NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM KRISTY

(EP132018)

6–12 August 2018

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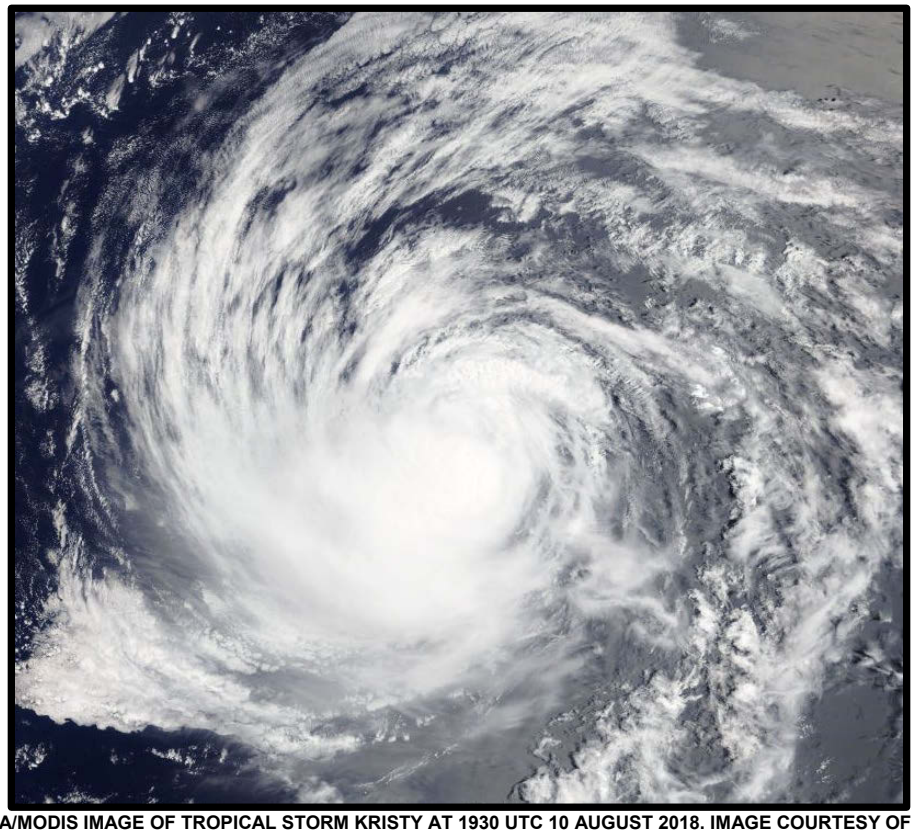

TERRA/MODIS IMAGE OF TROPICAL STORM KRISTY AT 1930 UTC 10 AUGUST 2018. IMAGE COURTESY OF NASA.

Kristy was a tropical storm that formed well to the west-southwest of the southern tip of the Baja California peninsula and remained over the open waters of the eastern North Pacific throughout its lifetime.

Tropical Storm Kristy

6–12 AUGUST 2018

SYNOPTIC HISTORY

Kristy developed during a heightened period of activity within an overall active eastern North Pacific hurricane season. When genesis of the cyclone occurred, Hurricane John and Tropical Storm Ileana were located offshore of Mexico to the east, while Hurricane Hector was located to the west. The origin of Kristy can be traced back to a tropical wave that moved off the west coast of Africa on 22 July. This system was devoid of deep convection for much of its trek across the Atlantic basin. The fast-moving wave crossed the southern Caribbean Sea and the northern portion of South America on 27–29 July, enhancing convection over northwestern Venezuela and northern Colombia, and the wave then moved over the eastern Pacific on 29–30 July. Bursts of convection continued in association with the system from 31 July through 2 August, while a broad area of low-level cyclonic curvature developed in the vicinity of the wave. The westward-moving system's cloud pattern gradually became better organized over the next several days, with slowly falling surface pressures.

The area of low pressure became better defined on 6 August with a growing area of deep convection around the center. It is estimated that the system became a tropical depression at 1800 UTC that day, and then became a tropical storm 6 h later, while centered about 900 n mi west-southwest of the southern tip of the Baja California peninsula. 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]. The cyclone moved generally westward early on 7 August, embedded in deep-layer easterlies associated with a subtropical ridge to the northeast, and Kristy became slightly better organized in a low-shear environment over warm sea surface temperatures (SSTs). By that afternoon, an upper-level low located to the northwest of Kristy began producing moderate northwesterly shear and advecting dry air into the cyclone's environment. These factors caused the cyclone to weaken slightly during the night of 7 August, followed by no change in intensity through 8 August while the system continued to move westward.

Kristy turned toward the west-northwest and northwest during the afternoon and evening of 8 August, as Hurricane John to its northeast eroded the subtropical ridge that was responsible for the earlier westward track. The shear that had been affecting the cyclone began to decrease, allowing for intensification to occur from late on 8 August through early on 10 August. By 10 August, Kristy was moving almost due north around the large circulation of a weakening John. The cyclone reached its peak intensity of 60 kt on 10 August. After that time, the cyclone's

[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.

northerly track brought it over progressively cooler SSTs and into an environment of increasing shear. These factors resulted in rapid weakening and loss of Kristy's associated deep convection, with the cyclone decreasing in intensity from 60 kt to 30 kt over the 18-h period from 1800 UTC 10 August to 1200 UTC 11 August. The cyclone remained a tropical depression through 0600 UTC 12 August, as a new burst of convection on the afternoon of 11 August maintained the system as a tropical cyclone. By 1200 UTC on 12 August, the last burst of convection waned, and the system degenerated into a remnant low. The low then moved westward as a swirl of low-level clouds, and dissipated by late on 13 August.

METEOROLOGICAL STATISTICS

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

Kristy's estimated maximum intensity of 60 kt from 0600 UTC to 1800 UTC 10 August is based on a blend of subjective and objective Dvorak classifications, SATCON estimates and data from an ASCAT overpass. Microwave imagery from late on 9 August, just before the storm reached peak intensity, showed a well-defined low-level cloud structure (Fig. 4), with an eye-like feature and distinct bands. Given the large spread of intensity estimates for this storm, there is likely greater than usual uncertainty in the estimate of the peak intensity of Kristy. Also, in post-analysis, Kristy was judged to have maintained tropical cyclone status about a day longer than was assessed operationally.

There were no ship reports of tropical storm force winds associated with Kristy.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

Kristy's genesis was well anticipated. The first mention of development in the Tropical Weather Outlook (TWO) came 114 h prior to genesis (Table 2). At that time the system was given

a low chance (<40%) for development during the next 5 days. The probability of genesis within 5 days was elevated to medium (40–60%) 90 h before genesis, with the possibility of genesis within 2 days mentioned 72 h before formation. The 5-day development probability was increased to the high category (>60%) 72 h before the cyclone formed, while the 2-day probability was increased to high 54 h before genesis. The genesis forecasts were aided by the SHIPS environmental diagnostics, which indicated shear values of 20 kt or less, 700–500-mb relative humidity values greater than 70%, and SSTs near 28°C for the 0–72 h forecast time period when guidance was initiated on 3 and 4 August.

A verification of NHC official track forecasts for Kristy is given in Table 3a. Official track forecast errors were lower than the mean official errors for the previous 5-yr period at 12 h and at 96 h through 120 h, although the sample size at 96 h and 120 h is small. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The official forecast bested nearly all of the guidance at all time intervals. In general, the consensus guidance, TVCE, TVCX, GFEX, and HCCA were the best performers for this storm. Some of the dynamical models, including the ECMWF (EMXI) and the GFS (GFSI), had very large track errors at longer lead times (over 400 n mi at 96 and 120 h). The EMXI had a left-of-track bias in part due to not weakening the subtropical ridge to the north of the cyclone (not shown). On the other hand, the GFSI had a right-of-track bias, as it was showing a more significant interaction between Kristy and the circulation of John located to the northeast (not shown).

A verification of NHC official intensity forecasts for Kristy is given in Table 4a. The mean official intensity forecast errors were close to the mean official errors for the previous 5-yr period for the 12- though 48-h forecast intervals, and also at 96 h and 120 h, and were better than the long-term means at 72 h. A homogeneous comparison of the official intensity forecast errors with selected guidance models is given in Table 4b. In general, the best intensity guidance was the model consensus, IVCN, at 12 through 72 h. For a small number of cases at 96 h and 120 h, EMXI and the HMON (HMNI) were the best-performing models.

No watches or warnings were issued in association with Kristy.

Table 1. Best track for Tropical Storm Kristy, 6–12 August 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
06 / 1800	14.8	122.6	1005	30	tropical depression
07 / 0000	14.6	123.6	1004	35	tropical storm
07 / 0600	14.4	124.6	1000	45	"
07 / 1200	14.1	125.6	1000	45	"
07 / 1800	14.0	126.6	1000	45	"
08 / 0000	14.0	127.4	1002	40	"
08 / 0600	14.0	128.2	1002	40	"
08 / 1200	14.3	128.9	1002	40	"
08 / 1800	14.5	129.4	1002	40	"
09 / 0000	14.9	129.8	1000	45	"
09 / 0600	15.4	130.1	997	50	"
09 / 1200	15.9	130.1	994	55	"
09 / 1800	16.5	130.1	994	55	"
10 / 0000	17.1	130.0	994	55	"
10 / 0600	17.8	129.9	991	60	"
10 / 1200	18.6	129.8	991	60	"
10 / 1800	19.4	129.9	991	60	"
11 / 0000	20.2	130.0	996	50	"
11 / 0600	20.9	130.4	1000	40	"
11 / 1200	21.3	130.8	1003	35	"
11 / 1800	21.7	131.2	1006	30	tropical depression
12 / 0000	22.0	131.6	1008	30	"
12 / 0600	22.3	132.0	1009	25	"
12 / 1200	22.4	132.4	1009	25	low
12 / 1800	22.4	132.9	1009	25	"
13 / 0000	22.4	133.4	1009	25	"
13 / 0600					dissipated
10 / 0600	17.8	129.9	991	60	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%)	114	114
Medium (40%-60%)	72	90
High (>60%)	54	72

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Kristy, 6–12 August 2018. 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	**17.3**	35.0	56.1	71.2	82.3	**70.4**	**54.2**
OCD5	35.5	84.9	143.1	221.4	451.0	668.5	606.4
Forecasts	19	18	16	14	10	6	2
OFCL (2013-17)	21.8	33.2	43.0	53.9	80.7	111.1	150.5
OCD5 (2013-17)	34.9	70.7	109.1	146.1	213.8	269.0	339.7

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Kristy, 6–12 August 2018. Errors smaller than the NHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	17.3	35.0	56.1	71.2	82.3	70.4	54.2
OCD5	35.5	84.9	143.1	221.4	451.0	668.5	606.4
TVCE	19.3	37.4	56.8	73.5	95.4	87.6	62.5
TVCX	19.2	35.6	**53.1**	74.2	108.8	86.3	121.3
GFEX	19.2	36.9	**55.8**	78.9	129.8	88.4	218.2
HCCA	18.8	35.0	**53.8**	75.0	107.9	85.0	93.2
AEMI	26.9	54.7	91.5	140.6	248.3	324.8	277.3
EMXI	24.2	41.1	66.5	110.9	238.8	474.0	749.6
HWFI	26.4	54.5	91.2	130.1	178.9	263.8	382.4
HMNI	26.5	49.1	73.6	106.2	146.8	194.3	185.3
GFSI	31.2	65.0	104.4	158.9	295.4	428.0	403.5
TABS	21.4	42.0	71.3	119.2	279.2	504.5	632.2
TABM	21.7	51.4	95.7	153.6	299.0	489.3	573.7
TABD	28.6	71.7	127.6	186.3	327.1	489.2	531.0
Forecasts	19	18	16	14	10	6	2

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Kristy, 6–12 August 2018. 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	6.6	**9.2**	12.2	**11.1**	**8.0**	15.8	15.0
OCD5	7.8	11.2	14.1	12.1	11.0	23.5	27.5
Forecasts	19	18	16	14	10	6	2
OFCL (2013-17)	5.8	9.6	11.8	13.2	15.1	15.1	14.6
OCD5 (2013-17)	7.6	12.4	15.6	17.7	19.8	20.8	19.6

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Kristy, 6–12 August 2018. Errors smaller than the NHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	6.6	9.2	12.2	11.1	8.0	15.8	15.0
OCD5	7.8	11.2	14.1	12.1	11.0	23.5	27.5
HCCA	6.8	10.1	12.2	14.1	14.9	19.0	20.5
EMXI	7.6	11.4	14.3	15.9	14.4	**5.7**	**4.0**
HWFI	**4.7**	**8.2**	**10.4**	14.5	22.6	25.2	22.5
HMNI	**6.1**	**7.5**	**10.1**	13.6	13.9	**4.5**	**9.5**
GFSI	8.1	13.7	17.7	16.6	8.2	**6.7**	**12.0**
IVCN	6.6	**8.8**	**11.2**	**10.4**	**7.6**	**10.2**	18.0
ICON	**6.5**	**8.3**	**10.9**	**10.8**	8.0	**8.2**	16.5
LGEM	8.0	10.4	14.0	13.5	9.2	**7.3**	**13.5**
DSHP	7.5	10.2	13.2	12.4	**7.3**	**8.2**	**14.0**
Forecasts	19	18	16	14	10	6	2

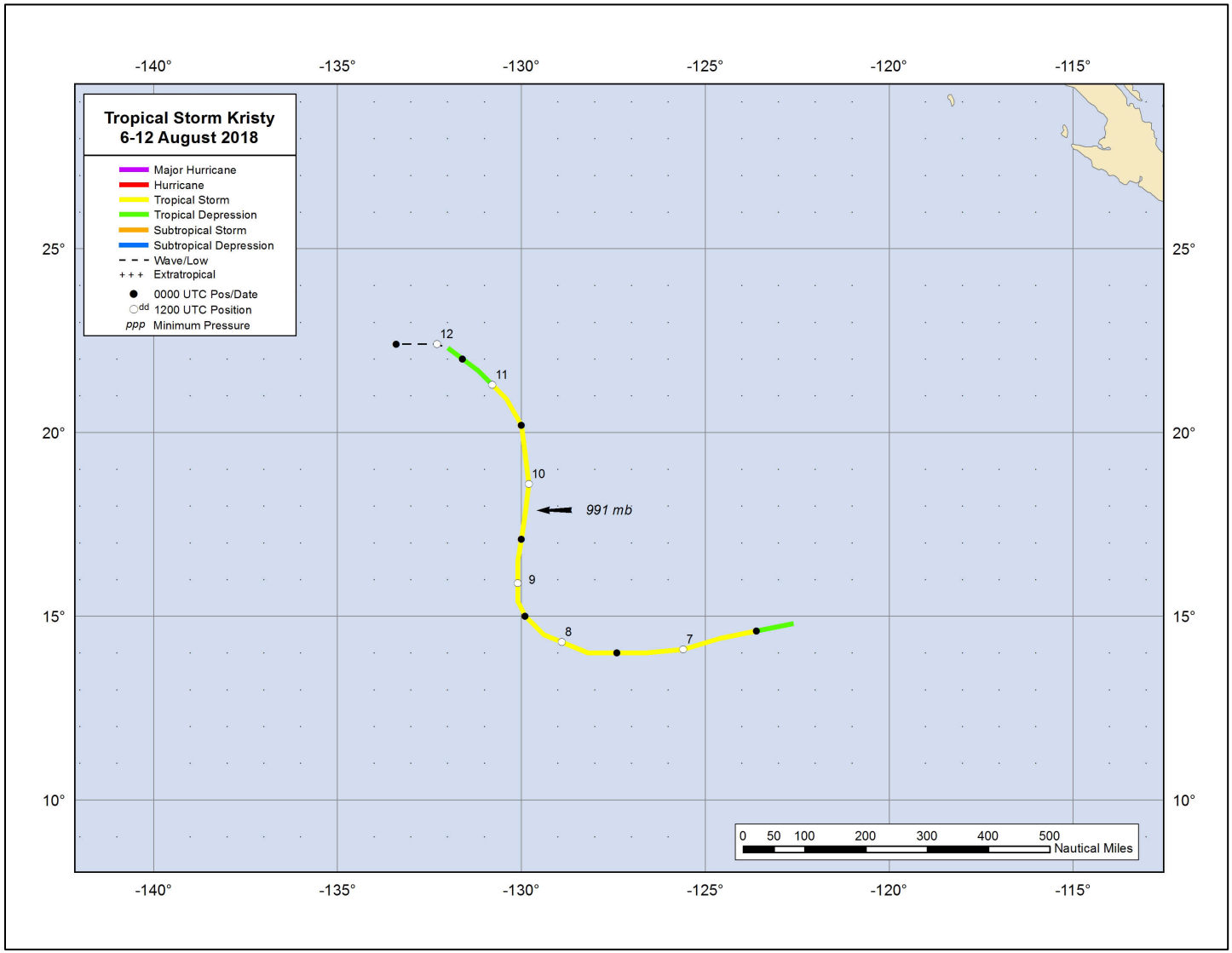

Figure 1. Best track positions for Tropical Storm Kristy, 6–12 August 2018.

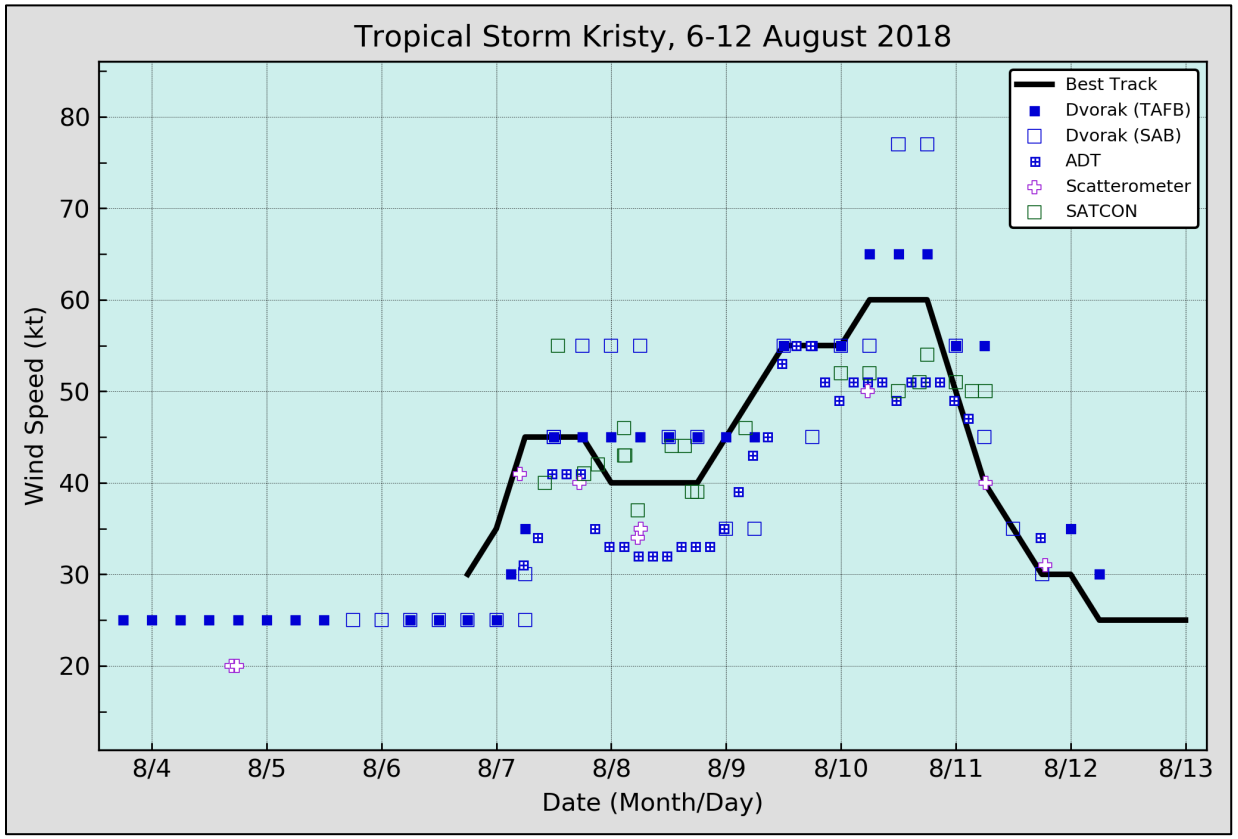

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Kristy, 6–12 August 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

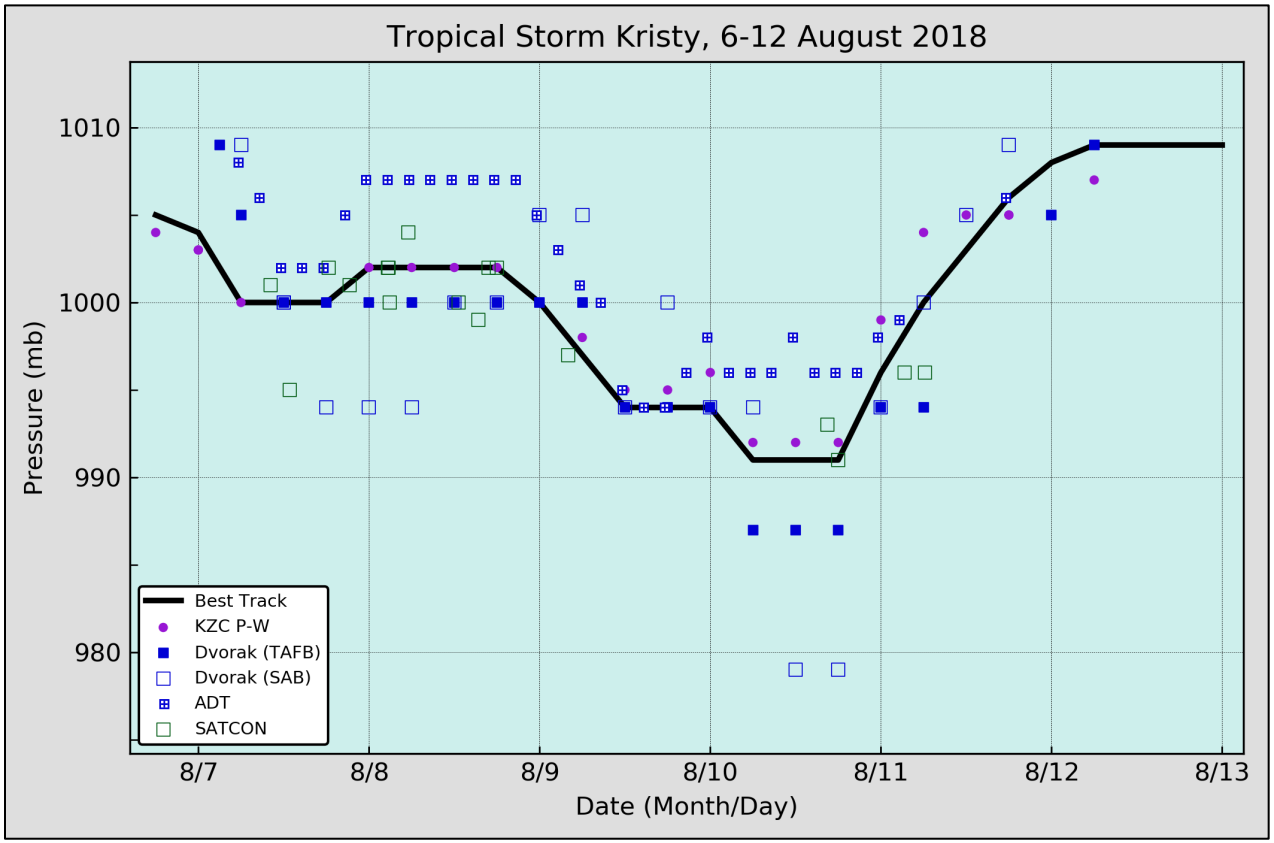

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Kristy, 6–12 August 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

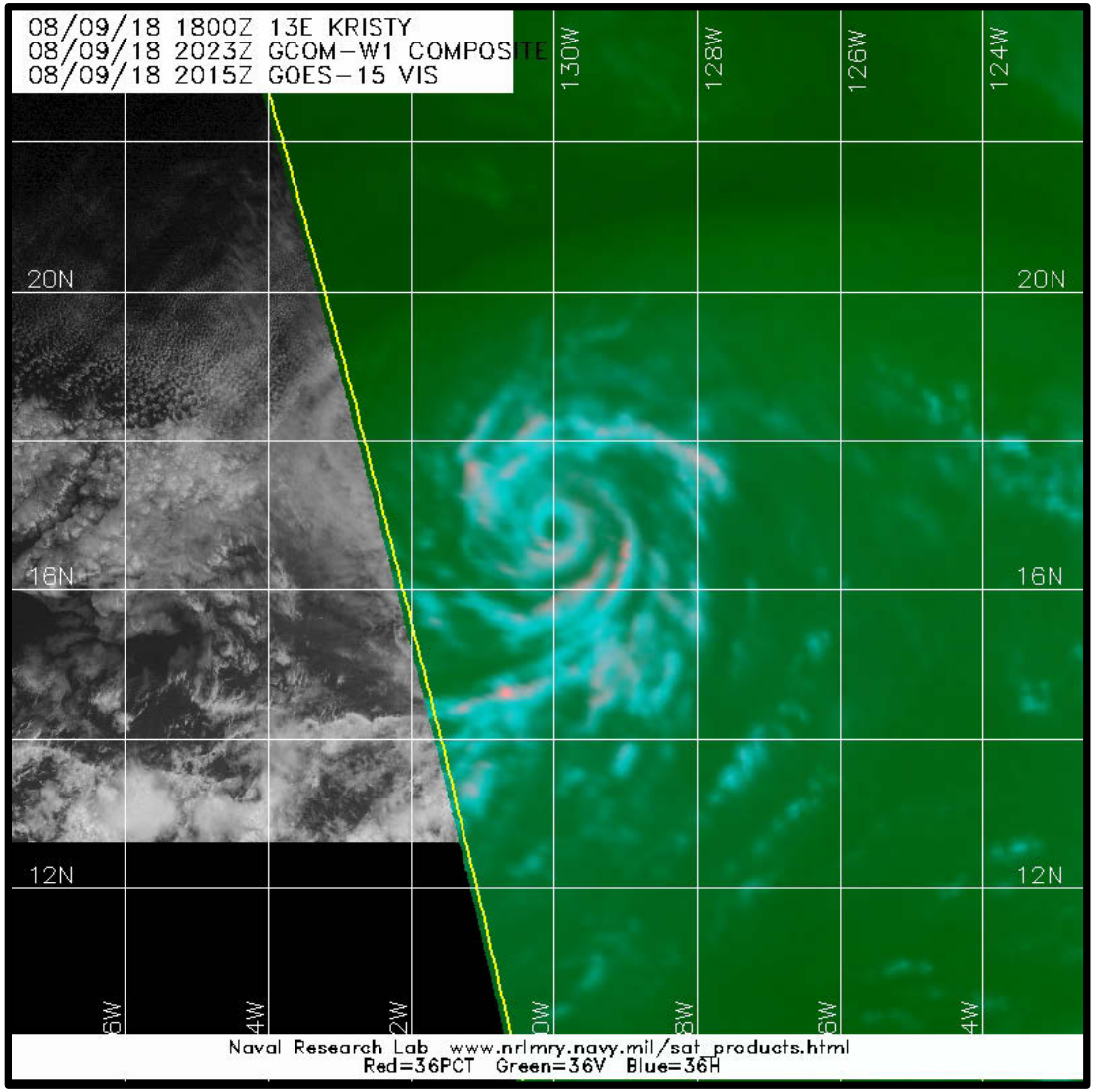

Figure 4. GCOM-W1 36-GHz microwave image at 2023 UTC 9 August 2018 showing a well-defined low-level structure, with an eye-like feature, associated with Tropical Storm Kristy nearing peak intensity. Image courtesy of the Naval Research Laboratory.