Tropical Cyclone Report
Hurricane Wilma
15-25 October 2005

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Wilma formed and became an extremely intense hurricane over the northwestern Caribbean Sea. It had the all-time lowest central pressure for an Atlantic basin hurricane, and it devastated the northeastern Yucatan Peninsula. Wilma also inflicted extensive damage over southern Florida.

a. Synoptic History

Wilma had a complicated beginning. During the second week of October, an unusually large, monsoon-like lower-tropospheric circulation and a broad area of disturbed weather developed over much of the Caribbean Sea. This system appeared to have been enhanced by an extensive area of diffluent flow to the south and southwest of an upper-level cyclone over the southwestern Atlantic. The easternmost portion of this low pressure area moved northeastward and merged with an extratropical cyclone. However, a more concentrated area of disturbed weather and surface low pressure formed near Jamaica by 14 October, possibly aided by a couple of tropical waves traversing the Caribbean during this time. Dvorak satellite classifications were initiated on this system at 1200 UTC 15 October. By 1800 UTC that day the surface circulation became well-enough defined, with sufficiently organized deep convection, to designate that a tropical depression had formed, centered about 190 n mi east-southeast of Grand Cayman. Figure 1 is a "best track" chart of the tropical cyclone's path, and time series of the wind and pressure are shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1.

A weak and ill-defined steering flow prevailed for the first couple of days of Wilma's existence, with a 500 mb high covering the Gulf of Mexico and another mid-tropospheric anticyclone located well to the east-northeast of the tropical cyclone. The depression moved slowly and erratically westward to west-southwestward for a day or so and then drifted south-southwestward to southward for a day or two. There was only slow strengthening during this period, and the system is estimated to have become a tropical storm at 0600 UTC 17 October. On 18 October Wilma turned toward the west-northwest and, while doing so, strengthened into a hurricane. Later that day, a remarkable, explosive strengthening episode began and continued through early on 19 October. By 0600 UTC 19 October, Wilma's winds had increased to near 150 kt (category 5 on the Saffir-Simpson Hurricane Scale). In the span of just 24 hours, Wilma had intensified from a 60-kt tropical storm to a 150-kt category 5 hurricane, an unprecedented event for an Atlantic tropical cyclone. It is fortunate that this ultra-rapid strengthening took place over open waters, apparently void of watercraft, and not just prior to a landfall. Wilma reached its peak sustained wind speed of 160 kt at around 1200 UTC 19 October. During the strengthening episode, Air Force reconnaissance observations indicated that the eye of the hurricane contracted to a diameter of 2 n mi; this is the smallest eye known to National Hurricane Center (NHC) staff. The estimated minimum central pressure at the time of peak intensity is 882 mb, which is a new record low value for a hurricane in the Atlantic basin.

Indeed, the actual minimum pressure may well have been lower than this value, as noted in the following section.

Wilma maintained category 5 status until 20 October, when its winds decreased to 130 kt, and the tiny eye was replaced by one about 40 n mi across. Interestingly, the hurricane would retain this large, or an even larger, eye ranging from about 40 to 60 n mi in diameter, for most of the remainder of its lifetime. By 21 October, as mid-level ridging to the northeast of Wilma increased somewhat and a series of shortwave troughs in the westerlies began to erode the high over the Gulf of Mexico, the hurricane turned toward the northwest and north-northwest, taking aim at the Yucatan Peninsula of Mexico. Wilma's maximum winds were still near 130 kt (category 4 intensity) when its center made landfall on the island of Cozumel around 2145 UTC 21 October, and it was probably only slightly weaker (but still category 4 intensity) when it crossed the coast of the Yucatan peninsula about 6 hours later. On 22 October, the mid-tropospheric high pressure area to the north of Wilma essentially dissipated, and the hurricane moved slowly northward, crossing and severely battering the extreme northeastern Yucatan peninsula. Wilma emerged into the southern Gulf of Mexico around 0000 UTC 23 October, with maximum winds of near 85 kt. Although Wilma's intensity had been reduced due to its passage over land, it was still a large and powerful hurricane.

A vigorous mid-tropospheric trough, moving eastward from the central United States, provided an increasingly strong southwesterly steering current that accelerated Wilma northeastward toward southern Florida. As the upper-level flow over the hurricane increased, so too did the vertical shear, and by early on 24 October the environmental 850-200 mb shear (averaged over an annulus about 100 to 400 n mi from the center) was roughly 25 kt. Despite the strong shear in its surroundings, Wilma strengthened over the southeastern Gulf of Mexico and its winds reached about 110 kt as it approached Florida. Maximum sustained winds were estimated to be near 105 kt (category 3 intensity) when landfall of the center occurred in southwestern Florida near Cape Romano around 1030 UTC 24 October. Continuing to accelerate and now moving at a forward speed of 20 to 25 kt, the hurricane crossed the southern Florida peninsula in 4.5 hours, with the center emerging into the Atlantic just southeast of Jupiter around 1500 UTC. Maximum winds had decreased to near 95 kt (category 2) during the crossing of Florida. A vigorous cold front associated with the mid-tropospheric trough swept across the area to the west of Wilma, yet the cooler and drier air behind the front could not fully penetrate the inner core of the hurricane to weaken it. Very shortly after departing Florida, the hurricane re-intensified one last time, and its winds again reached 110 kt around 0000 UTC 25 October. Thereafter, Wilma finally succumbed to an unfavorable atmospheric environment and lost strength while racing northeastward at 40-50 kt over the western Atlantic. It became an extratropical cyclone around 0000 UTC 26 October while centered about 200 n mi southeast of Halifax, Nova Scotia. This extratropical low was absorbed by another extratropical cyclone located over eastern Nova Scotia around 0000 UTC 27 October.

b. Meteorological Statistics

Observations in Wilma (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA), as well as flight-level and dropwindsonde observations from flights of the 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command (AFRES) and NOAA Aircraft Operations Center WP-3D aircraft. Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, NASA Aqua, and Defense Meteorological Satellite Program (DMSP) satellites were also useful in tracking Wilma.

Highest winds measured by the AFRES were 168 kt at a flight level of 700 mb in the southeastern eyewall at 0610 UTC 19 October, when Wilma was over the northwestern Caribbean Sea. Using a standard eyewall reduction factor (ratio of surface to flight level winds of 0.9) yields a surface wind of 151 kt. Since the central pressure was still falling at the time of the last pass of the aircraft through the eye at around 0800 UTC, it is likely that the winds also increased some more from 0800 to 1200 UTC. Therefore the peak intensity of Wilma is estimated to be 160 kt at 1200 UTC 19 October. When Wilma was over the southeastern Gulf of Mexico, and approaching south Florida, the AFRES measured a 700 mb wind of 135 kt at 0646 UTC 24 October, apparently associated with a short-lived mesocyclone in the southeastern eyewall. Because of the strong southwesterly shear, the ratio of surface to flight level winds was probably smaller than that typical for the hurricane eyewall. Therefore the surface to 700 mb wind speed ratio is reduced from the normal 0.9 to 0.8, resulting in an estimated intensity of 110 kt at 0600 UTC 24 October. Subsequent sampling of the southeastern eyewall by the aircraft and Doppler radar observations showed that the winds had diminished somewhat, so the intensity of Wilma at landfall in southwestern Florida has been set at 105 kt.

Wilma's deepening rate over the northwestern Caribbean Sea, from late on 18 October to early on 19 October, was incredible. Over the period from 2310 UTC to 0433 UTC, the central pressure fell from 954 mb to 901 mb, which is a deepening rate of 9.9 mb per hour. The minimum central pressure measured by dropsonde was 884 mb at 0801 UTC 19 October. Surface winds from this dropsonde were measured to be 23 kt, so the dropsonde probably did not capture the lowest pressure in Wilma's eye. Therefore the pressure around 0800 UTC was probably a couple of mb lower than 884, estimated at 882 mb. This is the lowest central pressure in the NHC records for the Atlantic basin. Given that the pressure was still falling at this time, it is possible that the pressure then dropped a little below 882 mb. It should be added that the largest 6-, 12-, and 24-h drops in best track central pressure for Wilma, 54 mb from 0000 to 0600 UTC 19 October, 83 mb from 1800 UTC 18 October to 0600 UTC 19 October, and 97 mb from 1200 UTC 18 October to 1200 UTC 19 October, respectively, are by far the largest in the available records for these periods going back to 1851. The previous record 6-h deepening was 38 mb in Hurricane Beulah, September 1967, the previous record 12-h deepening was 48 mb in Hurricane Allen, August 1980, and the previous record 24-h deepening was 72 mb in Hurricane Gilbert, September 1988.

Ship reports of winds of tropical storm-force associated with Wilma are given in Table 2, and selected surface observations from land stations and data buoys are given in Table 3. A 10-min average wind of 87 kt with a gust to 113 kt was observed in Cancun, Mexico, but it is not certain if these were the maximum values at that station. Islas Mujeres, very near Cancun, experienced hurricane-force winds in gusts for nearly a 24-h period from 21-22 October.

The highest sustained wind measured at an official surface observing site in Florida was a 15-min average speed of 80 kt from a South Florida Water Management District (SFWMD) observation site, L006, in Lake Okeechobee. It should be noted that another SFWMD platform, LZ40, located only about 5 n mi north of L006 recorded a 15-min wind speed of 79 kt at the same time. It is reasonable to assume that these measurements correspond to a 1-min average wind speed of at least 90 kt. A number of official surface wind observation (ASOS) sites in Miami-Dade and Broward Counties stopped reporting data at their highest noted sustained wind speeds, such as Opa-Locka Airport at 74 kt and Pompano Beach Airport at 72 kt. It is likely that higher sustained wind speeds occurred at these sites. Data from the Miami WSR-88D Doppler radar indicated a peak velocity of 138 kt at an elevation of about 5000 ft over western Broward County. A comparison of Doppler velocities with co-located, official 2-min and 1-min surface wind measurements in Miami-Dade in Broward Counties suggests that the ratios of surface to

5000 ft sustained wind velocities over southeastern Florida in Wilma were likely in the range of 0.65 to 0.70. This would result in a maximum surface wind speed estimate of 90-95 kt.

Based on the surface observations and the Doppler data it can be concluded that most of the southeastern Florida peninsula experienced at least category 1 hurricane conditions, and that some parts of northern Miami-Dade County, Broward, and Palm Beach Counties likely had category 2 hurricane conditions, including wind gusts to near 100 kt, at the standard 10 m height above ground. It is expected that the upper floors of the many high rise buildings in South Florida experienced wind speeds greater than occurred there at 10 m.

A storm surge of 4 to 8 ft was reported from coastal Collier Counter. It is likely, however, that higher storm surges occurred over uninhabited areas of southwestern Florida to the south of where Wilma made landfall. Storm surges of 4 to 5 ft were observed over much of the lower and middle Florida Keys, locally to near 7 ft. However, a storm surge of near 9 ft was estimated visually in the Marathon area. Storm surges were generally in the 4 to 5 ft range over the upper Keys. This resulted in considerable flooding over substantial portions of the Keys. Relatively minor storm surge flooding occurred on the Biscayne Bay shoreline of Dade County.

Wilma produced torrential rainfall as it moved slowly over portions of the eastern Yucatan Peninsula. According to the Meteorological Service of Mexico, a 24-h rainfall total of 62.05 inches was measured at Islas Mujeres. Because the hurricane moved quickly across the southern Florida peninsula, however, the rain amounts were not very large in Florida and storm totals ranged generally from 3 to 7 inches. Some locations in southeast Florida had totals of only 1 to 2 inches -- or less.

Wilma produced 10 tornadoes over the Florida peninsula on 23-24 October: one each in Collier, Hardee, Highlands, Indian River, Okeechobee, and Polk Counties, and four in Brevard County.

Figure 4 is an image of Wilma while it was located over South Florida from the Miami WSR-88D radar. Note the large area that was impacted by the eyewall.

c. Casualty and Damage Statistics

Twenty-two deaths have been directly attributed to Wilma: 12 in Haiti, 1 in Jamaica, 4 in Mexico, and 5 in Florida.

Damage was reported to have been very severe in portions of the northeastern Yucatan Peninsula, but detailed information from Mexico is not available. This dealt a major blow to the tourist industry in that area. There was major flooding from storm surge and/or wave action in portions of western Cuba. In southern Florida, damage was unusually widespread, including numerous downed trees, substantial crop losses, downed power lines and poles, broken windows, extensive roof damage, and destruction of mobile homes. Wilma caused the largest disruption to electrical service ever experienced in Florida. Media reports indicate up to 98 per cent of South Florida lost electrical service, and Florida Power and Light reported outages in 42 Florida counties. A preliminary amount of total insured damage compiled by the Property Claims Service is $6.1 billion. Using a doubling of insured losses to obtain the total damage gives a current estimate of Wilma's U.S. damage to be $12.2 billion.

d. Forecast and Warning Critique

Average official track errors (with the number of cases in parentheses) for Wilma were 29 (39), 42 (37), 61 (35), 84 (33), 136 (29), 264 (25), and 382 (21) n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. For 12 through 72 h, these errors are less than the average official track errors for the 10-yr period 1995-2004[1], but they exceed the 2001-2004 average errors at 96 and 120 h. There were some large along-track errors in the official forecasts for these longer time ranges; and the along-track biases indicate that the 4- and 5-day NHC forecasts for Wilma were, in general, too fast. Although the track guidance models were in general agreement that Wilma would cross the Florida peninsula, there was considerable spread in predicted forward speed. This was associated with large uncertainty in the timing of the hurricane strike on Florida. Table 4 shows the mean track errors for the various models and model combinations, and for the official forecasts. On average, the most accurate numerical guidance through 48 h was provided by the Florida State University Superensemble, and for 72 through 120 h by the NCEP Global Ensemble and the United Kingdom Meteorological Office global model. Interestingly, the NCEP Global Ensemble had a mean 5-day track error that was about 100 n mi less than the NCEP Global Forecast System (the parent model of the ensemble).

Average official intensity errors were 11, 18, 22, 22, 30, 27, and 25 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. These errors are quite a bit larger than the average official intensity errors over the 10-yr period 1995-2004. There was a negative bias (i.e. underforecast of intensity) at all forecast times. As might be expected for such a rapidly strengthening hurricane, there were some very large individual underforecasts of intensity when Wilma was over the northwestern Caribbean Sea – by as much as 80 kt at 48 h. The official forecasts did not explicitly predict Wilma to regain category 3 intensity before hitting Florida, but the NHC Tropical Cyclone Discussions on 22-23 October did note the possibility that the system could again be a major hurricane as it approached the coast of Florida.

Within a day of Wilma's genesis over the western Caribbean Sea, the Tropical Weather Outlooks issued by the National Hurricane Center anticipated the formation of a tropical depression, including (just prior to genesis) the possibility of development into a hurricane.

Table 5 lists the watches and warnings issued for Wilma. There was considerable lead time in the issuance of the hurricane warnings for the northeastern Yucatan Peninsula, as these warnings were posted well over 48 h prior to landfall in that area. Likewise the hurricane warning for Florida was issued well in advance, 31.5 h before Wilma's center made landfall there.

e. Acknowledgements

Most of the surface observations in this report were provided by the meteorological services of Mexico and Cuba, and National Weather Service Forecast Offices (NWSFOs) in Key West, Miami, Tampa, Melbourne, Jacksonville and Tallahassee Florida. Dan Brown, Lixion Avila, Jack Beven, James Franklin, Rick Knabb, Max Mayfield, Ed Rappaport, and Stacy Stewart of TPC/NHC provided useful comments. Colin McAdie of TPC/NHC along with Robert Molleda and Pablo Santos of the Miami NWSFO helped to analyze the WSR-88D data. Eric Swartz of the SFWMD helped with the wind observations from the SFMWD network.

[1] Errors given for the 96 and 120 h periods are averages over the four-year period 2001-4.

Table 1. Best track for Hurricane Wilma, 15-25 October 2005.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 1800	17.6	78.5	1004	25	tropical depression
16 / 0000	17.6	78.8	1004	25	"
16 / 0600	17.5	79.0	1003	30	"
16 / 1200	17.5	79.2	1003	30	"
16 / 1800	17.5	79.4	1002	30	"
17 / 0000	17.4	79.6	1001	30	"
17 / 0600	16.9	79.6	1000	35	tropical storm
17 / 1200	16.3	79.7	999	40	"
17 / 1800	16.0	79.8	997	45	"
18 / 0000	15.8	79.9	988	55	"
18 / 0600	15.7	79.9	982	60	"
18 / 1200	16.2	80.3	979	65	hurricane
18 / 1800	16.6	81.1	975	75	"
19 / 0000	16.6	81.8	946	130	"
19 / 0600	17.0	82.2	892	150	"
19 / 1200	17.3	82.8	882	160	"
19 / 1800	17.4	83.4	892	140	"
20 / 0000	17.9	84.0	892	135	"
20 / 0600	18.1	84.7	901	130	"
20 / 1200	18.3	85.2	910	130	"
20 / 1800	18.6	85.5	917	130	"
21 / 0000	19.1	85.8	924	130	"
21 / 0600	19.5	86.1	930	130	"
21 / 1200	20.1	86.4	929	125	"
21 / 1800	20.3	86.7	926	120	"
22 / 0000	20.6	86.8	930	120	"
22 / 0600	20.8	87.0	935	110	"
22 / 1200	21.0	87.1	947	100	"
22 / 1800	21.3	87.1	958	85	"
23 / 0000	21.6	87.0	960	85	"
23 / 0600	21.8	86.8	962	85	"
23 / 1200	22.4	86.1	961	85	"
23 / 1800	23.1	85.4	963	90	"
24 / 0000	24.0	84.3	958	95	"
24 / 0600	25.0	83.1	953	110	"
24 / 1200	26.2	81.0	950	95	"
24 / 1800	28.0	78.8	955	105	"
25 / 0000	30.1	76.0	955	110	"
25 / 0600	33.3	72.0	963	100	"
25 / 1200	36.8	67.9	970	90	"
25 / 1800	40.5	63.5	976	75	hurricane
26 / 0000	42.5	60.0	978	60	extratropical
26 / 0600	44.0	57.5	982	55	"
26 / 1200	45.0	55.0	986	50	"
26 / 1800	45.5	52.0	990	40	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
27 / 0000					merged with low
21 / 2145	20.6	86.8	927	130	landfall on Cozumel, Mexico
22 / 0330	20.8	86.9	933	115	landfall near Puerto Morelos, Mexico
24 / 1030	25.9	81.7	950	105	landfall near Cape Romano, Florida
19 / 1200	17.3	82.8	882	160	minimum pressure

Table 2. Selected ship and drifting buoy reports with winds of at least 34 kt for Hurricane Wilma, 15-25 October 2005.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
20 / 1200	WCY845	18.8	80.2	130 / 36	1007.0
20 / 2100	DDPH	18.9	82.3	140 / 35	1004.0
23 / 2100	A8FN3	20.3	84.2	240 / 43	1001.6
23 / 2100	P3GY9	21.8	85.3	260 / 46	993.0
24 / 0000	ZCAM4	23.4	88.1	340 / 37	1002.2
24 / 0000	V7HD2	28.3	88.0	010 / 37	1009.0
24 / 0600	WCY845	20.0	82.6	230 / 35	1004.0
24 / 0600	KS049	26.4	85.2	010 / 39	993.8
24 / 0900	KS049	25.7	86.0	350 / 41	997.6
24 / 1054	ANCF1	28.2	82.8	010 / 37	999.0
24 / 1154	FHPF1	28.1	82.8	020 / 39	999.6
24 / 1200	H3VT	25.6	77.1	160 / 44	1002.0
24 / 1200	WAAH	26.8	76.9	160 / 37	1000.0
24 / 1300	PMYF1	26.9	80.6	110 / 43	-99.0
24 / 1500	WAAH	26.2	76.2	170 / 39	999.5
24 / 1800	MYSU5	24.1	74.8	190 / 49	1005.6
24 / 1800	V7HD2	28.3	87.7	340 / 36	1015.0
24 / 1800	41625	27.6	70.5	210 / 43	1002.7
24 / 1900	41646	25.3	75.5	200 / 41	1001.2
24 / 2000	41646	25.3	75.5	200 / 39	1000.3
24 / 2100	WAAH	25.7	75.8	230 / 44	997.8
24 / 2128	TYBG1	31.6	79.9	330 / 35	996.0
24 / 2200	3FMX7	36.4	74.6	020 / 47	996.4
24 / 2200	41630	26.7	74.0	220 / 41	999.5
24 / 2233	SKMG1	31.5	80.2	310 / 37	998.0
24 / 2333	SKMG1	31.5	80.2	310 / 39	999.4
25 / 0000	ZCDF4	23.2	79.0	270 / 38	1007.9
25 / 0000	PDBO	28.6	67.2	210 / 35	1008.8
25 / 0000	KRHX	35.5	75.2	020 / 41	992.0
25 / 0000	41625	27.7	70.5	200 / 39	1005.7
25 / 0050	41934	28.6	72.5	*** / 41	997.4
25 / 0059	BRBN4	39.6	74.2	070 / 35	1002.4
25 / 0128	TYBG1	31.6	79.9	310 / 39	1000.5
25 / 0200	41625	27.8	70.4	210 / 41	1006.2
25 / 0300	KRHX	36.2	75.3	050 / 40	990.8
25 / 0459	AVAN4	39.1	74.7	070 / 35	995.0
25 / 0500	3FMX7	37.4	74.4	020 / 48	989.2
25 / 0600	A8ER9	34.9	75.2	350 / 37	989.0
25 / 0600	ZCDC2	37.0	75.1	030 / 38	991.0
25 / 0600	A8CJ2	37.4	74.2	050 / 37	987.0
25 / 0600	KAQP	40.2	66.3	090 / 36	997.5
25 / 0659	BRBN4	39.6	74.2	050 / 35	994.1
25 / 0900	KRPB	35.5	75.2	300 / 37	990.1
25 / 0900	WMVF	41.5	70.7	070 / 35	1001.0

25 / 1100	3FMX7	38.0	74.2	010 / 37	986.6
25 / 1200	V2AW5	27.3	69.0	190 / 37	1015.0
25 / 1200	ZCDC2	37.7	74.7	350 / 35	990.3
25 / 1200	SHJC	40.1	70.1	070 / 58	990.4
25 / 1200	VRWG6	43.8	62.9	070 / 40	1013.0
25 / 1500	VOTV	43.5	70.0	040 / 43	1002.0

Table 3. Selected surface observations for Hurricane Wilma, 15-25 October 2005.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Mexico								
Cancun			22/0000	87	113			
Cozumel		928.0						
Isla Mujeres	22/1930	968.6	22/0200	71	94			62.05
Siankaan								29.25
Cuba								
Bahia Honda			23/2225	49	60			
Caibarien			24/1459	27	34			
Casa Blanca			24/0040	62	73			
Colon			24/0503	27	43			
Cuba Francia			23/1650	38	48			
Indio Hatuey			24/0500	27	37			
Isabel Rubio			23/0220	38	51			
Jovellanos			24/0755	29	39			
La Fe			20/1256	41	51			
La Palma			23/2240	48	60			
Paso Real de San Diego			23/1705	24	42			
Pinar del Rio			23/2150	38	50			
Playa Giron			23/1959	32	46			
Punta del Este			20/1635	40	50			
San Juan y Martinez			23/1625	47	53			
Santa Lucia			23/2315	52	65			
Santiago de la Vegas			23/2025	43	57			
Santo Domingo			24/0550	28	38			
Union de Reyes			24/0615	26	35			
Varadero			24/0602	43	53			
Yabu			24/0552	29	39			
Florida								
2 W TNT (FCMP)			24/1311	77	101			
20 Mile Bend (S-5AE)								4.33
7W Weston FCMP Tower T1	24/1254	952.2	24/1429	77	92			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
(26.1°N 80.5°W)								
Alligator Alley West (S-140)								4.61
Andytown (ANDF1)								4.47
Belle Glade (BELLW) SFWMD	24/1215	953.6	24/1515	68	102			
Big Cypress (BCSI)	24/1130	951.4	24/1345	35	70			5.19
Bings Landing (NOS)			24/2100	18	37	0.86		
Brighton (S-129)								5.65
Brooksville (KBKV)	24/1206	1000.3	24/1829	25	34			1.08
Cache (LPIF1)			24/1115	57	97			
Chekika (CHKF1)			24/1235	67	98			
Chokoloskee (USGS)						7.0		
Clermont COOP								3.82
Clewiston (CFSW)			24/1415	53	73			
Clewiston Field Station (COE)								7.31
Coral Springs (CSPF1)								2.67
Crescent City CREF1								3.02
Daytona Beach (KDAB)	24/1857	997.3	24/1857	25	38			4.82
Daytona Beach COOP								4.25
Deland COOP								3.18
Everglades City (EGC)			24/0955	49				
FCMP Tower T0 (25.9°N 81.3°W)	24/1050	952.2	24/1227	63	82			
FCMP Tower T2 (25.9°N 80.9°W)	24/1149	955.2	24/1057	71	95			
Fernandina Beach (NOS)	24/2100	1001.2				1.13		
FIU Main (FCMP)			24/1411	60[e]	83[e]			
Forever FL COOP								8.00
Fort Lauderdale (KFLL)	24/1336	961.4	24/1211	61	86			3.04
Fort Lauderdale Executive (KFXE)	24/1133	977.3						
Fort Myers (KFMY)	24/1102	976.0	24/1216	54	66			
Fort Myers (KRSW)	24/1153	972.6	24/1229	51	69			5.44
Fort Pierce (KFPR)	24/1448	968.5	24/1606	45[e]	68[e]			5.47
Fort Pierce WP COOP								6.02
Hastings ARC HTGF1								3.65

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Hialeah (HIAF1)								1.23
Hillsboro Canal (S-2)								5.25
Islamorada			24/0926		94			
Jacksonville Int'l Airport (KJAX)	24/2058	1001.0						
Kennedy Space Center Shuttle Landing Facility								10.78
Key West (KEYW)			24/0616	62	72			2.02
Key West Harbor (NOS)	24/0818	977.2	24/0836	51	74	2.76		
Kissimmee COOP								4.73
Lake Okeechobee (L001) SFWMD			24/1515	74	93			
Lake Okeechobee (L006) SFWMD			24/1500	80	97			7.00
Lake Okeechobee SW (LOKEEM) SFWMD								7.14
Lake Okeechobee (LZ40) SFWMD			24/1500	79	95			
Lakeland (KLAL)								7.34
Lakeport (S-131)								6.00
Leesburg (KLEE)	24/1846	999.0	24/1806	28	35			4.88
Lisbon COOP								5.03
Loxahatchee (LXWS)	24/1300	954.3	24/1545	62	98			3.12
Loxahatchee West								3.82
MacDill AFB (KMCF)			24/1055	21	37			2.53
Mayport (NOS)	24/2030	1000.6	24/2030	25	33	0.82		
Melbourne (KMLB)	24/1520	987.1	24/1600	42	52			4.25
Melbourne (NWS)			24/1607		67			4.96
Miami (KMIA)	24/1225	967.5	24/1230	58	80			0.76
Miccosukee School			24/1100		93			
Miles City (RKIF1)			24/1235	34	76			4.69
NAS Jacksonville (KNIP)	24/1959	1000.3						
NASA LC39B (28.6°N 80.6°W)			24/1640	56	82			2.79
Naples (KAPF)	24/0942	965.8	24/1207	53[e]	71[e]			6.63
Naples Pier (NPSF1,NOS)	24/1024	960.9	24/1200	73	89	2.64		
Oasis (OASF1)			24/1330	46	86			2.33
Ocala (KOCF)	24/1735	1001.0	24/1735	23	34			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Ochoppi FCMP Tower T2			24/1227	64	84			
Ochopee (OCOF1)			24/1335	47				3.74
Opa Locka (KOPF)	24/1316	964.8	24/1216	74[e]	91[e]			
Orlando (KMCO)	24/1437	994.6	24/1212	35	42			5.17
Orlando (KORL)	24/1434	997.0	24/1723	30	43			3.88
Orlando East COOP								4.61
Ortona (ORTF1)								4.52
Palm Bay COOP								5.47
Palmdale								4.56
Patrick AFB			24/1521		64			6.95
Pinecastle Bombing Range (KNAE)	24/1851	998.6						
Plymouth COOP								3.81
Pompano Beach (KPMP)	24/1240	961.1[e]	24/1240	72[e]	85[e]			
Ponce Inlet COOP								3.07
Port Canaveral USCG	24/1600	992.0	24/1500	45	69			
Punta Gorda (KPGD)	24/1153	985.8	24/1252	45	61			3.93
ROTNWX (SFWMD)	24/1145	951.0	24/1200	56[e]	87[e]			
S7WX (SFWMD)	24/1215	952.3	24/1530	56	90			
S-140 (SFWMD)			24/1345	58	94			
STA5WX (SFWMD)	24/1145	950.5						
St. Augustine (KSGJ)	24/1945	999.7						
St. Petersburg (KPIE)	24/1145	997.6	24/1707	33	43			1.64
St. Petersburg (KSPG)	24/1153	995.9	24/1144	32	41			
Sanford (KSFB)	24/1820	995.9	24/1859	28	37			3.59
Sanford COOP								3.22
Sarasota (KSRQ)	24/1042	991.9	24/1350	31	42			3.81
Stuart (COOP)								4.55
Sweetwater (Miami WFO)	24/1210	966.5	24/1147	57	90			4.42
Tampa (KTPA)	24/1130	997.3	24/1629	30	38			1.44
Tenraw (ENPF1)			24/1120	66	92			2.64
Titusville COOP								6.90
Vaca Key (NOS)	24/0924	983.0	24/1412		52	6.43		
Vandenburg (KVDF)			24/1654	23	36			
Venice								7.45

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Vero Beach (KVRB)	24/1531	975.3	24/1353	35[e]	48[e]			5.53
Vero Beach (COOP)								5.50
Vilano Beach (NOS)			24/1800	27	37	1.77		
Virginia Key (VAKF1)	24/1300	972.4	24/1318	65	87	3.61		
West Palm Beach (KPBI)	24/1225	975.0	24/1310	71	88			1.07
West Kendall (KTMB)	24/1152	970.5	24/1133	50[e]	72[e]			1.18
Winter Haven (KGIF)	24/1236	995.3	24/1630	31	40			4.77
Georgia								
Glynco Airport (KBQK)	24/2019	1001.4	24/2059	15	22			
New Brunswick (KNRB)	24/2053	1000.7	24/0536	21	27			
Saint Simons Island (KSSI)	24/2120	1001.0	24/1949	18	27	0.52		1.69
Waycross (KAYS)	24/2058	1003.0	24/2058	21	29			
Buoy/CMAN								
NOAA Buoy 41009 (28.5°N 80.2°W)	24/1720	985.2	24/1720	52	68			
NOAA Buoy 41010 (29.0°N 78.5°W)	24/1950	969.5	24/2050	62	82			
NOAA Buoy 41012 (30.0°N 80.6°W)	24/1950	995.3	24/1950	37	45			
NOAA Buoy 42003 (26.1°N 85.9°W)	23/2050	997.8	24/1020	36 (10 min)	47			
Buoy 42013 (27.2°N 83.0°W)	24/1010	993.1	24/1110	41	49			
Buoy 42023 (26.1°N 83.1°W)	24/0759	982.5	24/0959	49				
NOAA Buoy 42036 (28.5°N 84.5°W)	24/1150	1002.3	24/0850	37	43			
NOAA Buoy 42056 (19.9°N 85.1°W)	21/0800	986.6	21/0416	67	81			
NOAA Buoy 42057 (17.6°N 80.7°W)	18/2200	998.1	19/0600	50	59			
NOAA Buoy 44004 (38.5°N 70.5°W)	25/0050	1002.1	25/0050	37				
NOAA Buoy 44005 (43.2°N 69.2°W)	25/1750	992.4	25/1650	39				
NOAA Buoy 44007 (43.5°N 70.1°W)	25/1650	997.6	25/1650	35				
NOAA Buoy 44008 (40.5°N 69.4°W)	25/1350	984.9	25/1350	39				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
NOAA Buoy 44009 (38.5°N 74.7°W)	25/0650	989.1	25/0750	37				
NOAA Buoy 44013 (42.4°N 70.7°W)	25/1650	993.8	25/1550	37				
NOAA Buoy 44017 (40.7°N 72.0°W)	25/1550	988.1	25/1250	41				
NOAA Buoy 44018 (41.3°N 69.3°W)	25/1350	987.4	25/1450	37				
NOAA Buoy 44025 (40.3°N 73.2°W)	25/1450	988.7	25/0950	39				
NOAA Buoy 44027 (44.3°N 67.3°W)	25/1750	997.5	25/1750	39				
NOAA Buoy 44034 (44.1°N 68.1°W)	25/1704	999.9	25/1704	35				
NOAA Buoy 44142 (42.5°N 64.0°W)	25/1700	992.4	25/1700	37				
Anclote Key (ANCF1) (28.2°N 82.8°W)			24/1054	37	47			
Big Carlos Pass (BGCF1) (26.4°N 81.9°W)	24/1054	969.2	24/1054	56	76			
Clearwater Beach (CWBF1) (28.0°N 82.8°W)			24/1400	41	48			
Cedar Key (CDRF1) (29.1°N 83.0°W)	24/1100	1003.2	24/1650	20	33			
Duck Pier (DUCN7) (36.2°N 75.7°W)	24/2200	998.4	24/2130	37				
Fowey Rocks (FWYF1) (25.6°N 80.1°W)	24/1243	975.3	24/1159	88	107			
Fort Myers (FMRF1) (26.7°N 81.9°W)			24/1242	46	62			
Fred Howard (COMPS FHP)			24/1154	39	49			
Homosassa (COMPS HOM)	24/1754	1001.0	24/1654	31				
Isle of Shoals (IOSN3) (43.0°N 70.6°W)	25/1600	995.4	25/1600	46				
Long Key (LONF1) (24.8°N 80.9°W)	24/1100	982.2	24/0930	57	76	4.0		
Mt Desert Rock MDRM1) (44.0° N 68.1°W)	25/1700	997.1	25/1700	49				
Matinicus Rock (MISM1) (43.8°N 68.9°W)	25/1700	997.1	25/1400	45				
Molasses Reef (MLRF1) (25.0°N 80.4°W)	24/1200	982.3	24/1220	66	81			
Port Richey (PTRF1) (28.3°N 82.7°W)			24/1654	25	37			
St. Augustine (SAUF1) (29.9°N 81.3°W)	24/2005	999.9	24/1440	35	44			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Settlement Point (SPGF1) (26.7°N 79.0°W)	24/1600	969.9	24/1600	83	103			
Sombrero Key (SMKF1) (24.6°N 81.1°W)	24/1000	983.4	24/0920	76	91	2.1		
Tyndall Tower (SGOF1) (29.4°N 84.9°W)	24/1100	1007.3	24/1400	40				
U.S. Navy Tower No. R8 (31.6°N 79.9°W, TYBG1)	24/2128	996.0	24/2128	35				
Venice (VENF1) (27.1°N 82.4°W)	24/1100	990.0	24/1500	44	55			
Woods Hole (BUZM3) (41.4°N 71.0°W)	25/1700	989.0	25/1300	48				
Unofficial Observations								
Florida								
Apopka								9.35
Arcadia (FAWN)			24/1245	34	56			
Archbold			24/1322		64			6.07
Avalon COOP								3.25
Balm (FAWN)			24/1045	28	44			
Boynton Beach (26.6°N 80.1°W)	24/1400	954.5						
W Boynton Beach (KFLBOYNT4)	24/1358	953.2	24/1554	78	103			
Collier County EOC			24/1316		109			
Cudjoe Key			24/0913		107			
Deerfield Beach (26.3°N 80.1°W)	24/1400	956.2						
Doral CBS-4 TV			24/1149		99			
Dry Tortugas Nat'l Park			24/0515		116			
Duck Key					75			2.39
Everglades City Mark Suddath HLP Tower	24/0955	953.9			117			
Fort Pierce (FAWN)								6.09
Grant								5.99
Interstate 75 and Florida. Highway 80	24/1130	978.7		56	74			
John Pennekamp State Park								1.50
Kenansville COOP								5.64
Lake Alfred (FAWN)			24/1215	16	38			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Lake Wales RAWS (LWEF1)			24/1345	24	43			
Lantana (26.6°N 80.1°W)	24/1415	953.2						
Marco Island	24/1015	954.0			117			
Martin County F&R Hobe Sound MCFR1 (AWS)	24/1514	954.6						
Martin County EOC Stuart MCEOP (AWS)	24/1444	957.0						
Melbourne Beach								5.14
Melbourne F.I.T			24/1651		64			
Miramar TV 6			24/1222		91			
Mountain Lake								6.00
Mulberry								6.93
Nettles Island COOP								0.08
North Port								5.67
North Port 2N								6.42
Okahumpka COOP								5.33
Ona (FAWN)			24/1800	20	46			
Orange Springs OSPF1								1.59
Palm Bay COOP			24/1602		60			
Palm Beach Gardens (26.8°N 80.3°W)	24/1415	951.8						
Palm Beach Gardens (26.9°N 80.2°W)	24/1445	953.5						
Palm Beach Jonathan Dickinson Missile Tracking Annex			24/1310	71	99			
Palm Coast WOGF1								3.95
Pembroke Pines	24/1300	960.0						
Pierson COOP								2.80
Pompano Beach			24/1248		104			
Ponce Inlet COOP								2.65
Port Salerno COOP								0.14
Punta Gorda 8 NE								7.57
Scottsmoor COOP								2.95
Sebring (FAWN)			24/1245	21	52			
South Fork St. Lucie River			UNK		116			
South Miami	24/1230	969.0						

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Starke SRKF1								1.16
Stuart Skywarn Spotter (27.1°N 80.2°W)			24/1419		94			
Tamarac BSO BSO01 (AWC)	24/1314	955.6						
Titusville COOP								2.87
Umatilla COOP								4.29
Weston BSO DNBS2 (AWC)	24/1314	957.3						

[a] Date/time is for sustained wind when both sustained and gust are listed.
[b] Except as noted, sustained wind averaging periods for C-MAN and land-based ASOS reports are 2 min; buoy averaging periods are 8 min, and SFWMD observations are 15 min.
[c] Storm surge is water height above normal astronomical tide level.
[d] Storm tide is water height above National Geodetic Vertical Datum (1929 mean sea level).
[e] Instrumentation failed
[f] Incomplete or missing data

Table 4. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Wilma, 15-25 October 2005. 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 extratropical stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	47 (38)	115 (36)	185 (34)	249 (32)	319 (28)	381 (24)	396 (20)
GFNI	40 (37)	79 (34)	122 (33)	172 (31)	258 (27)	366 (23)	463 (19)
GFDI	33 (39)	55 (37)	76 (35)	98 (33)	164 (29)	361 (25)	563 (21)
GFSI	32 (39)	52 (37)	65 (35)	84 (33)	**132 (29)**	265 (25)	429 (21)
AEMI	31 (39)	49 (37)	63 (35)	**81 (33)**	**126 (29)**	**240 (25)**	**328 (21)**
NGPI	35 (38)	69 (35)	104 (33)	139 (31)	218 (27)	339 (23)	441 (19)
UKMI	30 (37)	43 (35)	**57 (33)**	**77 (31)**	**113 (27)**	**240 (23)**	**340 (19)**
A98E	39 (38)	79 (36)	109 (34)	140 (32)	184 (28)	**243 (24)**	**380 (20)**
A9UK	39 (19)	77 (18)	107 (17)	140 (16)	199 (14)		
BAMD	49 (38)	88 (36)	115 (34)	132 (32)	197 (28)	379 (24)	533 (20)
BAMM	52 (38)	82 (36)	108 (34)	128 (32)	196 (28)	340 (24)	453 (20)
BAMS	73 (37)	124 (35)	165 (33)	192 (31)	231 (28)	332 (24)	414 (20)
CONU	29 (39)	48 (37)	71 (35)	96 (33)	150 (29)	271 (25)	**373 (21)**
GUNA	**26 (37)**	43 (35)	64 (33)	85 (31)	140 (27)	279 (23)	401 (19)
FSSE	**21 (33)**	**31 (31)**	**40 (29)**	**63 (27)**	142 (23)	308 (19)	480 (15)
OFCL	29 (39)	42 (37)	61 (35)	84 (33)	136 (29)	264 (25)	382 (21)
NHC Official (1995-2004 mean)	42 (3400)	75 (3116)	107 (2848)	138 (2575)	202 (2117)	236 (649)	310 (535)

Table 5. Watch and warning summary for Hurricane Wilma, 15-25 October 2005.

Date/Time (UTC)	Action	Location
16/0900	Hurricane Watch and Tropical Storm Warning Issued	Cayman Islands
17/1500	Tropical Storm Warning Issued	Honduras from the Honduras/ Nicaragua Border to Cabo Camaron
18/2100	Hurricane Watch Issued	Cuba from the Provinces of Matanzas westward through Pinar Del Rio and the Isle of Youth
18/2100	Hurricane Watch Issued	Mexico from Punta Allen to Cabo Catoche
19/0300	Hurricane Watch Issued	Mexico S of Punta Allen to Punta Gruesa
19/1500	Hurricane Watch changed to Hurricane Warning	Mexico from San Felipe to Tulum including Cozumel and nearby islands
19/1500	Tropical Storm Warning Issued	Mexico from S of Tulum to Chetumal
19/1500	Tropical Storm Warning Issued	Belize from the Border with Mexico to Belize City
19/1800	Hurricane Watch and Tropical Storm Warning Discontinued	Cayman Islands
20/0300	Hurricane Watch/Tropical Storm Warning changed to Hurricane Warning	Mexico from S of Tulum to Punta Allen
20/0300	Hurricane Watch Issued	Mexico from W of San Felipe to Celestun
20/0300	Tropical Storm Warning Issued	Cuba for the provinces of La Habana, Ciudad de la Habana, Pinar del Rio, and the Isle of Youth
20/0900	Tropical Storm Warning Issued	Mexico from W of San Felipe to Celestun
20/1500	Tropical Storm Warning changed to Hurricane Warning	Mexico from S of Punta Allen to Chetumal
21/0300	Tropical Storm Warning Discontinued	Honduras from the Honduras/ Nicaragua Border to Cabo Camaron
21/1500	Tropical Storm Warning Discontinued	Belize from the Border with Mexico to Belize City
22/1500	Hurricane Watch Issued	All of the Florida Keys including the Dry Tortugas and Florida Bay
22/2100	Hurricane Watch Issued	West coast of Florida from Longboat Key southward and the east coast of Florida from Titusville southward including Lake Okeechobee
22/2100	Hurricane Watch changed to Hurricane Warning	Cuban provinces of Ciudad de la Habana, La Habana, and Pinar del Rio
22/2100	Tropical Storm Watch Issued	Florida from N of Longboat Key to the Steinhatchee River and from north of Titusville to Fernandina Beach

23/0300	Hurricane Watch changed to Hurricane Warning	The Florida Keys including the Dry Tortugas and Florida Bay, the W coast of Florida from Longboat Key southward, the E coast of Florida from Jupiter Inlet southward including Lake Okeechobee
23/0300	Hurricane Watch Issued	NW Bahamas including the Abacos, Andros Island, Berry Islands, Bimini, Eleuthera, Grand Bahama Island, and New Providence
23/0600	Hurricane Warning Discontinued	Mexico from S of Punta Gresa to Punta Allen
23/0600	Hurricane Watch Discontinued	Mexico from W of San Felipe to Celestun
23/0600	Tropical Storm Warning Discontinued	Mexico from W of Progreso to Celestun
23/0900	Hurricane Watch changed to Hurricane Warning	Florida from N of Jupiter Inlet to Titusville
23/0900	Tropical Storm Watch changed to Tropical Storm Warning	Florida from N of Titusville to Flagler Beach
23/1200	Hurricane Warning Issued	NW Bahamas including the Abacos, Andros Island, Berry Islands, Bimini, Eleuthera, Grand Bahama Island, and New Providence
23/1500	Hurricane Warning changed to Tropical Storm Warning	Mexico from San Felipe to Punta Gresa
23/1500	Tropical Storm Warning Discontinued	Mexico from W of San Felipe to Progreso
23/2100	All Warnings Discontinued	Mexico
24/0300	Tropical Storm Watch changed to Tropical Storm Warning	Florida from N of Titusville to St. Augustine
24/1500	Tropical Storm Watch Discontinued	Florida from N of St. Augustine to Fernandina Beach
24/1700	Tropical Storm Warning Discontinued	Florida from N of Longboat Key to the Steinhatchee River
24/1830	Hurricane Warning changed to Tropical Storm Warning	The Florida Keys including the Dry Tortugas and Florida Bay, Florida W Coast from Longboat Key southward and Florida E Coast from S of Florida City including Lake Okeechobee
24/1830	Watches/Warnings Discontinued	Cuba
24/2100	Watches/Warnings Discontinued	Florida
24/2100	Warnings Discontinued	Bahamas

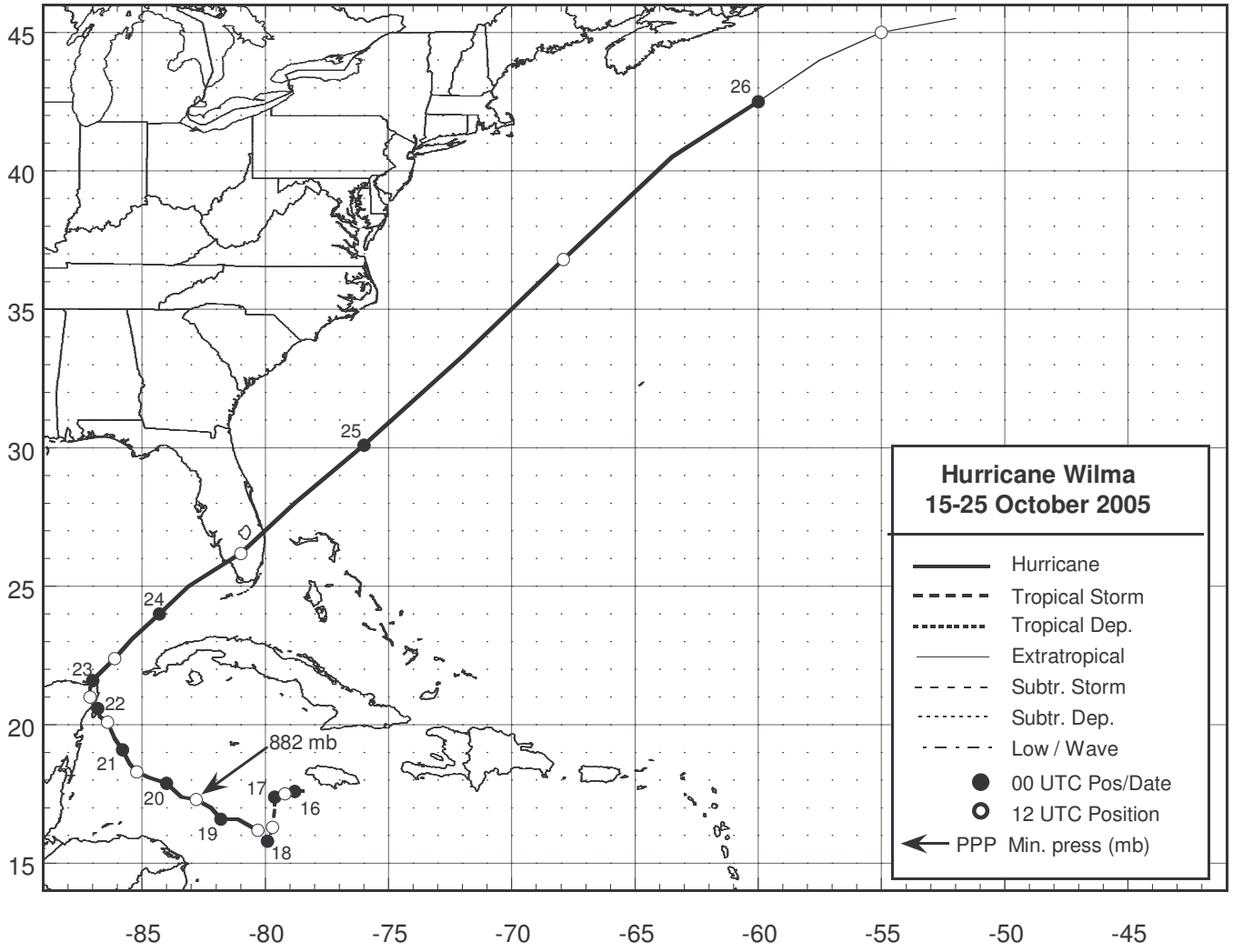

Figure 1. Best track positions for Hurricane Wilma, October 2005. Track during the extratropical stage is partially based on analyses from the NOAA Ocean Prediction Center.

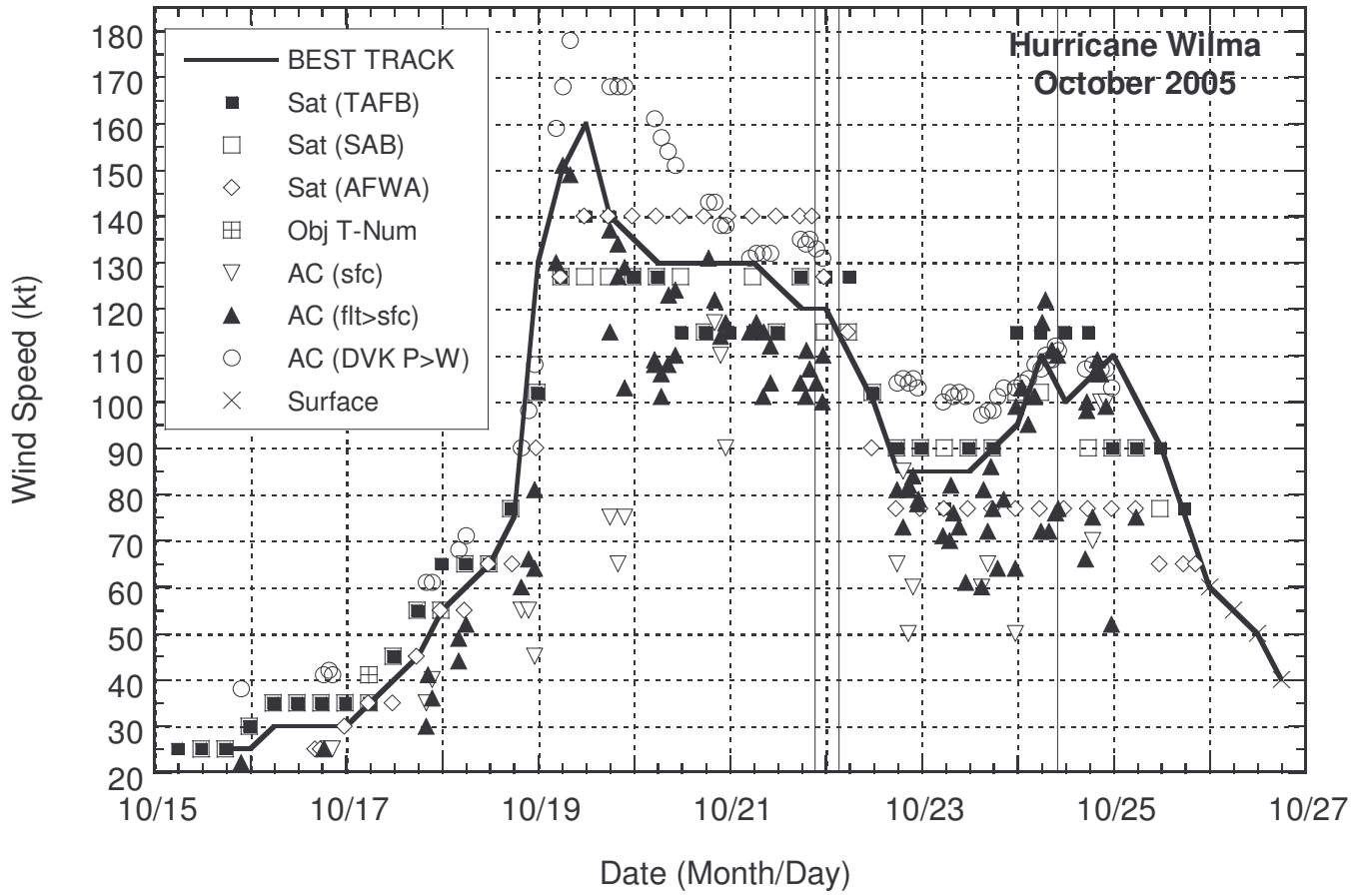

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Wilma, 15-25 October 2005. In most cases, aircraft observations have been adjusted for elevation using 90%, 80%, and 80% reduction factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Estimates during the extratropical stage are based partially on analyses from the NOAA Ocean Prediction Center. Vertical lines denote landfalls.

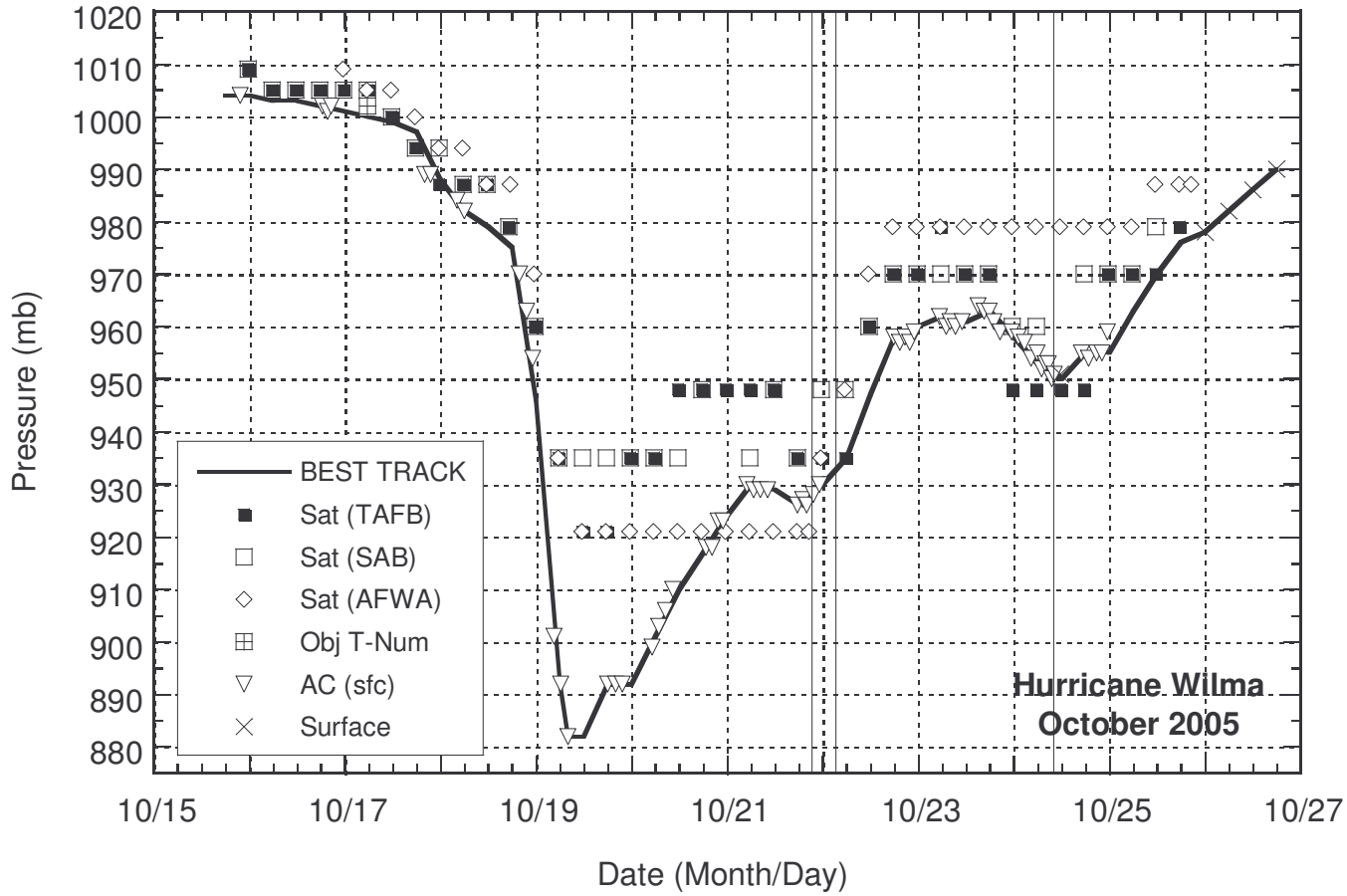

Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Wilma, 15-25 October 2005. Estimates during the extratropical stage are based partially on analyses from the NOAA Ocean Prediction Center. Vertical lines denote landfalls.

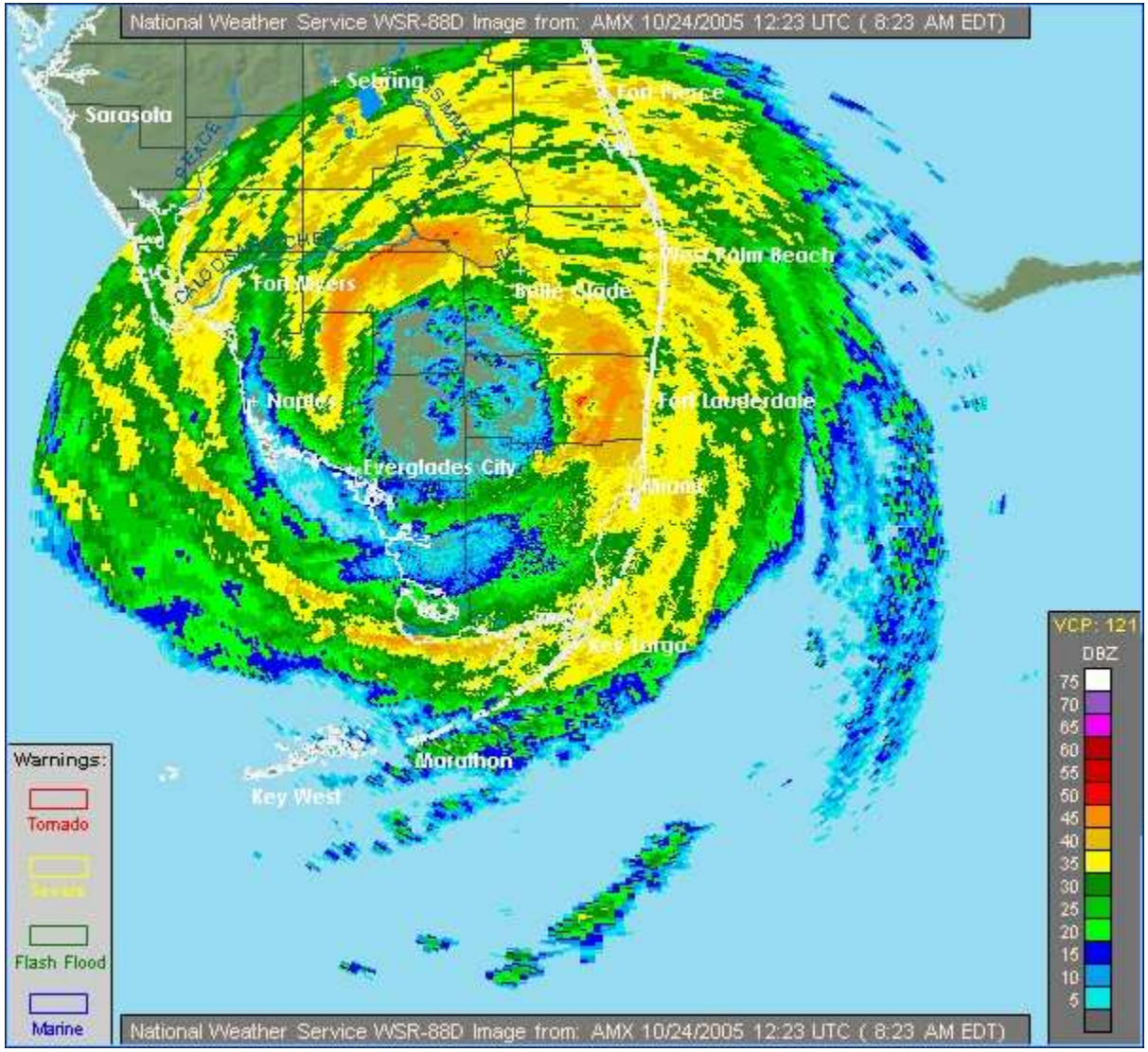

Figure 4. Image of Wilma over South Florida at 1223 UTC from the Miami National Weather Service WSR-88D radar.