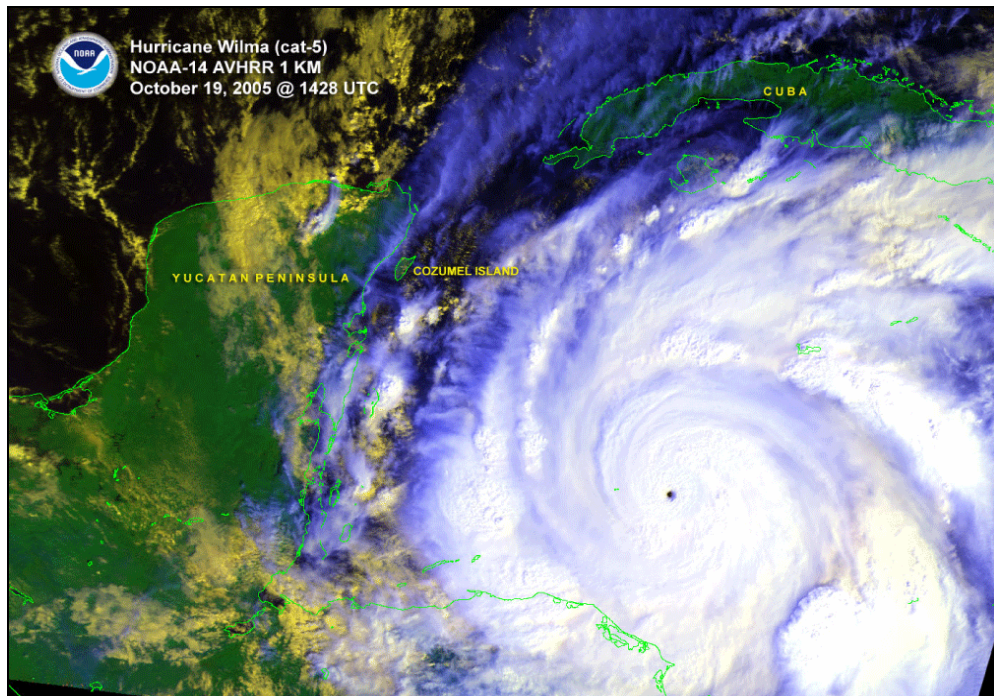


## Hurricane Wilma Post Storm Data Acquisition Estimated Peak Wind Analysis and Storm Tide Data

December 27, 2005

Hurricane Wilma was the sixth major hurricane of the record-breaking 2005 Atlantic hurricane season. It was also the third Category 5 hurricane of the season, eclipsing the records set in 1960 and 1961. Wilma was the third Category 5 hurricane to develop in October, the other two being Hurricane Mitch of 1998, and Hurricane Hattie of 1961.

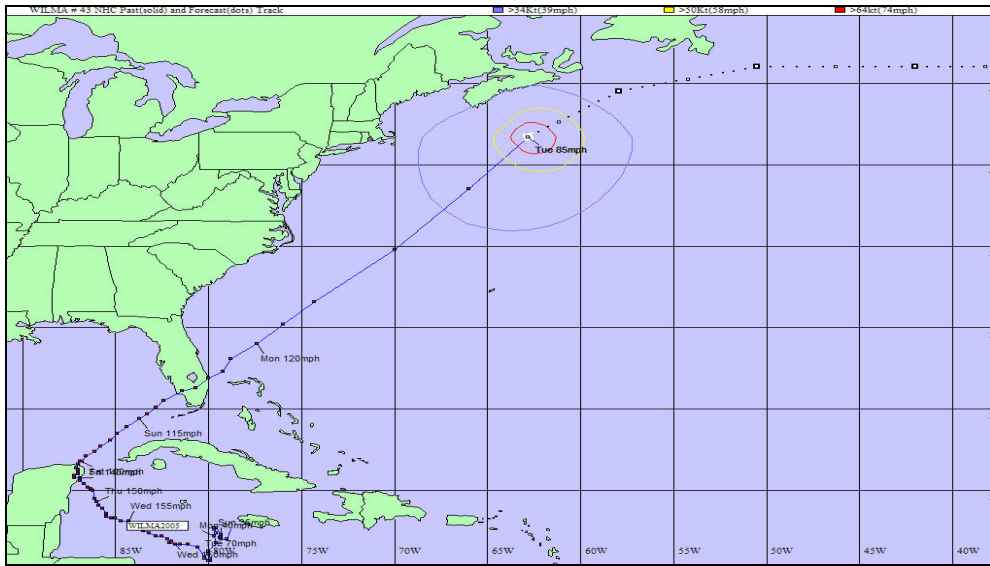
Based on surface pressure, Wilma became the most intense tropical cyclone ever recorded in the Atlantic basin on October 19 and the tenth most intense globally. Wilma had the lowest sea level pressure ever recorded in the Western Hemisphere of 882 millibars (mb), breaking the record of Hurricane Gilbert of 888 mb in 1988. Wilma's most destructive effects were felt in the Yucatán Peninsula of Mexico and in Cuba (**Figure 1**). In the U.S., Wilma made landfall along the southwest Florida coast affecting the Florida Keys, and the southern half of Florida. Insured damage in the U.S. is estimated at \$14 billion. This makes Wilma the fifth costliest hurricane in U.S. history. There were eleven direct fatalities in the U.S. associated with Hurricane Wilma.



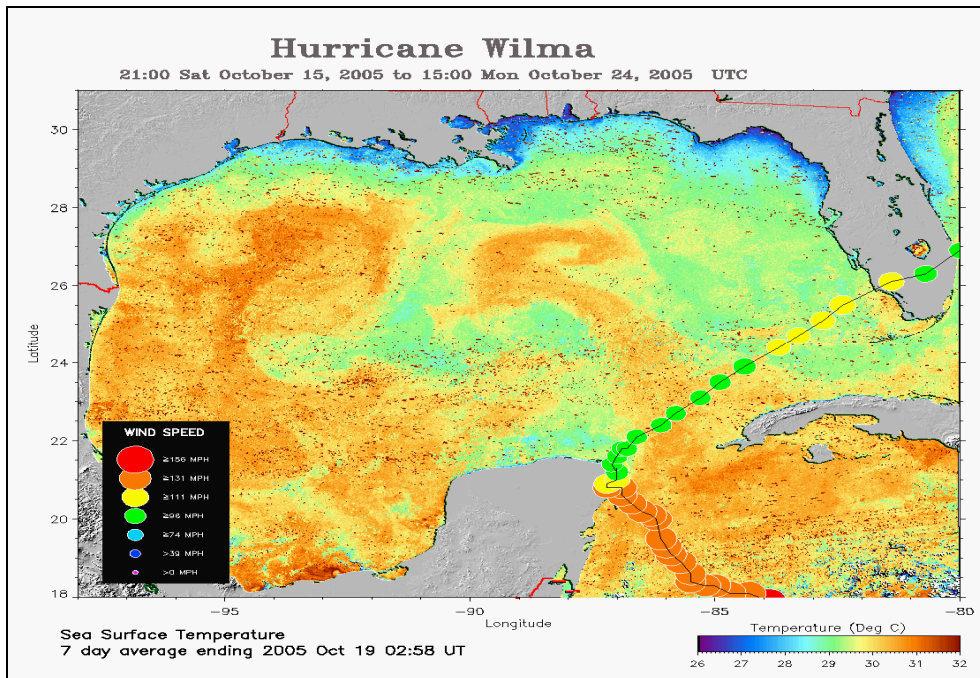
**Figure 1.** NOAA Satellite image of Hurricane Wilma at 1428 UTC October 19, 2005. Wilma was near its peak intensity of 882 mb and 175 mph maximum sustained winds.

Wilma formed in the western Caribbean Sea and made landfall in the Yucatán Peninsula as a category 4 and then moved northeast across the southern Gulf of Mexico making landfall near Everglades City, Florida around 6:30 a.m. October 24 as a category 4.

3 hurricane (**Figure 2**). Moving over the Yucatán Peninsula weakened Wilma to a category 2 hurricane but it regained some strength moving over the Loop Current of the Gulf Of Mexico where sea surface temperatures were near 31 C (88 F) (**Figure 3**).



**Figure 2.** Track of the center of Wilma beginning as a tropical storm on October 12. Wilma’s lowest pressure of 882 mb and highest sustained winds of 175 mph occurred on October 19 southeast of the Yucatán Peninsula.

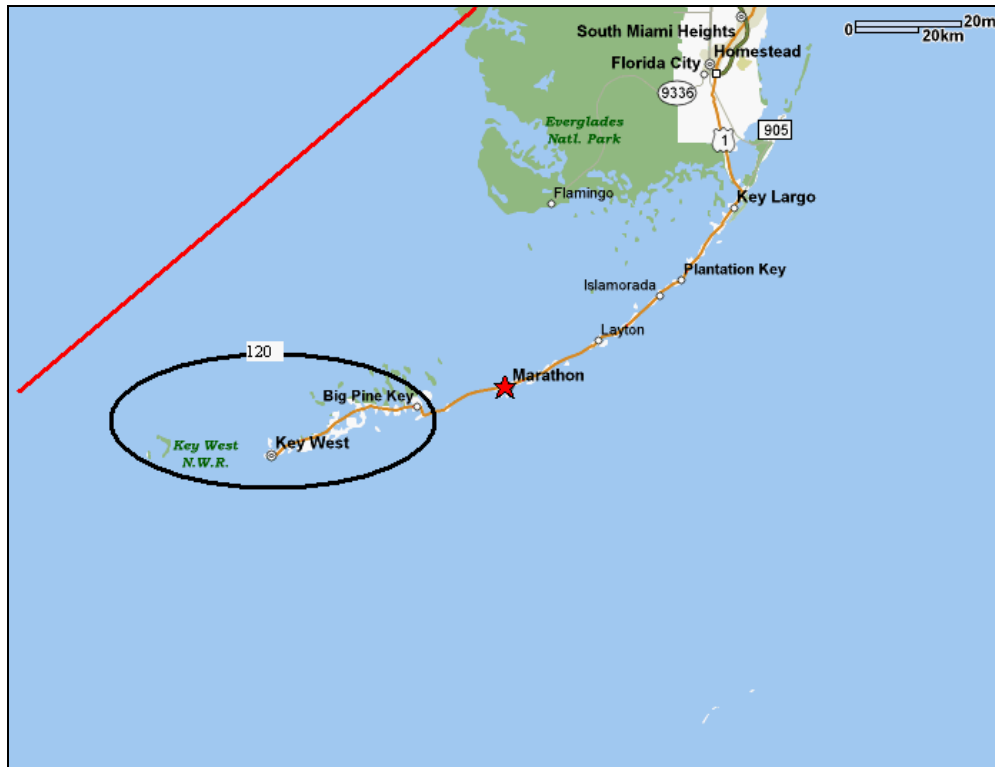


**Figure 3.** Track of Wilma overlaid on 7-day average of sea surface temperatures (SST) in the Gulf of Mexico and northwest Caribbean Sea. Wilma regained strength quickly when it moved over the Loop Current in the southern Gulf where SSTs were near 31 C (88 F).

## Peak Wind Analysis

### Florida Keys

Sustained hurricane force winds with Wilma occurred across the southern 1/3 of Florida and the Florida Keys. Based on wind gust estimates from WFO Key West, observed wind gusts from Dry Tortugas and Cudjoe Key, and the peak sustained winds (125 mph) of Wilma when the eye was located just north and west of the lower Keys (**Figure 5**), it is likely peak wind gusts throughout the lower Keys were greater than 120 mph (**Figure 4**).



**Figure 4.** Circled area indicates the approximate area where estimated peak wind gusts during Hurricane Wilma were greater than 120 mph. Peak wind gusts were estimated to be between 100-120 mph in the remainder of the Florida Keys. Red line indicates approximate track of the eye of Wilma.

The highest peak wind gusts occurred in the lower Florida Keys and Dry Tortugas. Dry Tortugas National Park, about 60 miles west of Key West, observed a peak wind gust of 134 mph and a spotter on Cudjoe Key, about 20 miles east of Key West, observed a 123 mph peak wind gust (**Table 1**). Automated Surface Observing System (ASOS) instruments at the Key West Airport and Key West Naval Air Station failed well before the strongest winds occurred. The peak wind gusts at both stations were 85 mph.

Location	Instrument	Peak Gust (mph)
Dry Tortugas (Keys)	National Park	134
South Fork of St. Lucie River (Martin County)	Vessel	133
Cudjoe Key	Spotter	123
Fowey Rocks	C-MAN	123
Palm Beach County	Co-op	114
Lake Okeechobee (South end)	Co-op	112
Islamorada (Keys)	Co-op	110
Ochopee	FCMP	109
Martin County	Spotter	108
Opa Locka	ASOS	105
Sombrero Key	C-MAN	105
Weston	FCMP	105
WFO Miami	NWS	104
Palm Beach International	ASOS	101
Fort Lauderdale Airport	ASOS	99
Pompano Beach	ASOS	98
Everglades City	FCMP	94
Cape Canaveral	Co-op	94
Buoy 41009 (offshore Cape Canaveral)	Buoy	94
Miami International	ASOS	92
Molasses Reef	C-MAN	91

**Table 1.** Observed peak wind gusts in south Florida during Hurricane Wilma. Wind measurements were taken from the Florida Coastal Monitoring Program (FCMP) wind equipment, Automated Surface Observing Systems (ASOS), Coastal Marine Automated Network (C-MAN) stations, National Data Buoy Center (NDBC) Data Buoys and NWS Co-op weather observers (Co-op) and spotters.

Because of Wilma’s northeast movement, the Middle and Upper Keys were located farther away from Wilma’s eye and strongest winds than the Lower Keys. Estimated peak wind gusts in the Middle and Upper Keys are between 100-120 mph. The ASOS at Marathon in the middle Keys failed before the strongest winds occurred. The Sombrero Key C-MAN station offshore Marathon recorded a peak wind gust of 105 mph while a Co-op observer in Islamorada in the Upper Keys observed a 110 mph peak wind gust. The Molasses Reef C-MAN station offshore Key Largo recorded a 91 mph peak wind gust. Peak winds throughout all of the Keys were generally from the southwest, south, and southeast (**Figure 5**).

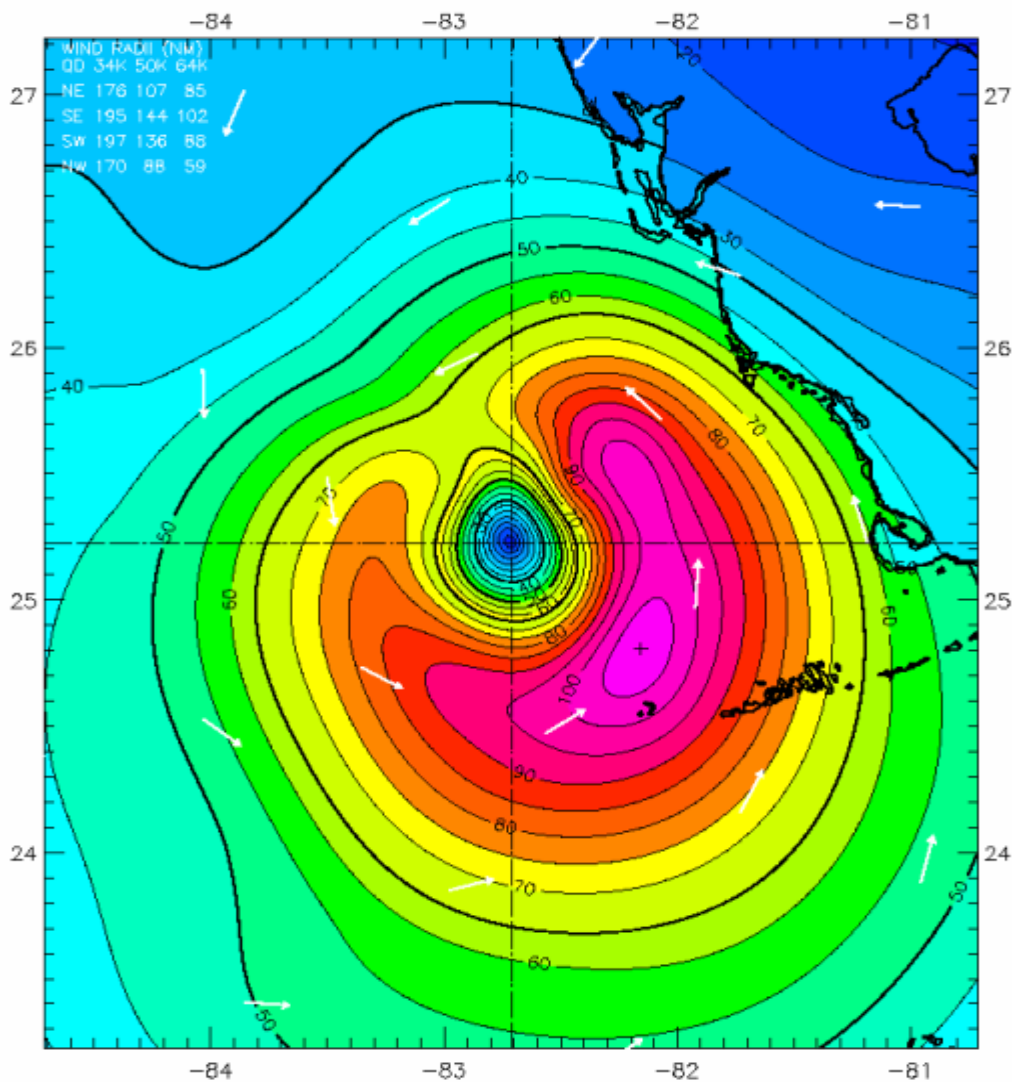


## Hurricane Wilma 0730 UTC 24 OCT 2005

**Max 1-min sustained surface winds (kt) for marine exposure**  
 Valid for marine exposure over water, open terrain exposure over land

Analysis based on SHIP from 0550 – 0707 z; CMAN from 0249 – 0729 z;  
 MOORED\_BUOY from 0249 – 0729 z; GOES\_SWIR from 0402 – 0702 z;  
 FCMP\_TOWER\_LD\_TO from 0246 – 0720 z; ASOS\_LD\_TO from 0253 – 0730 z;  
 GPSSONDE\_SFC from 0300 – 0713 z;  
 AFRES adj. to surface from mean height 2960 m from 0246 – 0729 z;  
 GPSSONDE\_WL150 from 0250 – 0713 z; CMAN\_LD\_TO from 0249 – 0729 z;  
 GPSSONDE\_MBL from 0250 – 0713 z;

0730 z position extrapolated from 0659 z Vortex wind center using 50 deg @ 17 kts; mslp = 952.0 mb



**Observed Max. Surface Wind: 109 kts, 42 nm SE of center based on 0648 z AFRES sfc measurement**

**Analyzed Max. Wind: 109 kts, 42 nm SE of center**

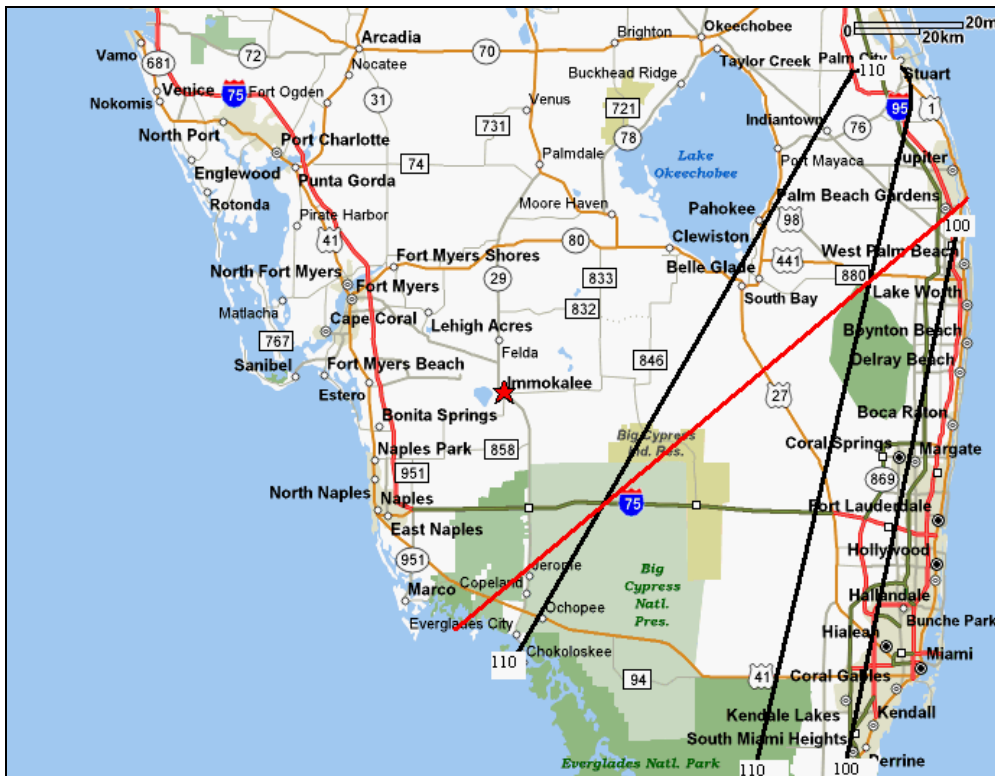
**Experimental research product of: NOAA / AOML / Hurricane Research Division**

**Figure 5.** Experimental wind analysis from NOAA’s Hurricane Research Division. Maximum sustained 1 minute winds of Wilma at 0730 UTC October 24 are analyzed in intervals of 5 knots with every 10 knots labeled. Intersection of vertical and horizontal axis is location of center. Plus sign indicates location of maximum wind observed 109 knots approximately 42 nm southeast of center. Arrows indicate the direction of winds.

## South Florida Mainland

The highest wind gust across the mainland of south Florida during Wilma, 133 mph, was measured by a vessel on the south fork of the St. Lucie River in Martin County. The Fowey Rocks C-MAN station offshore Key Biscayne measured 123 mph as the peak gust. Along the southwest Florida coast near the landfall of the eye, observations were sparse. There was a peak wind of 109 mph measured in Ochopee.

Based on observed wind gusts, assessments from the WFO Miami, and the sustained wind analysis from HRD (**Figure 7**), estimated peak wind gusts were generally near 100 mph along the southeast coast of Florida from West Palm Beach to Miami. Higher gusts were observed further north and west with estimated peak wind gusts generally between 110-120 mph from Stuart through the south end of Lake Okeechobee, and southwest across the Everglades to the area of landfall (**Figure 6**). Peak wind gusts were mainly from the southwest and south along the southwest coast of Florida and over the Everglades, from the southeast, east, and northeast along the southeast coast of Florida.



**Figure 6.** Estimated peak wind gusts across south Florida during Hurricane Wilma. The highest gusts, greater than 110 mph, were across the Everglades and near Lake Okeechobee. Wind gusts near 100 mph were common along the southeast coast. The red line indicates the approximate track of the eye of Hurricane Wilma.

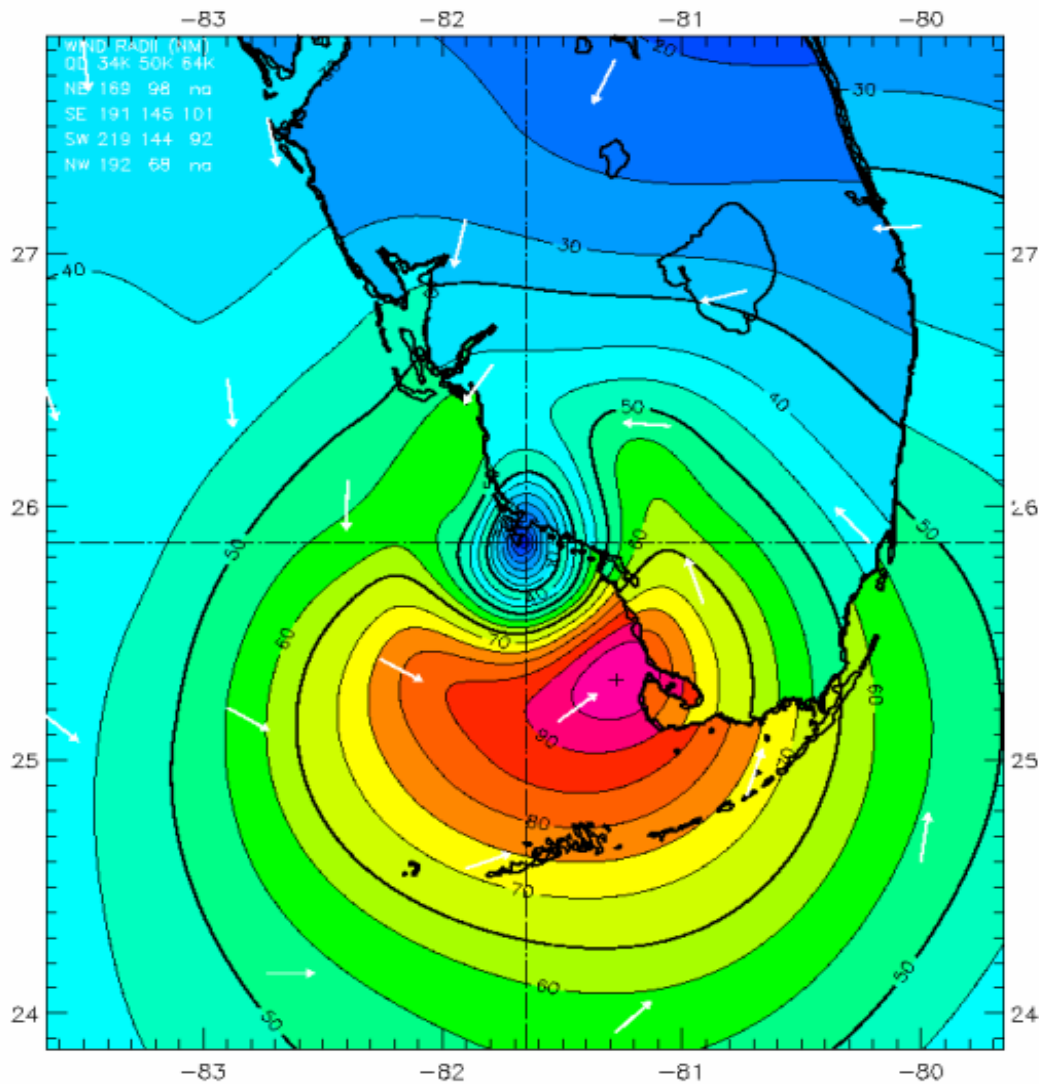
## Hurricane Wilma 1030 UTC 24 OCT 2005

Max 1-min sustained surface winds (kt) for marine exposure

Valid for marine exposure over water, open terrain exposure over land

Analysis based on CMAN from 0729 - 1029 z; MOORED\_BUOY from 0729 - 1029 z;  
GOES\_SWIR from 1002 - 1002 z; FCMP\_TOWER\_LD\_TO from 0731 - 1024 z;  
ASOS\_LD\_TO from 0727 - 1029 z; GPSSONDE\_SFC from 0750 - 1018 z;  
AFRES adj. to surface from mean height 2820 m from 0725 - 1029 z; QSCAT from 1010 - 1012 z;  
GPSSONDE\_WL150 from 0750 - 1018 z; CMAN\_LD\_TO from 0729 - 1029 z;  
GPSSONDE\_MBL from 0750 - 1018 z;

1030 z position interpolated from 1014 Vortex; mslp = 951.0 mb



Observed Max. Surface Wind: 100 kts, 39 nm SE of center based on 1025 z AFRES sfc measurement

Analyzed Max. Wind: 100 kts, 40 nm SE of center

Experimental research product of: NOAA / AOML / Hurricane Research Division

**Figure 7.** Experimental wind analysis from NOAA's Hurricane Research Division. Maximum sustained 1 minute winds of Wilma at 1030 UTC October 24 are analyzed in intervals of 5 knots with every 10 knots labeled. Intersection of vertical and horizontal axis is location of center. Plus sign indicates location of maximum wind observed 100 knots approximately 39 nm southeast of center. Arrows indicate the direction of winds.

## Storm Tide

The Florida Keys experienced the highest storm tides from Wilma. Maximum storm tides were estimated 6-8 feet above mean sea level (MSL) in the Lower Keys and 4-6 feet above MSL in the Middle and Upper Keys. The Keys experienced storm tides from the Atlantic Ocean (south) as Wilma approached from the southwest and from the Gulf of Mexico (north) as Wilma moved north of the Keys. Storm tides of 6-8 feet above MSL occurred along the southwest Florida Coast in locations near the landfall. Storm tides along the southeast coast of Florida were around 4 feet above MSL.



**Picture 1.** Storm tide of 6-8 feet above MSL along the south side of Key West, FL. Photo taken by WFO Key West, FL





**Picture 2.** More storm tide flooding in the southern portion of Key West. Photo taken by WFO Key West, FL.



**Picture 3.** Storm tide flooding along the southwest side of Key West. The water is actually coming from the Gulf of Mexico, north of Key West and flowing south across the island of Key West and into the Atlantic Ocean (south of Key West). Photo taken by WFO Key West, FL.