NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM KYLE

(AL122020)

14–15 August 2020

Eric Blake
National Hurricane Center
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VISIBLE SATELLITE IMAGE OF KYLE AT 1720 UTC 14 AUGUST 2020 (NASA).

Kyle was a short-lived tropical storm that formed just offshore of North Carolina, moved quickly away from the U.S. East Coast, and dissipated a few hundred miles south of Nova Scotia.

Tropical Storm Kyle

14–15 AUGUST 2020

SYNOPTIC HISTORY

Kyle formed from a mesoscale convective system (MCS) that moved off of the coasts of South Carolina and Georgia early on 11 August. Although convection weakened that day, the MCS left behind a small mid-level circulation that re-developed some thunderstorm activity that night while it moved slowly northeastward about 100 n mi offshore of South Carolina. This burst of deep convection produced a weak low-level circulation that moved near the coast of southern North Carolina late on 12 August. Satellite images showed the system becoming better organized the next day, although the system lacked a well-defined center or prominent banding features. The low moved offshore of the Outer Banks early on 14 August, and deep convection increased as most of the circulation was over water. Early-morning visible satellite images revealed that the low had become better defined as a result of the convection, and buoy and scatterometer data indicated that the system became a tropical storm near 1200 UTC 14 August about 90 n mi east-northeast of Duck, North Carolina. 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[1].

After genesis, Kyle moved east-northeastward away from the United States due to the flow between a broad mid-level trough over the northeastern United States and Canadian Maritimes and the western Atlantic subtropical ridge. Despite moderate-to-strong shear, the tropical storm gained strength while it moved over the Gulf Stream, and ship data indicate it reached a peak intensity of 45 kt at around 1200 UTC 15 August while the storm was located about 200 n mi southeast of Cape Cod, Massachusetts. Kyle began to weaken afterward due to increasing shear and interaction with a nearby stationary front. The tropical storm became embedded in the front by 0000 UTC 16 August, marking its transition to an extratropical cyclone, and it quickly lost a well-defined center and was absorbed by the front shortly thereafter a few hundred miles south of Nova Scotia.

METEOROLOGICAL STATISTICS

Observations in Kyle (Figs. 2 and 3) include subjective satellite-based Dvorak intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), 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

[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.

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

The 45-kt peak intensity of Kyle was primarily based on data from the ship **Maersk Ohio** (KABP), which reported 50-kt winds at 1000 UTC 15 August from a height of about 30 m. The ship also reported a pressure of 1005.4 mb at that time, which using the typical 1 mb per 10 kt reduction factor gives a minimum central pressure of about 1000 mb.

Ship reports of winds of tropical storm force associated with Kyle are given in Table 2. NOAA Buoy 41001, offshore of North Carolina, reported 1-min sustained winds of 31 kt from a height of 3.8 m at 1200 UTC 14 August, which adjusts to a standard 10-m wind speed of about 34 kt.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Kyle was not well foreseen. The precursor system was initially mentioned in the Tropical Weather Outlook (TWO) only 18 h prior to genesis, introducing a low (<40%) chance of formation in the 2- and 5-day time periods (Table 3). The probabilities were raised to a medium (40–60%) 5-day chance only 12 h prior to formation, and did not reach the high category before genesis. Model guidance first started to show some chance of formation about 3 days before it occurred, but the models were inconsistent from run to run and were not in good agreement. Most of the models showed, at best, a weak low, and it was also uncertain if the low would become tropical in nature.

A verification of NHC official track and intensity forecasts for Kyle is given in Tables 4 and 5, respectively. Official track (intensity) forecast errors were above (below) the mean official errors for the previous 5-yr period during all available time periods in a small sample (only 1 case at 24 h). No meaningful comparisons can be made with the models since the sample size is so small. NHC forecasts were accurate with the peak intensity forecast, but were too slow to predict Kyle achieving that strength and subsequent weakening.

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

Table 1. Best track for Tropical Storm Kyle, 14–15 August 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
14 / 1200	36.6	74.2	1008	35	tropical storm
14 / 1800	37.4	72.6	1007	35	"
15 / 0000	38.0	71.0	1005	40	"
15 / 0600	38.4	69.1	1003	45	"
15 / 1200	38.8	66.7	1000	45	"
15 / 1800	39.3	64.2	1001	40	"
16 / 0000	39.7	61.6	1003	35	extratropical
16 / 0600					dissipated
15 / 1200	38.8	66.7	1000	45	minimum pressure and maximum winds

Table 2. Selected ship reports with winds of at least 34 kt for Kyle, 14–15 August 2020.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
15 / 0100	KABP	37.2	70.0	230 / 42	1008.8
15 / 0200	KABP	37.3	69.6	130 / 38	1008.8
15 / 0300	KABP	37.4	69.3	130 / 35	1008.6
15 / 0800	KABP	37.9	67.3	240 / 45	1006.0
15 / 1000	KABP	38.2	66.6	230 / 50	1005.4
15 / 1300	KABP	38.5	65.2	230 / 47	1006.0
15 / 1400	KABP	38.6	64.8	130 / 35	1006.1
15 / 1500	KABP	38.7	64.4	230 / 40	1006.0
15 / 1500	VRGM7	40.5	58.6	020 / 40	1010.9
16 / 0000	VRGM7	40.2	62.1	050 / 40	1006.6
16 / 0600	KABP	39.5	58.1	240 / 38	1007.0

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%)	18	18
Medium (40%-60%)	0	12
High (>60%)	-	-

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Kyle. 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	27.8	45.9						
OCD5	41.4	107.9						
Forecasts	3	1						
OFCL (2015-19)	24.1	36.9						
OCD5 (2015-19)	44.7	96.1						

Table 5. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Kyle. 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	**3.3**	**5.0**						
OCD5	4.7	9.0						
Forecasts	3	1						
OFCL (2015-19)	5.2	7.7						
OCD5 (2015-19)	6.8	10.8						

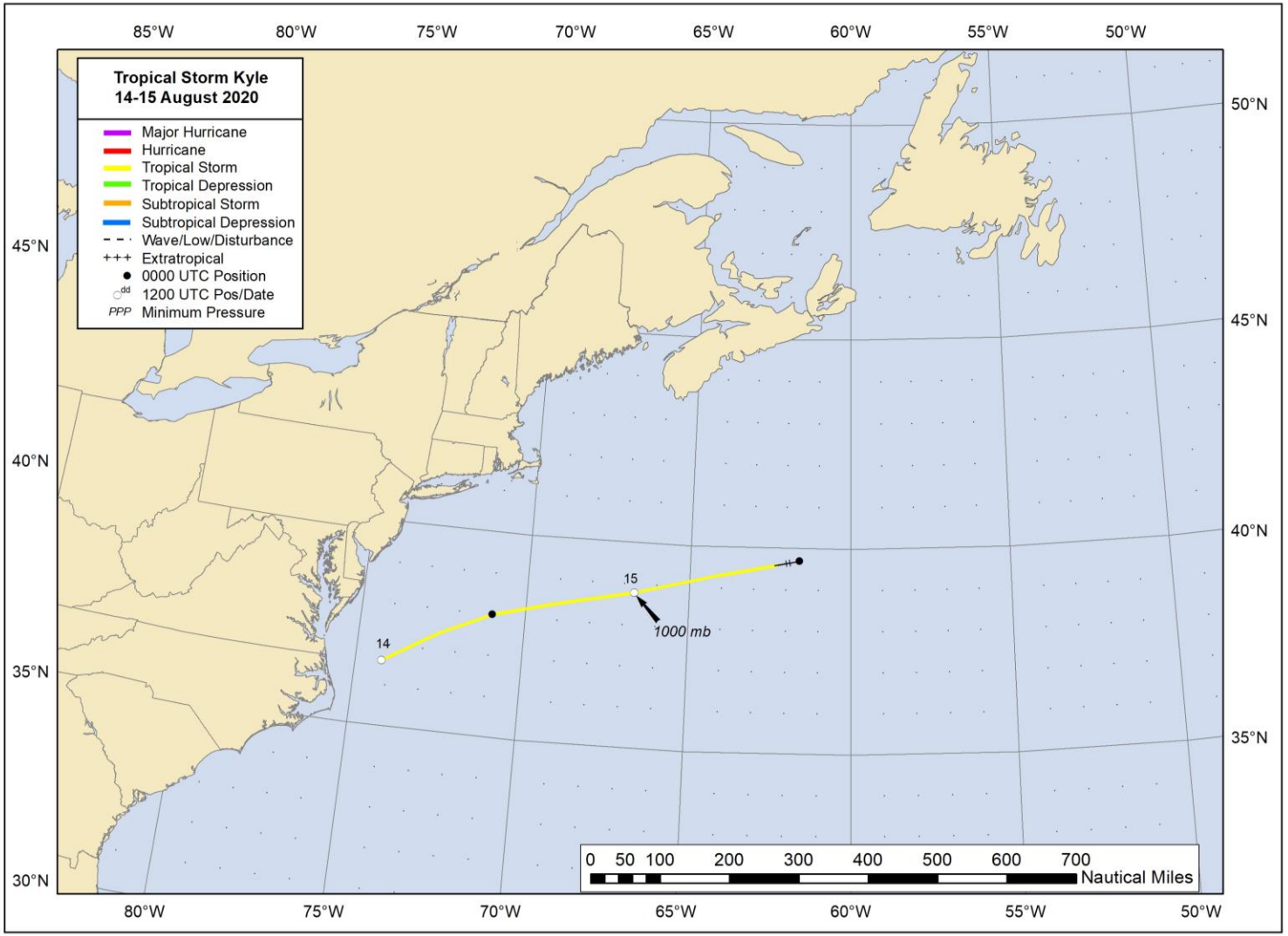

Figure 1. Best track positions for Kyle, 14–15 August 2020.

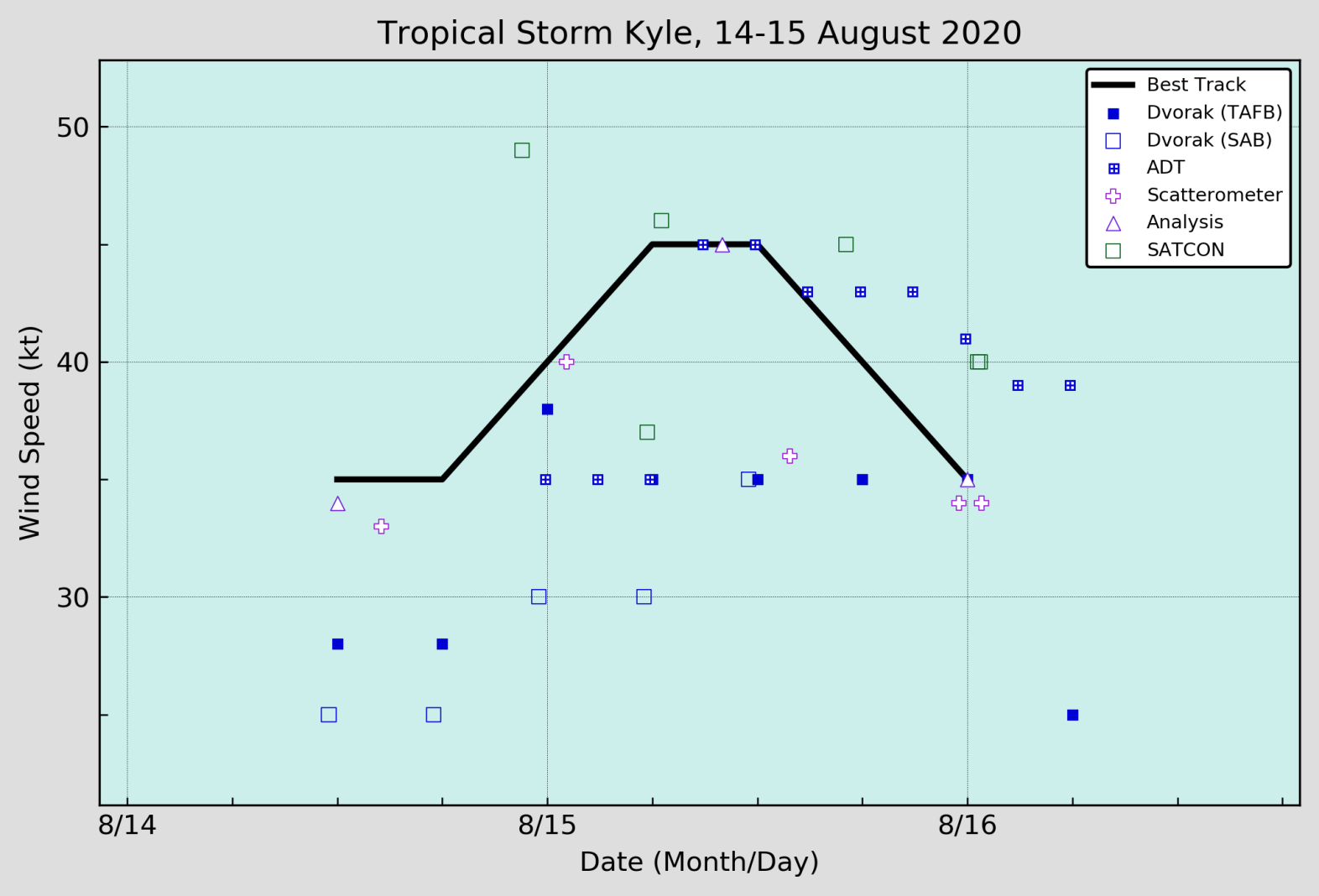

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Kyle, 14–15 August 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

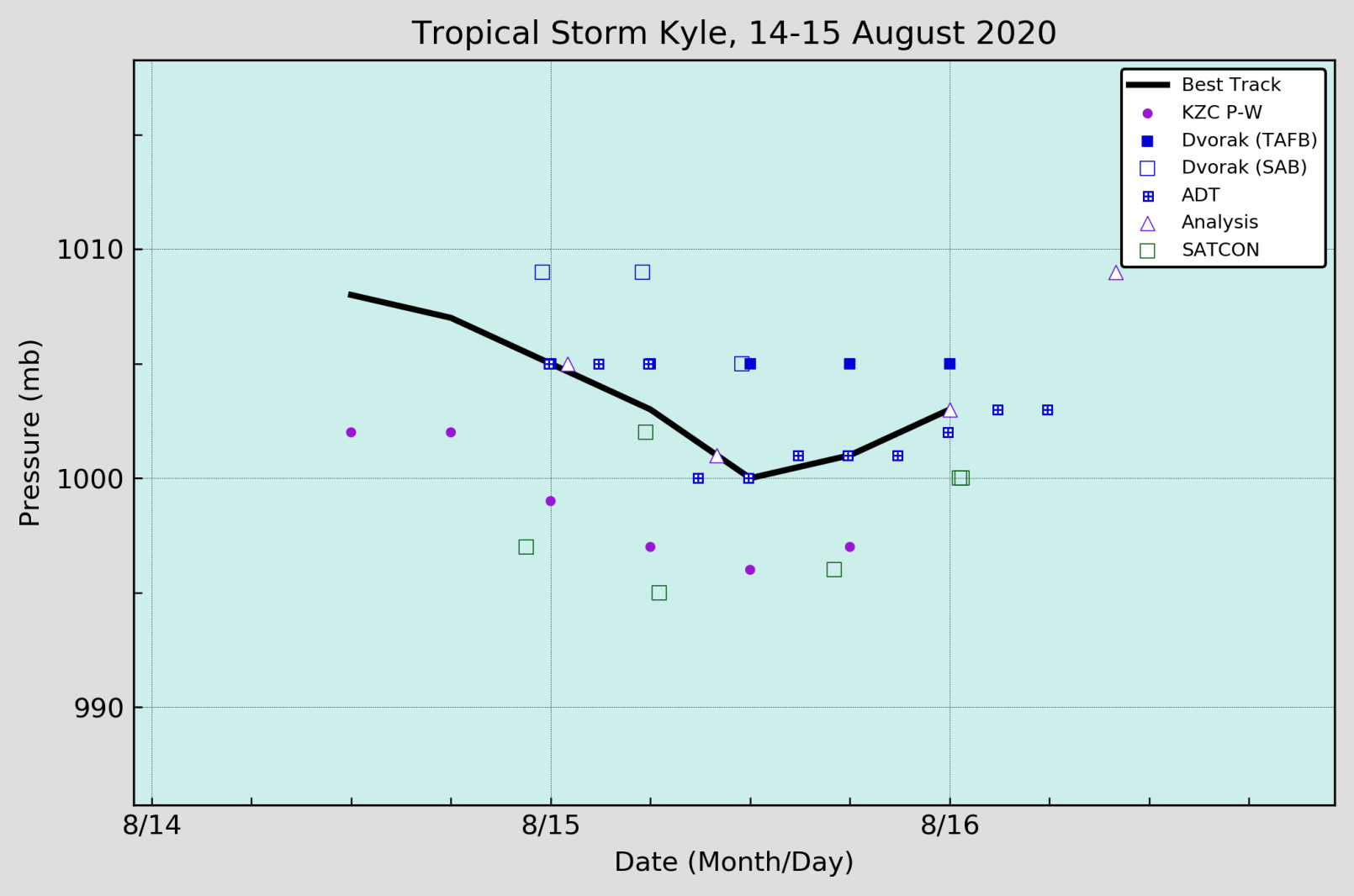

Figure 3. Selected pressure observations and best track minimum central pressure curve for Kyle, 14–15 August 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.