

Tropical Cyclone Report  
Tropical Storm Kristy  
(EP112012)  
12-17 September 2012

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Kristy was a tropical storm over the eastern North Pacific Ocean that did not affect land.

a. Synoptic History

The genesis of Kristy was associated with a tropical wave that moved off the west coast of Africa on 31 August. This wave produced minimal shower activity while it was over the Atlantic Ocean; however, once it crossed Central America on 9 September convection increased. On 10 September, thunderstorms became organized around the wave axis when it was located to the south of the Gulf of Tehuantepec. A well-defined low pressure system developed in association with the wave by 1800 UTC 11 September, and the low acquired sufficiently organized deep convection to be classified a tropical depression by 0600 UTC 12 September, when it was centered about 150 n mi south-southwest of Manzanillo, Mexico. 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<sup>1</sup>.

Deep convection increased in intensity and coverage, and the depression strengthened to a tropical storm 6 h later. Kristy moved west-northwestward to northwestward on the south side of a mid-level ridge and intensified slowly during the next day or two, reaching its peak intensity of 50 kt around 0600 UTC 14 September. At that time the cloud pattern was asymmetric, with most of the convection located to the northeast of the center. Kristy began to weaken later that day when it moved over cool waters and into an environment of north-northwesterly shear. Deep convection decreased, and by 0000 UTC 15 September the remaining convection was confined to the east of the center in a few curved bands. The tropical storm continued to weaken while remaining on a west-northwestward course over progressively cooler waters, and it became a tropical depression by 1800 UTC 16 September, when it was centered about 470 n mi west-northwest of Cabo San Lucas, Mexico.

Kristy degenerated into a remnant low around 0600 UTC 17 September when it lost all of its deep convection. The remnant low slowed down, and then reversed course and moved southeastward in northwesterly low-level flow. The shallow cyclone dissipated shortly after 1800 UTC 19 September, when it was located about 350 n mi west of Cabo San Lucas, Mexico.

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<sup>1</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.

b. 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 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 Tropical Rainfall Measuring Mission (TRMM), 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.

The analyzed 50-kt peak intensity of Kristy at 0600 UTC 14 September is based on Dvorak T-numbers of 3.0/45 kt from TAFB and SAB, 3.3/51 kt from UW-CIMSS ADT, and an ASCAT pass with a maximum wind of 47 kt at 0408 UTC 14 September.

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

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Kristy was well predicted. The disturbance from which Kristy developed was introduced in the Tropical Weather Outlook and given a "low" (< 30%) chance of genesis over the next 48 h at 1200 UTC 9 September, 66 h before it became a tropical depression. The probability of formation was increased to the "medium" (30 to 50%) category 54 h before genesis and the "high" (>50%) category 18 h before formation.

A verification of NHC official track forecasts for Kristy is given in Table 2a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period from 12 h to 48 h, and near the 5-yr means at 72 h and 96 h. The only model that consistently outperformed the official forecasts was the multi-model consensus TVCE. The European Centre for Medium-Range Weather Forecasts (EMXI) model and the Florida State Superensemble (FSSE) had lower errors than the NHC forecasts from 12 h to 48 h, and at 12 h and 24 h, respectively.

A verification of NHC official intensity forecasts for Kristy is given in Table 3a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period at all forecast times. The OCD5 errors were also lower than its 5-yr mean from 12 h to 48 h and were slightly higher than the 5-yr mean beyond that. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. The best performing model was the Logistic Growth Equation Model (LGEM), which beat the official forecast at most times. Beyond 48 h, the Geophysical Fluid Dynamics Laboratory (GHMI) model and the

Hurricane Weather Research and Forecasting (HWFI) model had the largest errors, since those models incorrectly predicted that Kristy would become a hurricane.

There were no watches or warnings associated with Kristy.

Table 1. Best track for Tropical Storm Kristy, 12-17 September 2012.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
11 / 1800	15.4	103.4	1008	25	low
12 / 0000	15.9	104.0	1007	25	"
12 / 0600	16.5	104.7	1006	30	tropical depression
12 / 1200	17.1	105.4	1005	35	tropical storm
12 / 1800	17.7	106.2	1003	40	"
13 / 0000	18.1	107.1	1002	45	"
13 / 0600	18.4	108.0	1002	45	"
13 / 1200	18.7	108.9	1002	45	"
13 / 1800	19.1	109.8	1001	45	"
14 / 0000	19.5	110.7	999	45	"
14 / 0600	19.8	111.5	998	50	"
14 / 1200	20.1	112.2	998	50	"
14 / 1800	20.5	112.8	1000	45	"
15 / 0000	20.9	113.5	1001	45	"
15 / 0600	21.5	114.2	1002	45	"
15 / 1200	22.1	114.8	1003	45	"
15 / 1800	22.8	115.4	1003	40	"
16 / 0000	23.4	116.0	1004	35	"
16 / 0600	23.9	116.7	1005	35	"
16 / 1200	24.3	117.5	1006	35	"
16 / 1800	24.7	118.2	1007	30	tropical depression
17 / 0000	25.1	118.9	1008	30	"
17 / 0600	25.6	119.4	1009	30	low
17 / 1200	26.0	119.6	1009	30	"
17 / 1800	26.3	119.6	1009	30	"
18 / 0000	26.5	119.3	1010	25	"
18 / 0600	26.4	119.0	1010	25	"
18 / 1200	26.1	118.6	1010	25	"
18 / 1800	25.7	118.3	1010	25	"
19 / 0000	25.2	118.0	1010	25	"
19 / 0600	24.6	117.6	1010	25	"
19 / 1200	23.8	117.0	1010	25	"
19 / 1800	23.1	116.6	1011	20	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
20 / 0000					dissipated
14 / 0600	19.8	111.5	998	50	maximum wind and minimum pressure

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Kristy, 12-17 September 2012. Mean errors for the 5-yr period 2007-11 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	<b>26.2</b>	<b>41.3</b>	<b>48.5</b>	<b>67.7</b>	116.9	145.7	
OCD5	55.1	131.3	203.8	248.9	351.7	731.8	
Forecasts	18	16	14	12	8	4	
OFCL (2007-11)	28.6	46.3	62.7	78.1	108.0	145.3	
OCD5 (2007-11)	38.5	74.8	116.0	159.8	246.1	324.2	

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Kristy, 12-17 September 2012. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 2a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	17.8	28.9	36.9	49.3	58.4		
OCD5	29.3	53.1	78.6	100.8	129.4		
GFSI	17.9	31.9	46.9	67.6	99.6		
GHMI	30.5	58.8	86.1	103.8	202.0		
HWFI	23.7	40.8	62.6	89.3	95.2		
EGRI	25.3	39.9	53.8	87.6	197.7		
EMXI	<b>16.6</b>	<b>24.9</b>	<b>36.6</b>	<b>48.8</b>	139.6		
CMCI	25.6	32.5	43.3	59.9	132.6		
AEMI	19.6	31.5	47.0	64.3	72.0		
FSSE	<b>16.0</b>	<b>25.2</b>	38.1	54.4	103.2		
TVCE	<b>17.0</b>	<b>26.5</b>	<b>36.0</b>	<b>45.9</b>	<b>50.9</b>		
LBAR	25.6	39.1	53.5	53.6	62.2		
BAMD	30.2	61.2	90.1	108.2	115.8		
BAMM	27.8	54.8	78.9	98.0	116.7		
BAMS	31.2	57.9	83.2	108.2	138.8		
NAMI	31.2	70.0	120.0	165.1	260.4		
Forecasts	15	12	10	8	5		

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Kristy, 12-17 September 2012. Mean errors for the 5-yr period 2007-11 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	<b>4.2</b>	<b>5.3</b>	<b>6.8</b>	<b>7.5</b>	<b>11.9</b>	<b>15.0</b>	
OCD5	5.9	8.8	11.9	14.6	23.1	21.5	
Forecasts	18	16	14	12	8	4	
OFCL (2007-11)	6.4	10.6	13.7	15.1	17.0	18.5	
OCD5 (2007-11)	7.5	12.4	16.1	18.4	20.1	20.1	

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Kristy, 12-17 September 2012. Errors smaller than the NHC 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	2.5	4.6	5.5	6.1	5.0	5.0	
OCD5	3.5	<b>2.7</b>	<b>4.7</b>	6.1	13.7	13.0	
GHMI	4.1	<b>3.8</b>	<b>4.5</b>	6.4	19.3	17.5	
HWFI	<b>2.3</b>	4.6	6.5	9.9	16.3	20.0	
DSHP	3.3	<b>4.5</b>	6.7	9.0	12.7	13.5	
LGEM	3.4	<b>3.2</b>	<b>3.5</b>	<b>2.6</b>	<b>3.0</b>	<b>1.5</b>	
ICON	2.9	<b>2.9</b>	<b>4.5</b>	6.6	12.0	13.5	
FSSE	3.9	5.5	7.6	10.1	11.5	11.5	
Forecasts	16	13	11	9	6	2	

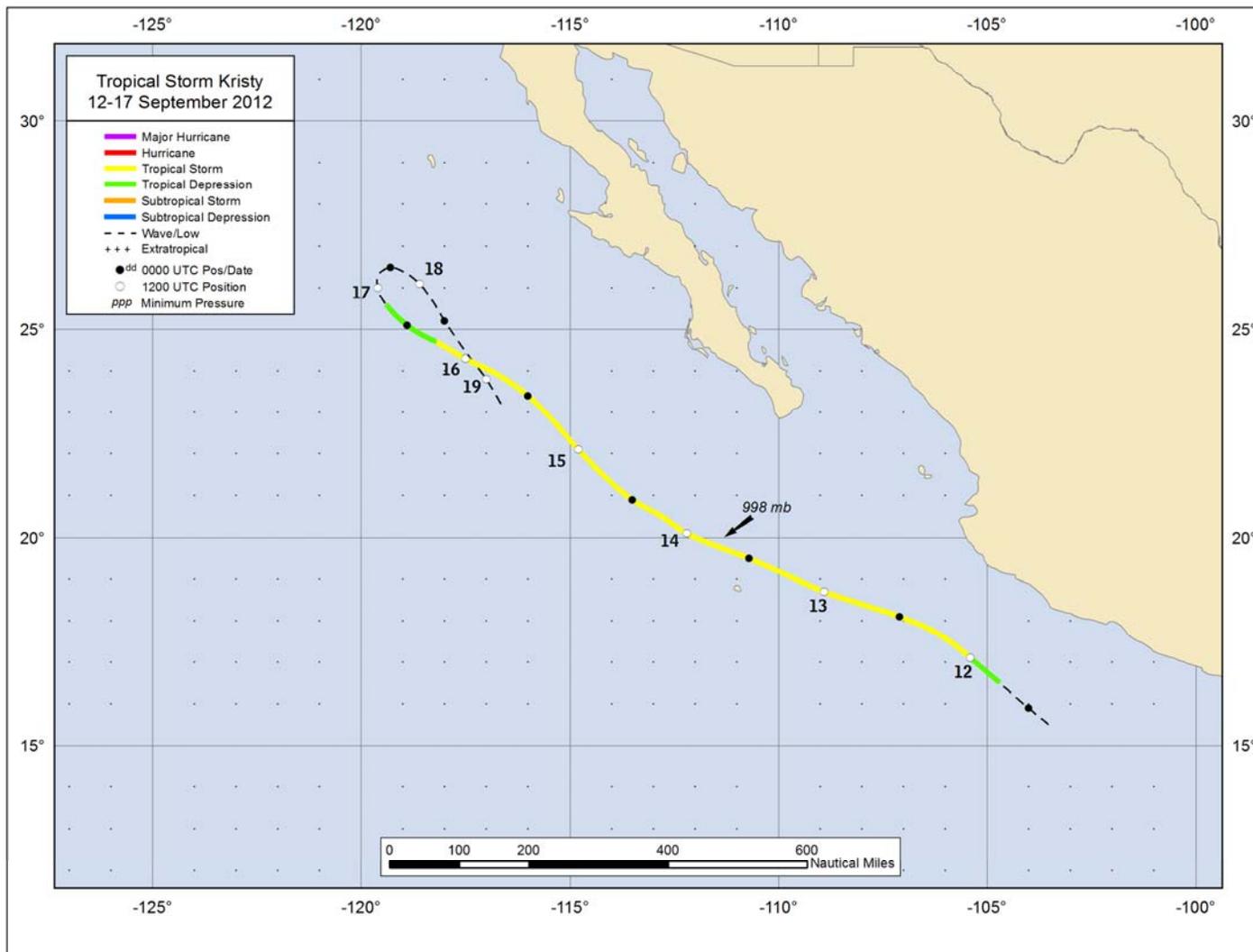


Figure 1. Best track positions for Tropical Storm Kristy, 12-17 September 2012.

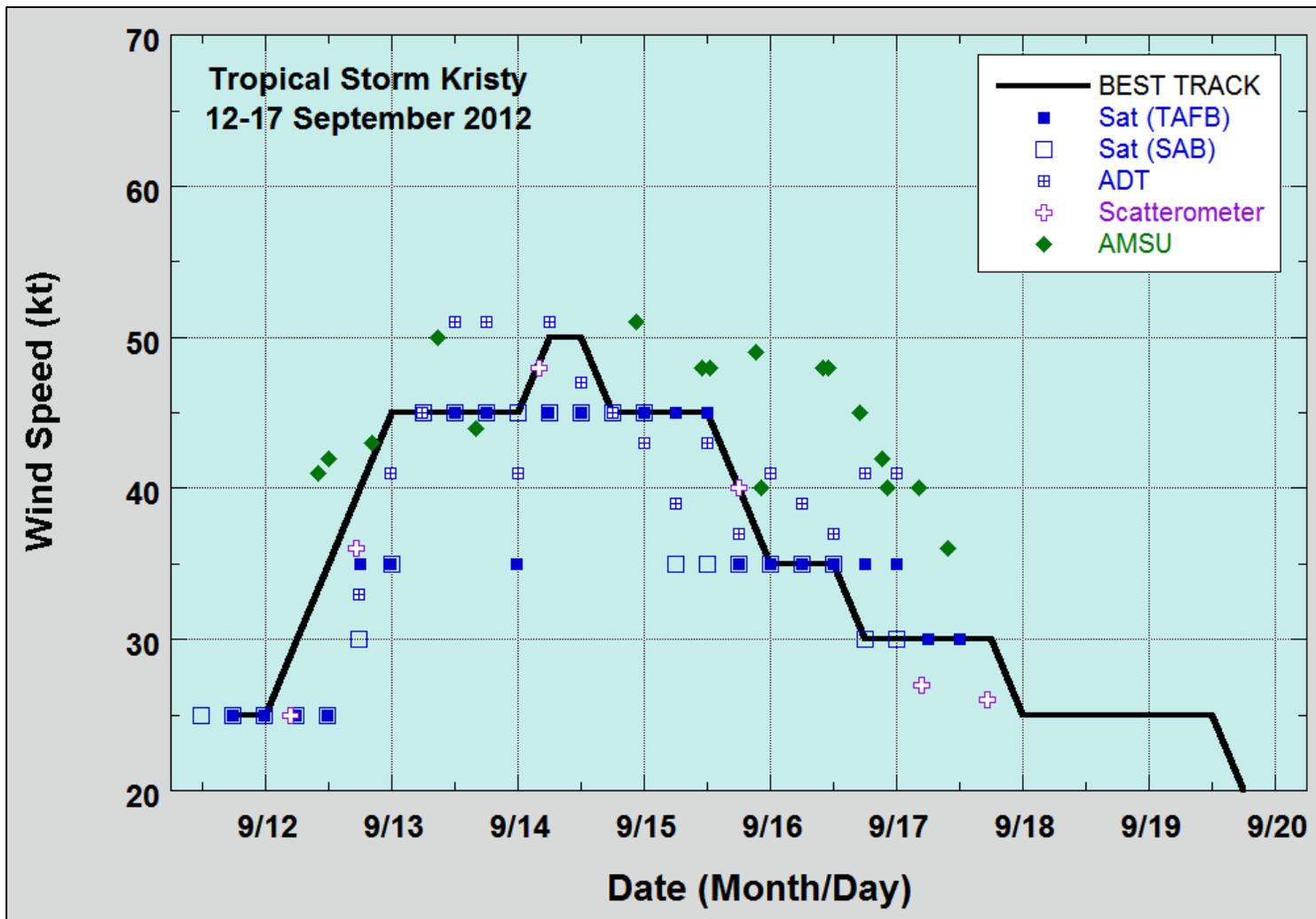


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Kristy, 12-17 September 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

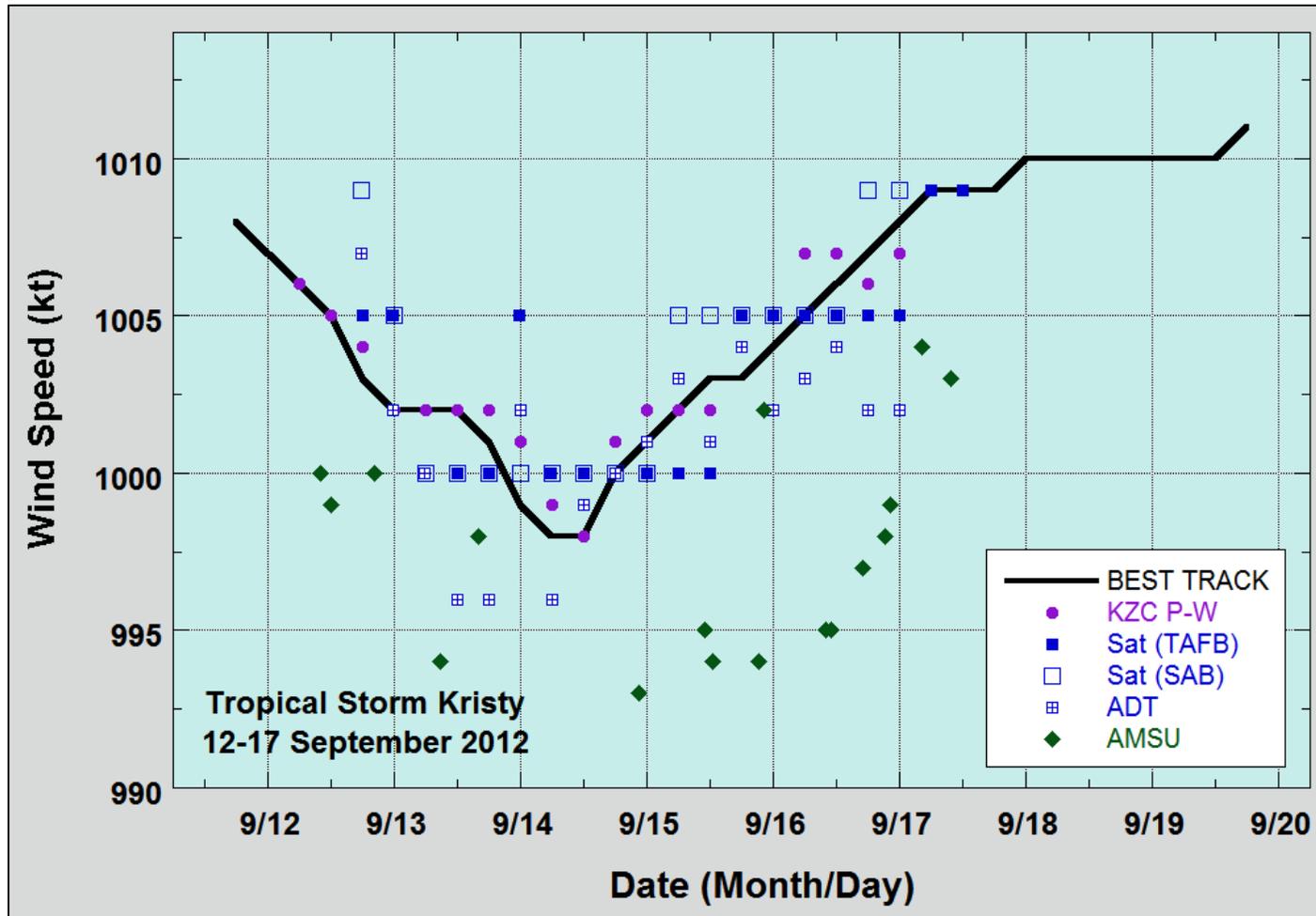


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Kristy, 12-17 September 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data. Dashed vertical lines correspond to 0000 UTC.