

Tropical Cyclone Report
Tropical Storm Kiko
(EP152007)
15 – 23 October 2007

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Kiko was a tropical storm that threatened the southwestern coast of Mexico before turning westward and dissipating over the open ocean.

a. Synoptic History

Kiko developed from a tropical wave that exited the coast of Africa on 26 September and initially spawned Tropical Storm Melissa over the eastern tropical Atlantic Ocean on 28 September. The southern portion of the wave continued westward and crossed into the eastern North Pacific basin around 8 October. A broad area of low pressure, accompanied by showers and thunderstorms, developed along the wave axis early on 11 October, while centered about 240 n mi south of Acapulco, Mexico. As the system moved slowly west-northwestward, it remained disorganized for several days due to strong upper-level easterly winds. The upper-level winds abated somewhat, and the nearly-stationary area of showers and thunderstorms associated with the low pressure improved in organization late on 13 October, while centered about 350 n mi south-southwest of Manzanillo, Mexico. By 0000 UTC on 15 October, the system had acquired sufficient organization to be classified as a tropical depression. 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.

The depression was initially embedded within a broad low-level cyclonic gyre with weak mid-tropospheric steering, and subsequently drifted southward for the next 30 h. Despite the moderate easterly shear, the tropical cyclone managed to produce a deep burst of convection early on 16 October close to the surface circulation center. The cyclone briefly reached tropical storm strength around 1200 UTC October 16, while centered about 375 n mi southwest of Manzanillo.

This initial strengthening episode was short-lived, however, and six hours later visible satellite imagery depicted an exposed low-level circulation with convection located about 75 n mi southwest of the center, and Kiko weakened to a depression. The cyclone moved eastward to east-northeastward with a slowly increasing forward motion primarily due to the low-level steering.

Kiko became a tropical storm once again around 0600 UTC 17 October, while centered about 335 n mi south-southwest of Manzanillo. For the next couple of days, Kiko moved toward the east-northeast as a minimal tropical storm, toward the southwestern coast of Mexico, in response to the cyclone being embedded within the low-level southwesterly flow on the south side of the Intertropical Convergence Zone. By 0000 UTC 19 October, Kiko turned toward the northwest as a ridge developed over Mexico. At this time, Kiko was located about 140 n mi south of Manzanillo and the associated convection was becoming better organized as a result of

decreasing wind shear. During the next couple of days, Kiko slowly moved toward the northwest and gradually strengthened in response to light to moderate shear and sufficiently warm waters.

Kiko reached its maximum intensity of 60 kt and a minimum pressure of 991 mb at 1800 UTC 20 October, while centered about 150 n mi west-southwest of Manzanillo. Kiko maintained this intensity for about 12 hours as it moved north-northwestward within a small break in the subtropical ridge. Thereafter, gradual weakening occurred due to both increasing southerly shear and a more stable environment. Kiko weakened a tropical depression around 0000 UTC 23 October, while centered about 215 n mi west-southwest of Cabo Corrientes Mexico. Coming under the influence of a restrengthening deep-layer ridge to the north, the depression produced occasional bursts of deep convection while moving westward and west-southwestward until it degenerated into a remnant low around 0000 UTC 24 October. The remnant low continued to move generally westward for the next couple of days within the low-level steering flow then turned northward before dissipating on 27 October.

b. Meteorological Statistics

Observations in Kiko (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB). Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA Aqua, the NASA QuikSCAT, the Department of Defense WindSat, and Defense Meteorological Satellite Program (DMSP) satellites were also useful in tracking Kiko. The 60 kt estimated peak intensity of Kiko on 20 October was determined by taking a blend of the subjective Dvorak intensity estimates from TAFB and SAB.

No ship or land station reported sustained winds of tropical storm force in association with Kiko.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Kiko was fairly-well anticipated. The broad trough of low pressure that eventually spawned Kiko was introduced to the Tropical Weather Outlook (TWO) at 1630 UTC 11 October, almost four days prior to genesis. For the next couple of days, there was continual mention in the TWO that slow development of the system was possible and the experimental probability of genesis forecasts made during this period were either 20% or 30%. By the morning of 13 October, the potential for tropical cyclone formation was explicitly mentioned in the outlook. This resulted in a 31 h lead time between the first mention of potential tropical depression formation in the TWO and when tropical cyclogenesis actually occurred. Once the

potential for tropical cyclone formation was explicitly mentioned in the TWO, the experimental probability of genesis forecasts ranged from 60 to 80%.

A verification of NHC official and guidance model track forecasts is given in Table 2. Average official track errors for Kiko were 35, 64, 94, 122, 153, 175, and 212 n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. These errors are higher than or close to the average long-term official track errors from 12 through 48 hours; but, the errors are lower than the average long-term official tracks errors at days three through five (Table 2). The official track forecast errors were overall smaller than those of the individual models but were larger than the consensus forecast errors of CONU, GUNA, and FSSE. The earlier official track forecasts were complicated by weak steering flow; and, the later official track forecasts suffered a right bias because Kiko was forecast to maintain a stronger intensity for a longer period of time and move more northwestward in response to the deep-layer steering.

Average NHC official intensity errors were 4, 6, 9, 12, 18, 21, and 19 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively (Table 3). For comparison, the average long-term official intensity errors are 6, 10, 12, 14, 18, 20, and 22 kt, respectively. The official intensity forecast errors were below or near the average long-term errors at all forecast times. SHF5 provided the most accurate intensity guidance and did particularly well in the 48 through 120 hour time periods. Kiko strengthened to a 60 kt tropical storm very slowly, and it is reasonable that a statistical intensity model, SHF5, based on climatology and persistence, performed quite well.

On 18 October, the official NHC track forecasts and model guidance suggested that the storm would continue to move northward toward the southwestern coast of Mexico. This prompted the government of Mexico to issue tropical storm watches and warnings for portions of the southwestern coast of Mexico (Table 4).

Table 1. Best track for Tropical Storm Kiko, 15-23 October 2007.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 0000	15.0	108.7	1005	25	tropical depression
15 / 0600	15.0	108.8	1004	30	"
15 / 1200	14.9	108.9	1003	30	"
15 / 1800	14.7	108.9	1003	30	"
16 / 0000	14.5	108.9	1002	30	"
16 / 0600	14.3	108.7	1002	30	"
16 / 1200	14.1	108.4	1001	35	tropical storm
16 / 1800	14.0	108.0	1001	30	tropical depression
17 / 0000	14.0	107.6	1001	30	"
17 / 0600	14.3	107.1	1000	35	tropical storm
17 / 1200	14.4	106.4	1000	35	"
17 / 1800	14.5	105.6	1000	35	"
18 / 0000	14.7	104.9	1000	35	"
18 / 0600	15.2	104.2	1000	35	"
18 / 1200	16.0	103.7	1000	35	"
18 / 1800	16.5	103.9	1000	35	"
19 / 0000	16.6	104.3	1000	35	"
19 / 0600	16.8	104.6	1000	35	"
19 / 1200	17.0	105.0	999	40	"
19 / 1800	17.2	105.3	998	45	"
20 / 0000	17.4	105.7	997	45	"
20 / 0600	17.6	106.0	995	50	"
20 / 1200	17.9	106.4	993	55	"
20 / 1800	18.2	106.8	991	60	"
21 / 0000	18.6	107.1	991	60	"
21 / 0600	18.9	107.2	992	60	"
21 / 1200	19.2	107.3	996	50	"
21 / 1800	19.4	107.5	998	45	"
22 / 0000	19.5	107.8	1000	45	"
22 / 0600	19.6	108.1	1001	40	"
22 / 1200	19.6	108.6	1002	40	"
22 / 1800	19.6	109.5	1003	35	"
23 / 0000	19.4	110.4	1004	30	tropical depression
23 / 0600	19.1	111.4	1005	30	"
23 / 1200	18.7	112.5	1006	30	"
23 / 1800	18.4	113.6	1007	30	"
24 / 0000	18.4	114.8	1008	25	remnant low
24 / 0600	18.4	115.9	1008	25	"
24 / 1200	18.4	117.0	1008	25	"

24 / 1800	18.4	118.0	1009	25	"
25 / 0000	18.5	118.9	1009	20	"
25 / 0600	18.6	119.7	1009	20	"
25 / 1200	18.7	120.5	1010	20	"
25 / 1800	18.8	121.3	1010	20	"
26 / 0000	19.0	121.9	1010	20	"
26 / 0600	19.4	122.2	1011	20	"
26 / 1200	19.8	122.4	1011	20	"
26 / 1800	20.2	122.5	1011	20	"
27 / 0000	20.7	122.5	1011	20	"
27 / 0600	21.1	122.4	1011	20	"
27 / 1200					dissipated
20 / 1800	18.2	106.8	991	60	Maximum wind and minimum pressure

Table 2. Preliminary track forecast evaluation (heterogeneous sample) for Tropical Storm Kiko, 15-23 October 2007. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage but does not include the remnant low stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	48 (34)	101 (32)	155 (30)	197 (28)	257 (24)	308 (20)	389 (16)
GFNI	34 (31)	54 (27)	69 (25)	86 (23)	174 (18)	308 (13)	343 (8)
GFDI	44 (34)	82 (32)	119 (30)	158 (28)	185 (24)	178 (20)	199 (16)
HWFI	44 (34)	78 (32)	113 (30)	157 (28)	267 (24)	347 (20)	456 (16)
GFSI	44 (34)	78 (32)	109 (30)	141 (28)	178 (24)	183 (20)	229 (16)
AEMI	44 (34)	77 (32)	104 (30)	125 (28)	146 (24)	140 (18)	171 (14)
NGPI	38 (33)	61 (31)	77 (29)	106 (27)	164 (22)	235 (18)	217 (12)
UKMI	47 (31)	80 (29)	107 (27)	132 (25)	191 (21)	228 (16)	293 (15)
BAMD	65 (34)	125 (32)	187 (30)	249 (28)	358 (24)	441 (20)	547 (16)
BAMM	47 (34)	87 (32)	133 (30)	173 (28)	252 (24)	313 (20)	390 (16)
BAMS	42 (34)	79 (32)	120 (30)	156 (28)	208 (24)	236 (20)	290 (16)
CONU	31 (34)	50 (32)	69 (30)	89 (28)	119 (24)	145 (20)	154 (16)
GUNA	34 (30)	56 (28)	80 (26)	104 (24)	128 (19)	122 (14)	139 (11)
FSSE	35 (24)	52 (24)	67 (22)	77 (20)	90 (16)	102 (12)	161 (8)
OFCL	35 (34)	64 (32)	94 (30)	122 (28)	153 (24)	175 (20)	212 (16)
NHC Official (2002-2006 mean)	35 (1852)	61 (1686)	86 (1519)	112 (1362)	162 (1100)	221 (885)	290 (723)

Table 3. Preliminary intensity forecast evaluation (heterogeneous sample) for Tropical Storm Kiko, 15-23 October 2007. Forecast errors (kt) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage but does not include the remnant low stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
SHF5	4.3 (34)	7.2 (32)	9.3 (30)	10.4 (28)	9.6 (24)	7.1 (20)	8.9 (16)
GHMI	5.6 (34)	10.6 (32)	16.5 (30)	18.3 (28)	17.8 (24)	20.0 (20)	18.6 (16)
HWFI	5.1 (34)	8.3 (32)	11.5 (30)	15.4 (28)	20.7 (24)	22.4 (20)	20.0 (16)
SHIP	4.4 (34)	7.3 (32)	9.2 (30)	11.2 (28)	14.4 (24)	17.4 (20)	16.6 (16)
DSHP	4.4 (34)	7.3 (32)	9.2 (30)	11.2 (28)	14.7 (24)	16.6 (20)	14.9 (16)
FSSE	5.5 (24)	7.8 (24)	10.6 (22)	11.1 (20)	13.2 (16)	19.3 (12)	14.8 (8)
ICON	5.0 (34)	8.3 (32)	11.9 (30)	13.8 (28)	16.8 (24)	19.2 (20)	17.5 (16)
OFCL	4.4 (34)	6.1 (32)	8.8 (30)	11.8 (28)	17.5 (24)	21.0 (20)	19.1 (16)
NHC Official (2002-2006 mean)	6.4 (1852)	9.8 (1686)	12.0 (1519)	14.1 (1362)	18.3 (1100)	19.8 (885)	21.8 (723)

Table 4. Watch and warning summary for Tropical Storm Kiko, 15 – 23 October, 2007.

Date/Time (UTC)	Action	Location
18 / 1500	Tropical Storm Warning issued	Zihuatanejo, Mexico to Manzanillo, Mexico
18 / 1500	Tropical Storm Watch issued	Manzanillo to La Fortuna, Mexico
19 / 0600	Tropical Storm Warning discontinued	All
19 / 0600	Tropical Storm Watch modified to	Punta San Telmo, Mexico to Cabo Corrientes, Mexico
20 / 0300	Tropical Storm Watch modified to	Manzanillo to Cabo Corrientes
21 / 0300	Tropical Storm Watch discontinued	All

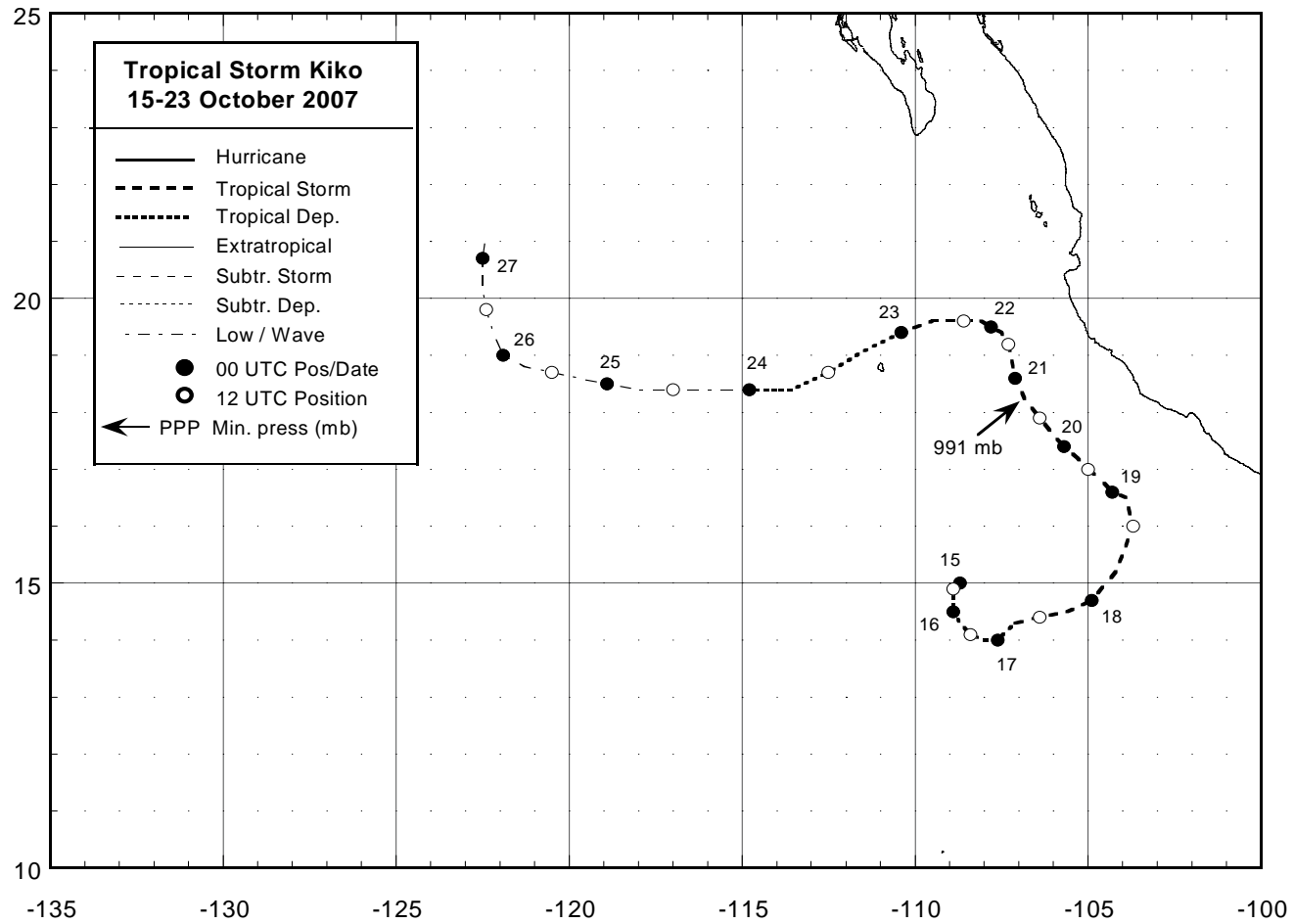


Figure 1. Best track positions for Tropical Storm Kiko, 15-23 October 2007.

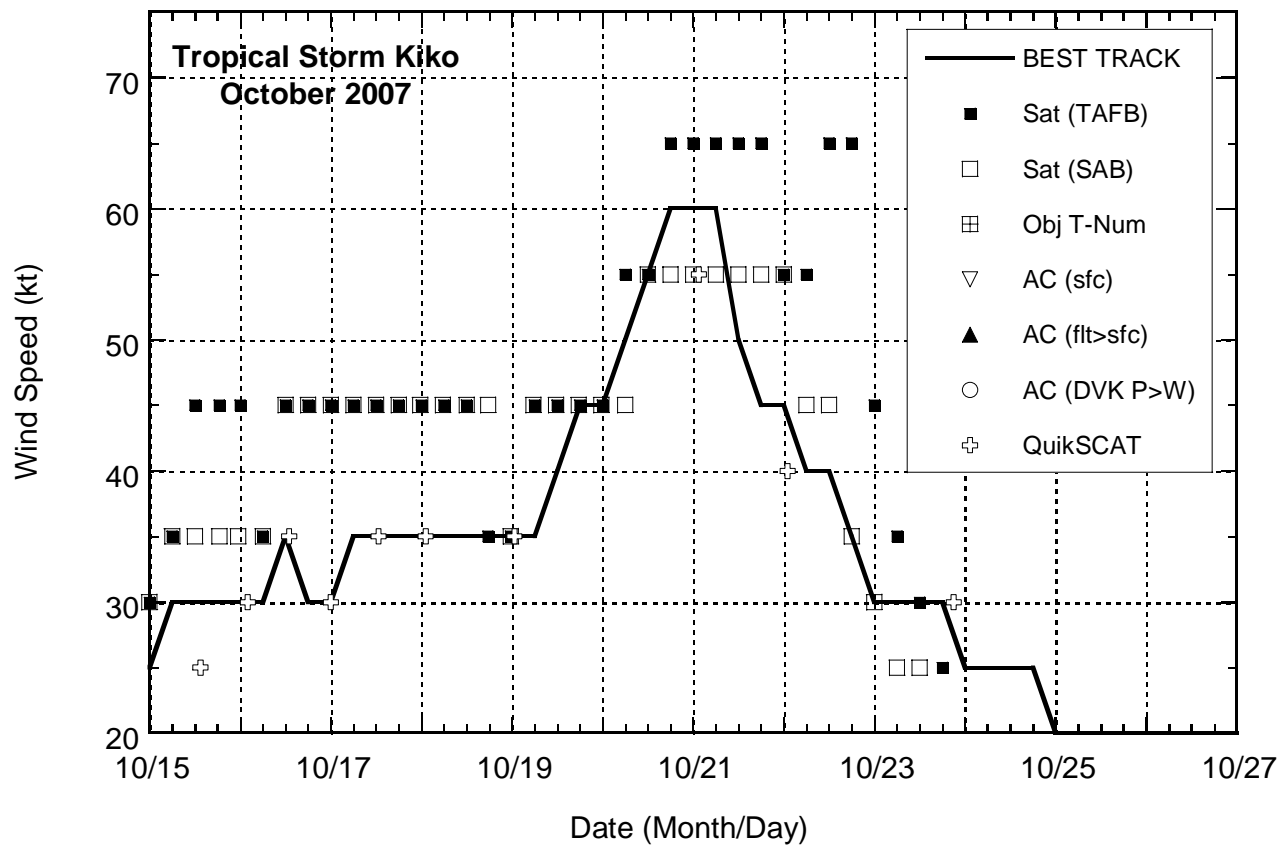


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Kiko, 15-23 October 2007.

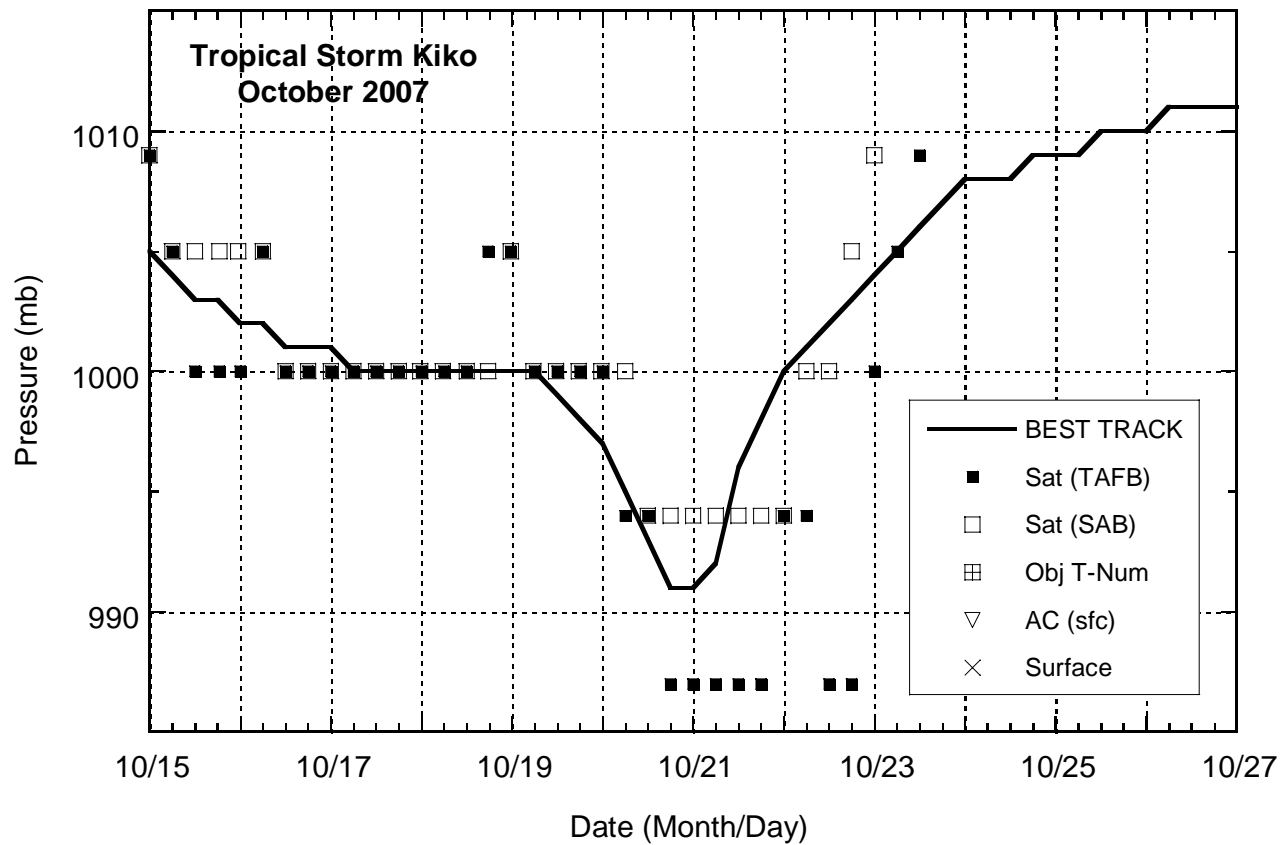


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Kiko, 15-23 October 2007.