Tropical Cyclone Report
Tropical Storm Don
(AL042011)
27–30 July 2011

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Updated 4 November 2011 for Laredo, Texas, wind observation in Table 2

Don was a tropical storm that formed in the Yucatan Channel and moved west-northwestward across the Gulf of Mexico. Don weakened to a tropical depression as it made landfall in south Texas.

a. Synoptic History

Don originated from a tropical wave that moved off the west coast of Africa on 16 July. The wave produced intermittent disorganized convection while it moved across the tropical Atlantic over the next several days. As the wave moved across the Lesser Antilles and entered the Caribbean Sea on 23 July, it produced squalls with wind gusts of up to 35 kt in Puerto Rico and the U. S. Virgin Islands. The wave continued westward and convection became focused along the northern portion of the wave axis over the Greater Antilles on 24-25 July. Early on 26 July thunderstorm activity became more concentrated south of Cuba around a broad surface low associated with the wave. The convection gradually became better organized over the next 24 h as the low-level circulation became better defined, and it is estimated that a tropical depression formed around 0600 UTC 27 July, when the system was centered about 50 n mi northeast of Cancun, Mexico. The depression strengthened to a tropical storm 12 h later when it was centered about 55 n mi north-northeast of Cancun. The "best track" chart of Don's track 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].

After reaching tropical storm status, Don moved generally toward the west-northwest at 12 to 14 kt as it was steered by a subtropical ridge over the southeastern and south-central United States. While the cyclone moved across the Gulf of Mexico, it encountered an environment characterized by light to moderate northerly vertical shear and a relatively dry airmass, which likely prevented significant intensification. Deep convection diminished near the center of Don during the morning of 28 July, but returned later that day accompanied by a brief period of strengthening and a drop in central pressure. Don reached its peak intensity of 45 kt around 0000 UTC 29 July while centered about 345 n mi east-southeast of Corpus Christi, Texas, and the cyclone maintained this intensity for about 18 h. After that time the storm began to weaken as deep convection rapidly decreased near the center (Fig. 4), likely due to increasing northerly to

[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.

northeasterly vertical wind shear and entrainment of dry air from drought-stricken areas in northeastern Mexico and southern Texas.

As the deep convection diminished, the winds associated with Don decreased and the cyclone weakened to a tropical depression as it made landfall in Texas around 0230 UTC 30 July along the Padre Island National Seashore just to the northeast of Baffin Bay. After landfall, Don continued moving west-northwestward and weakened to a remnant low by 0600 UTC 30 July when centered near Alice, Texas. The remnant low dissipated 6 h later.

b. Meteorological Statistics

Observations in Don (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), as well as flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from five flights of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command and one flight from the NOAA Aircraft Operations Center WP-3D aircraft. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU) instrument, NASA's Tropical Rainfall Measuring Mission (TRMM), the European Space Agency's ASCAT, the U.S. Navy's WindSat, and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Don.

The estimated peak intensity of Don is based on SFMR wind maxima of 43 kt and 46 kt at 0007 UTC and 1712 UTC 29 July and an 850-mb flight-level wind maximum of 56 kt at 1713 UTC that day. The minimum central pressure of 997 mb is based on a dropwindsonde measurement of 999 mb with a surface wind of 29 kt from an Air Force Reserve Hurricane Hunter aircraft at 0010 UTC 29 July and an extrapolated pressure of 996 mb from a NOAA P-3 aircraft at 2312 UTC 28 July.

There were no ship or land reports of tropical-storm-force winds in association with Don. The highest sustained wind measured on land at an official observing site was 30 kt at Laredo, Texas, and the highest gust was 36 kt at Waldron Field, Texas. Selected surface observations from land stations and data buoys are given in Table 2.

Don produced only light rainfall amounts of less than an inch over most areas of coastal Texas (Table 2). The highest rainfall total was 2.56 in. in Bay City, Texas, well northeast of where the center made landfall.

Don produced storm tide values of 1 to 2.5 ft. above mean lower low water (MLLW) along the Texas coast. The highest observed storm tide values were 2.54 ft. at the Bob Hall Pier in Corpus Christi, 2.53 ft. at the Galveston Bay Entrance North Jetty, and 2.46 ft. at the Freeport Coast Guard station. The highest reported storm surge was 1.89 ft. at the Bob Hall Pier.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Don was not well anticipated. While the precursor system that developed into Don was first mentioned in the Tropical Weather Outlook more than five days prior to genesis at 1800 UTC 21 July, the 48-h chance of development remained in the low (< 30%) or medium (30-50%) categories until the time that genesis actually occurred due to the presence of seemingly unfavorable environmental conditions.

A verification of NHC official track forecasts (OFCL) for Don is given in Table 3a. Official track errors were 30 to 40 percent lower than the mean OFCL errors for the previous 5-yr period (2006–2010) at all time periods. CLIPER model (OCD5) errors for Don were lower than the 2006–2010 average values at 12 and 24 h and higher than the 2006-2010 average after that time. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. While no individual or consensus model bested OFCL at all time periods, the simple Limited Barotropic model (LBAR) had smaller errors than OFCL at 24 to 48 h. Overall the sample size is quite small and prevents any meaningful interpretation of these errors.

A verification of NHC official intensity forecasts (OFCL) for Don is given in Table 4a. Official forecast intensity errors were about 50 percent lower than the mean OFCL errors for the 2006–2010 period at 12 to 36 h, and near the 2006-2010 mean error at 48 h. Decay-SHIFOR (OCD5) errors were smaller than the 2006-2010 average values at all time periods, suggesting that Don's intensity forecasts were easier than average. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. While the sample size is small, the HWRF model (HWFI) and the ICON and IVCN intensity consensus models had smaller average errors than OFCL at all forecast times.

Coastal watches and warnings associated with Don are listed in Table 5. A tropical storm watch was first issued for the Texas coast about 48 h prior to landfall, and a tropical storm warning was issued 12 h later. However, since Don weakened as it made landfall tropical storm conditions did not occur in the warning area.

Table 1. Best track for Tropical Storm Don, 27–30 July 2011.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
27 / 0600	21.6	85.7	1007	30	tropical depression
27 / 1200	21.8	86.2	1006	30	"
27 / 1800	22.0	86.7	1003	35	tropical storm
28 / 0000	22.3	87.4	1000	35	"
28 / 0600	22.9	88.4	1000	35	"
28 / 1200	23.7	89.5	1001	40	"
28 / 1800	24.2	90.7	1004	40	"
29 / 0000	24.6	91.9	997	45	"
29 / 0600	25.1	93.1	1000	45	"
29 / 1200	25.8	94.3	1002	45	"
29 / 1800	26.4	95.5	1004	45	"
30 / 0000	27.0	96.9	1006	35	"
30 / 0600	27.8	98.1	1009	25	low
30 / 1200					dissipated
29 / 0000	24.6	91.9	997	45	minimum pressure
30 / 0230	27.3	97.4	1007	30	landfall on Padre Island National Seashore near Baffin Bay, Texas

Table 2. Selected surface observations for Tropical Storm Don, 27–30 July 2011.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)			
Texas								
International Civil Aviation Organization (ICAO) Sites								
Laredo (KLRD)	30/0056	1010.0	30/1835	26	30			
Corpus Christi (KCPR)	30/0236	1009.8	30/0408	27	34			
Alice (KALI)	30/0541	1009.5	29/2203	20	28			
Victoria (KVCT)	30/0100	1012.2	29/1825	23	31			
Cotulla (KCOT)	29/2300	1009.5	29/2306	24	29			
Corpus Christi NAS (KNGP)	30/0142	1009.1	30/0247	26	33			
Kingsville (KNQI)	30/0416	1008.8	29/2237	21	26			
Rockport (KRKP)	30/0209	1010.5	30/0250	24	30			
Orange Grove (KNOG)	30/0159	1008.8	30/0612	20	27			
Waldron Field (KNVT)	30/0151	1009.1	30/0422	24	36			
Cabaniss Field (KNGW)	30/0228	1008.8	30/0356	23	31			
Beeville (KBEA)	30/0215	1011.5	29/2015	23	28			
Robstown (KRBO)	30/0415	1010.2	30/0415	22	29			
Port Lavaca (KPKY)	30/0115	1012.2	29/1815	20	25			
Hebbronville (KHBY)	29/2115	1011.5	29/2215	19	23			0.61
Pearland (KLVJ)	29/0117	1013.5	29/1944	22	30			0.33
Palacios (KPSX)	30/0153	1012.2	29/2111	25	28			
Non-METAR Observations								
Freeport (D7155)	29/2333	1012.7	29/2213	17	35			0.48
Surfside Beach (XSRF)			29/2310	21	24			
Marine Observations								
Rollover Pass TCOON (RLOT2) 29.52°N 94.51°W						0.82	1.90[e]	
Eagle Point NOS (EPTT2) 29.48°N 94.92°W						1.30	2.41[e]	

Galveston Bay Entrance North Jetty TCOON 29.36°N 94.73°W							2.53[e]	
Galveston Pier 21 NOS (GTOT2) 29.31°N 94.79°W						1.14	2.20[d]	
Baffin Bay TCOON (BABT2) 27.30°N 97.42°W			30/0424	24	29			
Corpus Christi Bob Hall Pier (NOS) 27.58°N 97.22°W			30/0230	29	33	1.89	2.09[d] 2.54[e]	
South Bird Island (TCOON)			30/0300	25	31			
Packery Channel TCOON (PACT2) 27.63°N 97.24°W			30/0224	25	30	0.92	1.22[d]	
Port Ingleside TCOON (NGLT2) 27.82°N 97.20°W			30/0300	23	28	1.20	1.45[e]	
Nueces Delta Watershed TCOON 27.89°N 97.62°W			30/0200	26	30			
Rockport NOS (RCPT2) 28.02°N 97.05°W			30/0218	23	29	0.58	1.73[d]	
Port O'Connor TCOON (PCNT2) 28.45°N 96.39°W			30/0318	25	29	1.24	1.58[e]	
Port Aransas TCOON (RTAT2) 27.84°N 97.07°W			29/2300	21	28	1.29	1.67[e]	
Port Aransas C-MAN (PTAT2) 27.83°N 97.05°W	30/0100	1010.8	30/0300	23	26			
NDBC Buoy 42020 50 nm SE of Corpus Christi 26.97°N 96.70°W	29/2250	1006.3	30/0050	27	33			
NDBC Buoy 42001 Mid Gulf 25.89°N 89.66°W			29/1809	29	41			
TABS K Buoy 42045 26.22°N 96.50°W	29/2030	1009.8	29/2230	21	29			
Texas State Aquarium TCOON 27.81°N 97.40°W						1.33	1.43[e]	
Seadrift TCOON (SDRT2) 28.41°N 96.71°W						0.98	1.08[e]	
Port Lavaca TCOON 28.64°N 96.61°W						1.46	2.00[e]	
Copano Bay TCOON 28.11°N 97.02°W						0.92	1.14[e]	

Freeport Coast Guard Station NOS (FCGT2) 28.94°N 95.30°W						1.15	2.46[e]	
South Padre Island Coast Guard Station TCOON 26.07°N 97.17°W						0.89	1.98[e]	
Port Isabel NOS (PTIT2) 26.06°N 97.22°W						0.94	1.32[d]	
Public/Other								
Bay City (BYTM) 29.00°N 95.98°W								2.56
Hebbronville (HBBT2) 27.31°N 98.69W								0.85
Brownsville (TXCMR17) 25.96°N 97.42°W								0.71
Victoria Fire Dept. #5 (VFDT2) 28.86°N 97.02°W								0.66
Rancho Viejo (TXCMR1) 26.03°N 97.55°W								0.66

[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.
[c] Storm surge is water height above normal astronomical tide level.
[d] Storm tide is water height above North American Vertical Datum of 1988 (NAVD88).
[e] Storm tide is water height above Mean Lower Low Water.

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Don. Mean errors for the five-year period 2006–10 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (Don)	**22.1**	**29.4**	**46.1**	**56.5**			
OCD5 (Don)	31.8	77.3	164.6	257.3			
Forecasts	8	6	4	2			
OFCL (2006-10)	31.0	50.6	69.9	89.5			
OCD5 (2006-10)	47.7	98.3	156.4	218.1			

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Don. 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	22.9	27.8	44.9	56.5			
BAMS	25.2	32.3	**31.1**	62.9			
BAMM	23.3	34.6	56.8	87.5			
BAMD	26.1	52.9	90.0	140.9			
LBAR	24.1	**22.5**	**14.1**	**20.2**			
TVCC	**19.5**	**22.8**	47.2	65.4			
TVCE	**19.8**	**24.4**	52.4	68.9			
TVCA	**19.5**	**24.8**	51.6	67.2			
AEMI	26.3	46.2	71.3	90.7			
GFSI	**20.6**	28.4	53.6	84.8			
CMCI	27.1	**25.3**	**23.2**	**28.6**			
EMXI	32.5	53.1	51.9	66.0			
NGPI	34.8	37.3	53.2	76.2			
HWFI	23.5	**22.7**	49.7	**50.1**			
GHMI	33.5	62.3	122.8	168.9			
NAMI	37.4	65.3	125.2	169.4			
Forecasts	5	4	2	2			

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Don. Mean errors for the five-year period 2006–10 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL (Don)	**4.4**	**5.0**	**7.5**	**15.0**			
OCD5 (Don)	4.6	7.8	10.5	15.5			
Forecasts	8	6	4	2			
OFCL (2006-10)	7.2	11.0	13.2	15.1			
OCD5 (2006-10)	8.5	12.3	15.4	17.8			

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Don. 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 4a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	4.4	5.0	7.5	15.0			
LGEM	**3.8**	6.5	8.5	19.0			
DSHP	**3.8**	7.0	7.8	16.0			
HWFI	**4.0**	**4.2**	**5.3**	**3.5**			
GHMI	4.8	8.2	12.8	**13.5**			
ICON	**3.6**	**3.7**	**3.3**	**6.0**			
IVCN	**3.9**	**3.7**	**2.5**	**5.5**			
Forecasts	8	6	4	2			

Table 5. Watch and warning summary for Tropical Storm Don, 27–30 July 2011.

Date/Time (UTC)	Action	Location
28/0300	Tropical Storm Watch issued	Port Mansfield to west of San Luis Pass, Texas
28/0900	Tropical Storm Watch modified to	Mouth of the Rio Grande to west of San Luis Pass, Texas
28/1500	Tropical Storm Warning issued	Port Mansfield to San Luis Pass, Texas
29/0300	Tropical Storm Warning modified to	Mouth of the Rio Grande to San Luis Pass, Texas
29/0900	Tropical Storm Warning discontinued	San Luis Pass to north of Matagorda, Texas
30/0000	Tropical Storm Warning discontinued	Matagorda to Port O'Connor, Texas
30/0300	All coastal watches and warnings discontinued	

Figure 1. Best track positions for Tropical Storm Don, 27–30 July 2011.

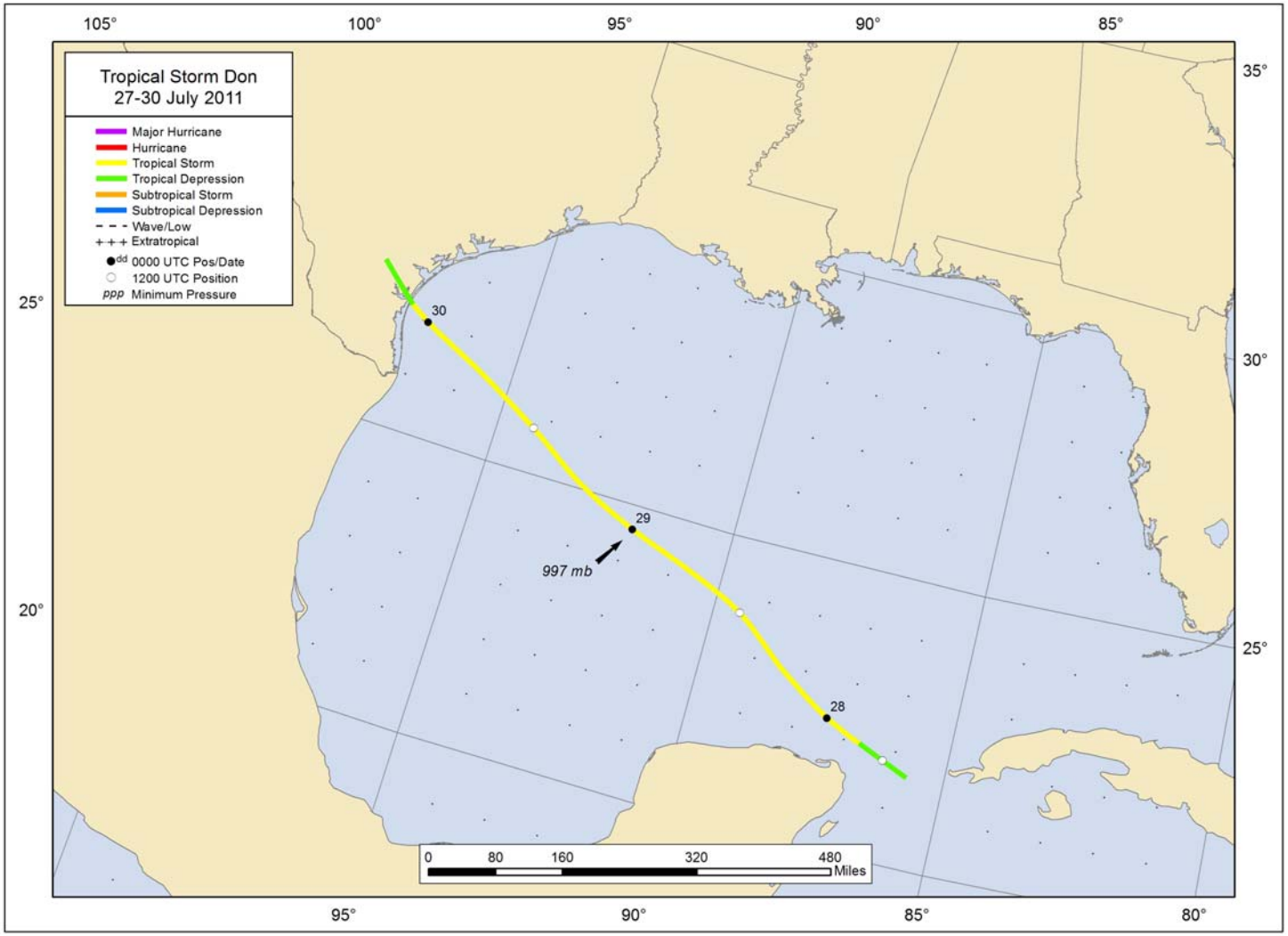


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Don, 27–30 July 2011. Dashed vertical lines correspond to 0000 UTC. Solid vertical line corresponds to landfall. AMSU data are from the Cooperative Institute of Meteorological Satellite Studies (CIMSS) at the University of Wisconsin intensity technique.

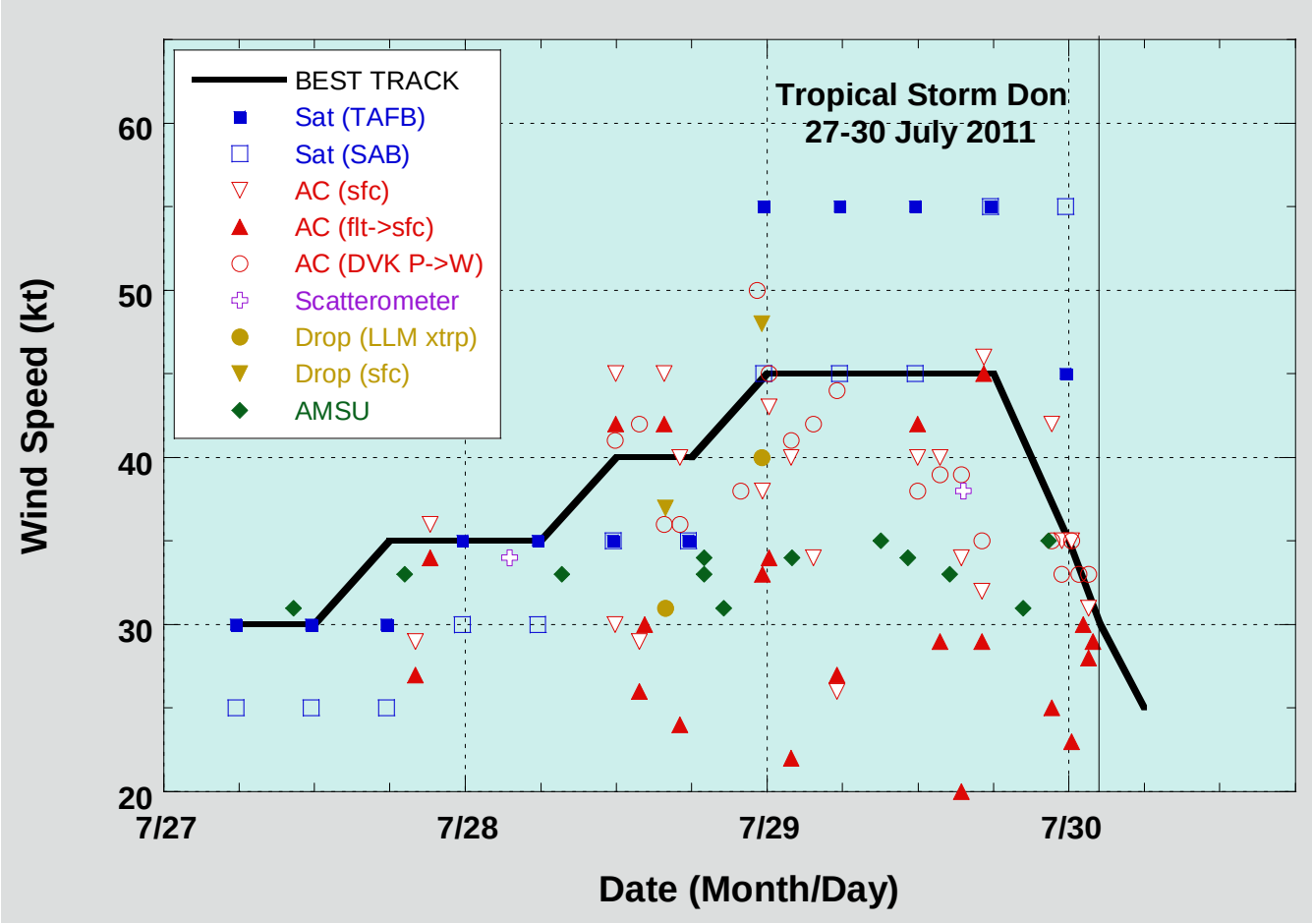
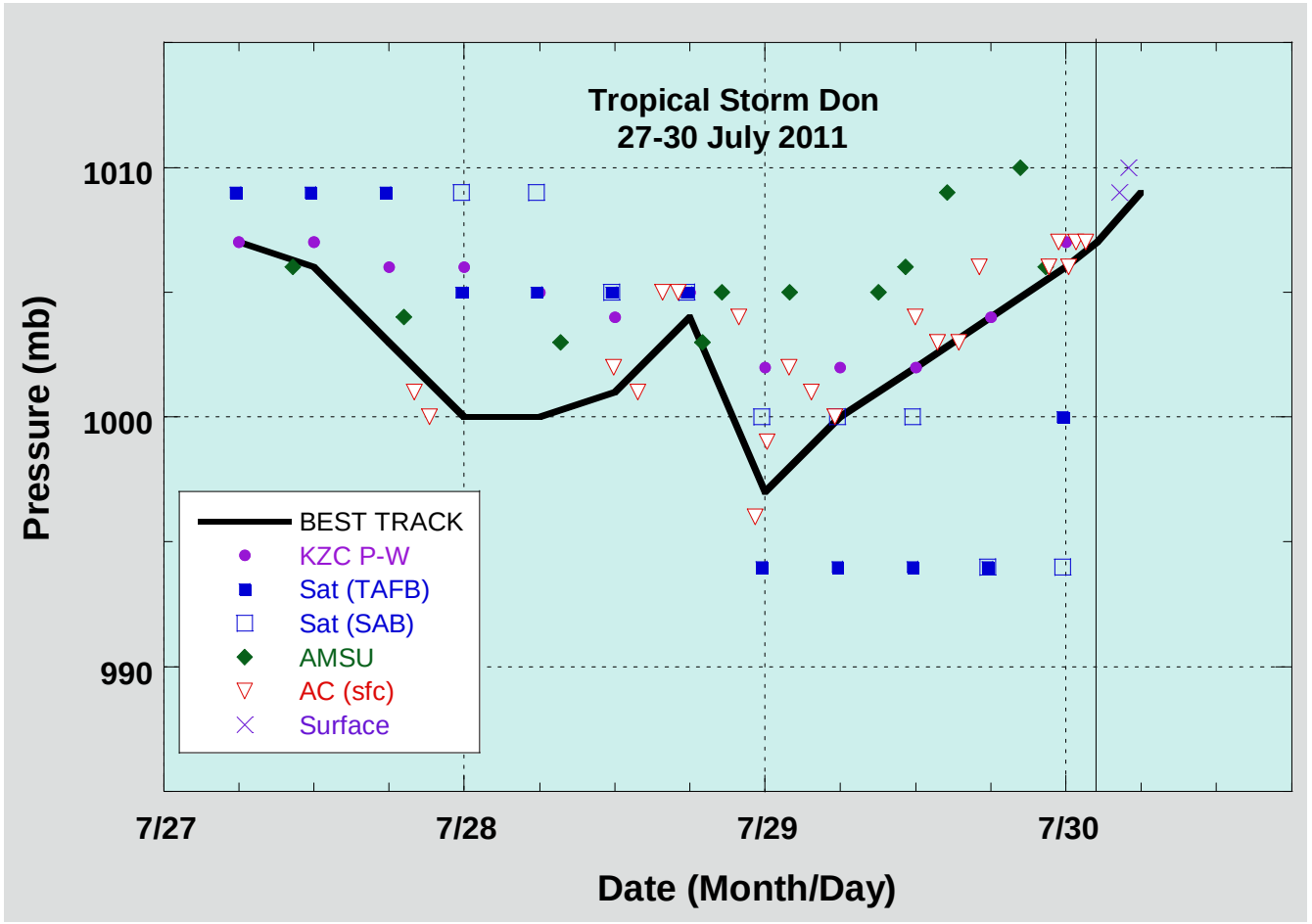


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Don, 27–30 July 2011. Dashed vertical lines correspond to 0000 UTC. Solid vertical line corresponds to landfall. AMSU data are from the Cooperative Institute of Meteorological Satellite Studies (CIMSS) at the University of Wisconsin intensity technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data.



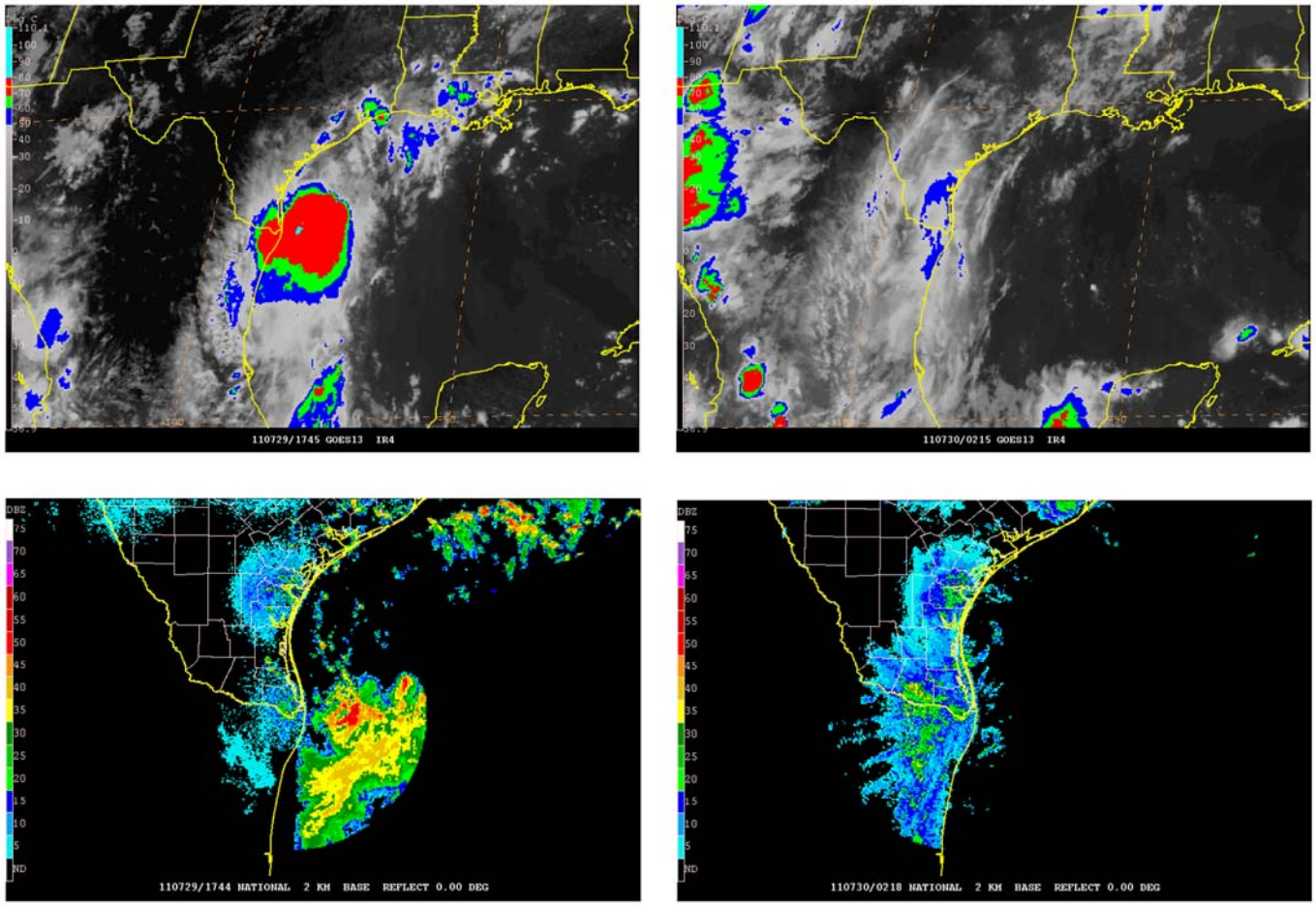


Figure 4. *GOES-13* enhanced infrared imagery of Tropical Storm Don at 1745 UTC 29 July 2011 (top left) and 0215 UTC 30 July 2011 (top right), and mosaic radar reflectivity at 1744 UTC 29 July (bottom left) and 0218 UTC 30 July (bottom right).