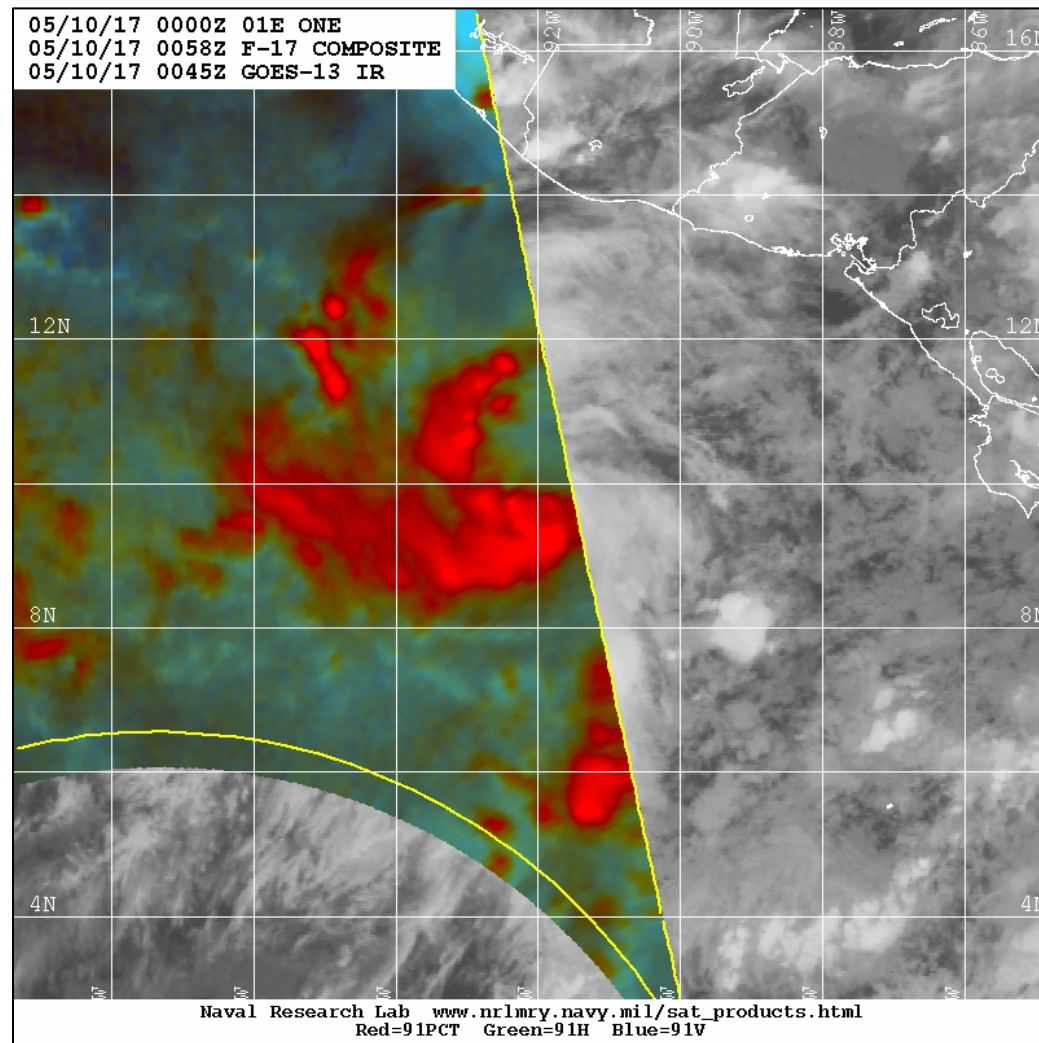
Figure 4.   SSMIS 91-GHz color composite image over Adrian at 0058 UTC 10 May 2017. Image courtesy of the U.S. Naval Research Laboratory tropical cyclone webpage.
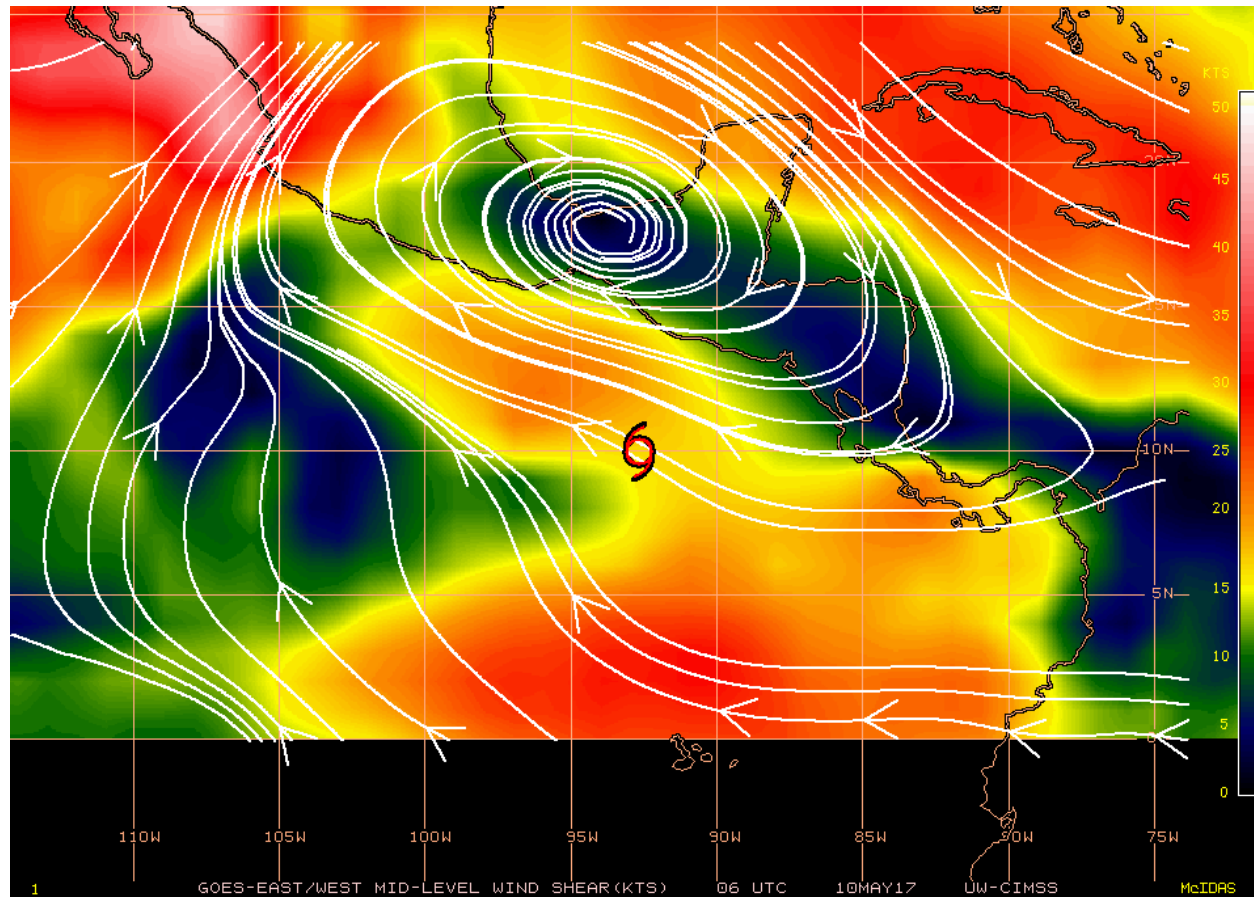
Figure 5.   Mid-tropospheric vertical wind shear analysis from the Cooperative Institute for Meteorological Satellite Studies at the University of Wisconsin-Madison valid at 0600 UTC 10 May 2017. Shear magnitude (kt) is shown in color fill while the shear direction is shown by the streamlines. The position of Adrian at the analysis time is indicated by the tropical storm symbol.
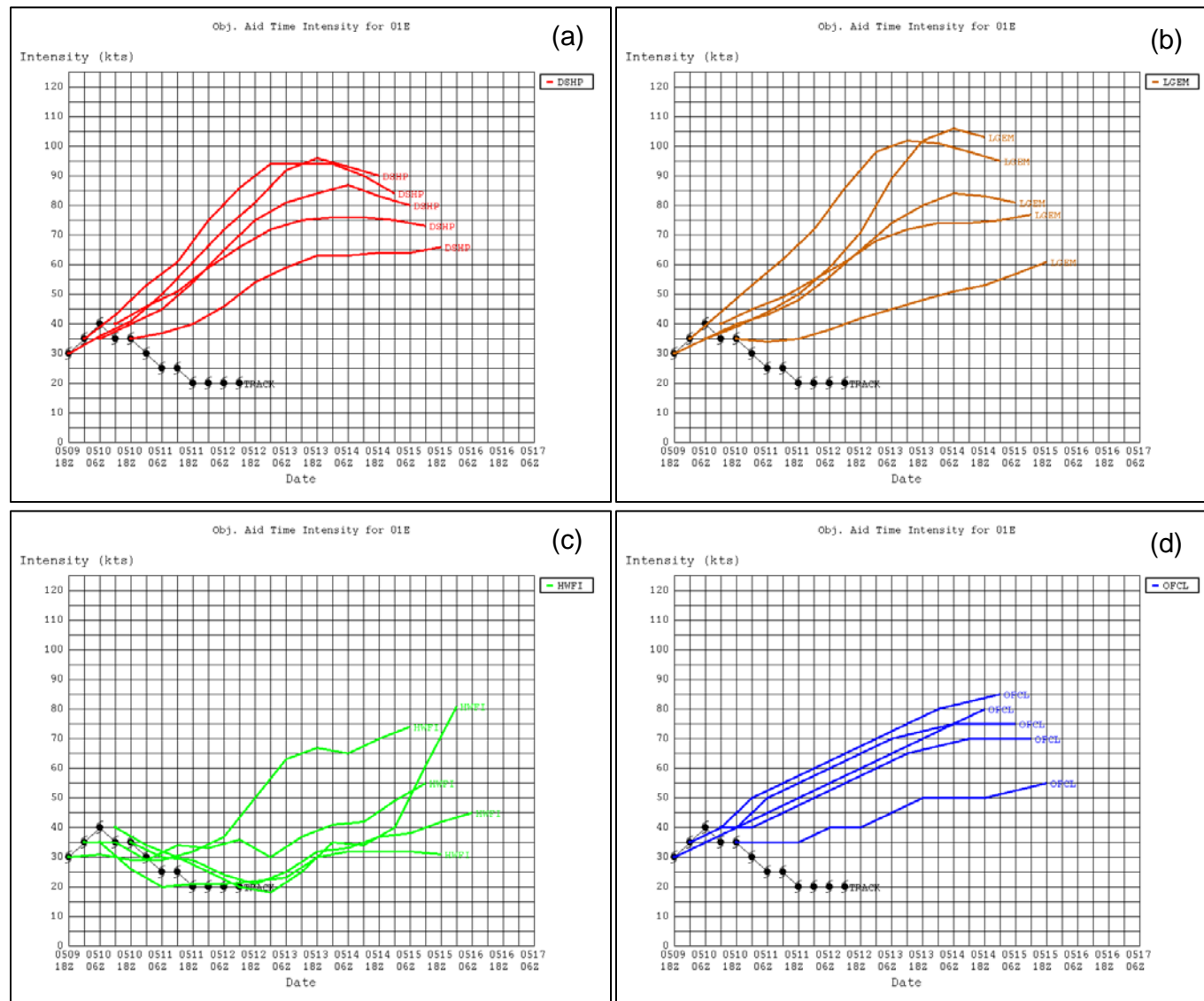
Figure 6.   Intensity forecasts (colored lines, kt) for Adrian for forecast cycles from 1800 UTC 9 September through 1800 UTC 10 September 2017 from the (a) Decay-SHIPS, (b) LGEM, (c) and HWRF models along with the (d) NHC official forecast. The best track intensity of Adrian is indicated by the black line with hurricane symbols.