NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM BONNIE

(AL022016)

27 May – 4 June 2016

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National Hurricane Center
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GOES-13 VISIBLE IMAGE OF BONNIE AT PEAK INTENSITY (1900 UTC 28 MAY 2016). IMAGE COURTESY OF THE U.S. NAVAL RESEARCH LABORATORY TC WEBPAGE.

Bonnie was a tropical storm that formed from non-tropical origins northeast of the Bahamas. It made landfall near Charleston, South Carolina, as a tropical depression and brought heavy rainfall to coastal sections of the Carolinas.

Tropical Storm Bonnie

27 MAY – 4 JUNE 2016

SYNOPTIC HISTORY

Bonnie originated from a mid- to upper-level low that cut off from the mid-latitude westerlies over the Bahamas on 25 May. An inverted surface trough formed about 350 n mi north-northeast of the southeastern Bahamas that day and began to move slowly westward to west-northwestward. Although southwesterly vertical wind shear displaced the convective activity to the north and east of the trough, by 0600 UTC 27 May a well-defined area of low pressure formed about 270 n mi east-northeast of the island of Eleuthera in the central Bahamas. The convective organization gradually increased that day, and a tropical depression formed around 1800 UTC, centered about 180 n mi miles northeast of Great Abaco in the Bahamas. 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[1].

After genesis, the depression moved quickly west-northwestward between a mid-level ridge to the northeast and the mid- to upper-level low to the southwest of the tropical cyclone. Despite being in an environment of moderate southerly to southeasterly vertical wind shear, the cyclone reached tropical storm strength at 1200 UTC 28 May, while centered about 195 n mi south-southeast of Charleston, South Carolina. Bonnie reached its peak intensity of 40 kt 6 h later. However, by 0600 UTC on 29 May wind shear had displaced most of the deep convection away from the center and Bonnie began to weaken while it turned northward at a slower forward speed. Bonnie then began to move more quickly toward the northwest and weakened to a tropical depression around 1200 UTC 29 May while centered just offshore of the South Carolina coast, about 15 n mi east-southeast of Charleston. Bonnie made landfall shortly thereafter, around 1230 UTC about 10 n mi east of Charleston on the Isle of Palms, South Carolina,

Bonnie made a slow cyclonic loop over coastal South Carolina west of Charleston after landfall and slowly weakened. Early on 30 May, Bonnie began moving slowly northeastward and organized deep convection dissipated, marking the transition of Bonnie to a post-tropical remnant low around 1200 UTC that day while centered about 30 n mi north-northeast of Charleston. The remnant low then turned eastward and re-emerged into the Atlantic Ocean shortly after 0000 UTC 31 May. On 31 May and 1 June the low moved slowly eastward and passed south of Cape Fear, North Carolina, while producing only intermittent convection.

Organized deep convection became more persistent near the low center around 0000 UTC 2 June, and Bonnie regained tropical cyclone status as a depression at that time while centered about 40 n mi southeast of Cape Lookout, North Carolina. The depression then accelerated northeastward ahead of an approaching mid-level trough and the center passed

[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.

about 10 n mi east-southeast of Cape Hatteras around 1200 UTC that day. Bonnie then turned eastward with an increase in forward speed as it came under the influence of the mid-latitude westerlies. The cyclone regained tropical storm status at 1200 UTC 3 June, while centered about 140 n mi east-northeast of Cape Hatteras.

Bonnie continued moving eastward through early on 4 June. An increase in vertical wind shear and a track over 22°C waters resulted in Bonnie's weakening to a tropical depression at 1800 UTC that day. Organized deep convection dissipated over the next few hours, and Bonnie again became a post-tropical remnant low at 0000 UTC 5 June. The remnant low moved generally eastward for the next several days and acquired frontal characteristics on late on 7 June. During this time, maximum winds remained between 25 to 30 kt. The low dissipated shortly after 1800 UTC 9 June about 475 n mi south-southwest of the Azores.

METEOROLOGICAL STATISTICS

Observations in Bonnie (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. Observations also include flight-level and stepped frequency microwave radiometer (SFMR) observations from four flights of the 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), 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 Bonnie.

Selected surface observations from land stations and data buoys are given in Table 2.

Winds and Pressure

The estimated 40-kt peak intensity of Bonnie is based on an SFMR measurement of 40 kt at 0124 UTC 29 May. An earlier SFMR measurement of 46 kt around 1045 UTC 28 May was deemed unreliable due to rain contamination.

No sustained winds of tropical storm force were observed at land or coastal observing sites in association with Bonnie. The highest reported sustained wind on land was 30 kt at Ft. Pulaski, Georgia, where a gust of 35 kt was also observed. A sustained wind of 27 kt was observed at the Charleston, South Carolina, International Airport, where a wind gust of 35 kt was also reported.

Storm Surge[2]

Storm surge associated with Bonnie was observed along the Atlantic coast from northern Florida through North Carolina. The highest observed storm surge was 1.80 ft above normal tide levels at Oyster Landing, South Carolina. The highest reported storm tide was 3.95 ft above the North American Vertical Datum of 1988 (NAVD88) at Fort Pulaski, Georgia. A storm tide of 3.36 ft was reported at Charleston, South Carolina, while a storm tide of 3.30 ft was observed at Fernandina Beach, Florida. The storm tide resulted in inundation values of less than 1 ft from north Florida through North Carolina.

Rainfall and Flooding

Rainfall totals from Bonnie ranged from 4 to 10 inches across much of the central and southern portions of the South Carolina coast and adjacent areas of eastern Georgia (Figure 4). The highest observed rainfall total in this area was 10.36 inches near Ridgeland in Jasper County, South Carolina. This rainfall caused extensive flooding in Jasper County, where portions of Interstate 95 and U.S. Highway 17 were closed. Road flooding also occurred in portions of Dorchester, Charleston, and Hampton Counties in South Carolina and Bulloch County in Georgia.

Farther north, widespread rainfall totals of 3 to 5 inches occurred across portions of coastal North Carolina (Figure 4), with totals over 10 inches near Cape Hatteras. The highest observed total was 13.95 inches at Billy Mitchell Airport (KHSE) in Frisco. Note that some of this rainfall fell during Bonnie's post-tropical phase.

CASUALTY AND DAMAGE STATISTICS

There was one casualty[3] reported in association with Bonnie – a person drowned in the surf at Carolina Beach, North Carolina, on 29 May. Several rescues were also reported due to strong rip currents in association with Bonnie in Wrightsville Beach and Carolina Beach, North Carolina, and in Myrtle Beach, South Carolina, on 29–30 May.

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[2] Several terms are used to describe water levels due to a storm. **Storm surge** is defined as the abnormal rise of water generated by a storm, over and above the predicted astronomical tide, and is expressed in terms of height above normal tide levels. Because storm surge represents the deviation from normal water levels, it is not referenced to a vertical datum. **Storm tide** is defined as the water level due to the combination of storm surge and the astronomical tide, and is expressed in terms of height above a vertical datum, i.e. the North American Vertical Datum of 1988 (NAVD88) or Mean Lower Low Water (MLLW). **Inundation** is the total water level that occurs on normally dry ground as a result of the storm tide, and is expressed in terms of height above ground level. At the coast, normally dry land is roughly defined as areas higher than the normal high tide line, or Mean Higher High Water (MHHW).

[3] Deaths occurring as a direct result of the forces of the tropical cyclone are referred to as "direct" deaths. These would include those persons who drowned in storm surge, rough seas, rip currents, and freshwater floods. Direct deaths also include casualties resulting from lightning and wind-related events (e.g., collapsing structures). Deaths occurring from such factors as heart attacks, house fires, electrocutions from downed power lines, vehicle accidents on wet roads, etc., are considered indirect" deaths.

According to a media report, about $640,000 in damage occurred in Jasper County, South Carolina, due to flooding, mainly in the town of Ridgeland. No other monetary damage estimates associated with Bonnie were available as of this writing.

FORECAST AND WARNING CRITIQUE

The genesis of Bonnie was reasonably well forecast, particularly in the short range. However, a 5-day possibility of genesis was not noted until three days prior to genesis (Table 3). The 5-day genesis forecast reached the medium (40-60%) category 42 h before genesis, and was raised to the high (>60%) category 30 h prior to formation. The possibility of genesis within 48 h was first mentioned 42 h before formation. The 48-h genesis probabilities reached the medium and high categories 30 h and 18 h prior to genesis, respectively.

The re-genesis of Bonnie back to a tropical cyclone on 2 June was not anticipated and no genesis probabilities were provided before the system regained tropical cyclone status.

A verification of NHC official track forecasts for Bonnie is given in Table 4a. Official forecast track errors (OFCL) were near the mean official errors for the previous 5-yr period at 12 h and well below the long-term mean at all other forecast times. Climatology-persistence (OCD5) track errors were also much smaller than the long-term mean OCD5 errors, suggesting that Bonnie's track was easier to forecast than a typical system. A homogeneous comparison of the official track errors with selected guidance models is given in Table 4b. Overall, OFCL performed well in comparison to the available guidance. The best performing track model guidance was the GEFS ensemble mean (AEMI), which bested OFCL at 12, 24, 48 and 72 h. The ECMWF (EMXI) beat OFCL at 12-36 h.

A verification of NHC official intensity forecasts for Bonnie is given in Table 5a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period at all forecast lead times. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 5b. The NHC forecast was beaten by the variable intensity consensus aid (IVCN) at 24, 36, 48 and 120 h, but performed better than most of the rest of the guidance at most forecast lead times.

Watches and warnings associated with Bonnie are given in Table 6.

Table 1. Best track for Tropical Storm Bonnie, 27 May–4 June 2016.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
27 / 0600	27.2	72.1	1010	30	low
27 / 1200	27.7	73.1	1009	30	"
27 / 1800	28.3	74.4	1009	30	tropical depression
28 / 0000	28.8	75.5	1009	30	"
28 / 0600	29.4	76.7	1009	30	"
28 / 1200	30.0	78.0	1008	35	tropical storm
28 / 1800	30.7	79.1	1008	40	"
29 / 0000	31.0	79.4	1007	40	"
29 / 0600	31.7	79.4	1007	35	"
29 / 1200	32.7	79.7	1007	30	tropical depression
29 / 1230	32.8	79.8	1007	30	"
29 / 1800	33.0	80.3	1010	30	"
30 / 0000	32.7	80.3	1011	25	"
30 / 0600	33.1	80.0	1011	25	"
30 / 1200	33.3	79.8	1012	25	low
30 / 1800	33.4	79.6	1011	25	"
31 / 0000	33.2	79.3	1009	25	"
31 / 0600	33.1	78.8	1007	25	"
31 / 1200	33.2	78.4	1007	25	"
31 / 1800	33.3	78.0	1007	25	"
01 / 0000	33.4	77.7	1008	20	"
01 / 0600	33.4	77.3	1009	20	"
01 / 1200	33.4	76.9	1009	20	"
01 / 1800	33.5	76.4	1010	20	"
02 / 0000	34.1	76.0	1010	20	tropical depression
02 / 0600	34.7	75.7	1010	25	"

02 / 1200	35.1	75.4	1009	25	"
02 / 1800	35.4	75.0	1008	30	"
03 / 0000	35.6	74.5	1006	30	"
03 / 0600	35.7	73.7	1006	30	"
03 / 1200	35.9	72.6	1006	35	tropical storm
03 / 1800	35.9	71.4	1006	35	"
04 / 0000	35.9	70.2	1006	35	"
04 / 0600	35.9	68.9	1006	35	"
04 / 1200	35.6	67.3	1007	30	tropical depression
04 / 1800	35.1	65.9	1008	30	"
05 / 0000	34.8	64.6	1009	25	low
05 / 0600	34.3	63.0	1011	25	"
05 / 1200	33.8	61.2	1011	25	"
05 / 1800	33.4	59.2	1012	25	"
06 / 0000	33.0	57.1	1013	25	"
06 / 0600	32.4	54.5	1013	25	"
06 / 1200	31.6	51.5	1014	25	"
06 / 1800	31.0	48.7	1014	25	"
07 / 0000	30.3	46.2	1015	25	"
07 / 0600	29.6	42.9	1015	25	"
07 / 1200	29.2	40.3	1015	30	"
07 / 1800	28.9	38.0	1015	30	extratropical
08 / 0000	28.8	36.2	1015	30	"
08 / 0600	28.9	34.7	1015	25	"
08 / 1200	29.1	33.5	1016	25	"
08 / 1800	29.4	32.5	1016	25	"
09 / 0000	29.9	31.7	1019	25	"
09 / 0600	30.2	30.9	1018	25	"
09 / 1200	30.4	30.4	1018	25	"

09 / 1800	30.6	29.5	1020	25	"
10 / 0000					dissipated
28 / 1800	30.7	79.1	1008	40	maximum winds
29 / 1230	32.8	79.8	1007	30	landfall at Isle of Palms, South Carolina
03 / 0000	35.6	74.5	1006	30	minimum pressure

Table 2. Selected surface observations for Tropical Storm Bonnie, 27 May–4 June 2016.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
North Carolina									
International Civil Aviation Organization (ICAO) Sites									
Frisco (KHSE) 35.23N 75.62W									13.95
Beaufort (KMRH) 34.73N 76.66W									2.41
New Bern (KEWN) 35.07N 77.04W									2.19
National Ocean Service (NOS) Sites									
Duck 36.18N 75.75W						0.40	1.46		
Oregon Inlet Marina 35.80N 75.55W						0.70	0.77	0.30	
USCG Cape Hatteras 25.21N 75.70W						0.91		0.37	
Beaufort 34.72N 76.67W						0.74	1.89	0.43	
Wilmington 34.23N 77.95W						1.31		0.46	
Wrightsville Beach 34.21N 77.79W						1.01	2.32	0.55	
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
3.3 NE Frisco 35.26N 75.59W									12.25
Ocracoke 35.11N 75.99W									5.32
0.7 N Bath 35.48N 76.81W									5.30
1 E Holden Beach 33.91N 78.23W									5.22
0.3 ESE Smyrna 34.76N 76.52W									4.20
4.6 SSW Grantsboro 35.08N 76.88W									4.07
1.2 NE Jacksonville 34.77N 77.39W									4.00
1.3 SSW Varnamtown 33.94N 78.24W									3.71
3.2 NE Harkers Island 34.73N 76.52W									3.96

Kill Devil Hills 36.00N 75.67W									3.69
0.2 SE Lowland 35.30N 76.56W									3.22
4.4 SSE Wilmington 34.17N 77.92W									2.29
NWS Cooperative Observer Program (COOP) Sites									
Frisco 35.25N 75.60W									11.09
Ocracoke 35.11N 75.99W									5.70
Gum Neck 35.71N 76.13W									4.91
Manteo 35.92N 75.70W									3.93
Jacksonville 34.80N 77.40W									3.72
Perrytown 35.06N 77.09W									3.15
South Carolina									
International Civil Aviation Organization (ICAO) Sites									
Charleston International Airport (KCHS) 32.90N 80.04W	29/1256	1008.8	29/1256	27	35				4.84
Beaufort MCAS (KNBC) 32.49N 80.70W	29/1956	1012.3	29/2028	19	25				
Hilton Head (KHXD) 32.23N 80.69W			29/0315	22	28				
Coastal-Marine Automated Network (C-MAN) Sites									
Folly Beach (FBIS1) 32.69N 79.89W	29/1200	1010.7	29/0720	22	27				
National Ocean Service (NOS) Sites									
Charleston (CHTS1) 32.78N 79.93W	29/1218	1009.7	28/1812	16	22	1.51	3.36	0.74	
Springmaid Pier (MROS1) 33.66N 78.92W	30/1954	1011.2	28/1954	25	29	1.37	2.87	0.43	
National Estuarine Research Reserve System									
Oyster Landing (NIQS1) 33.35N 79.19W						1.80	3.11	0.70	
Caro-COOPS									
Fripp Nearshore Buoy 42003 (32.28N 80.41W)	31/0808	1010.3	28/2208	25	35				
Capers Nearshore Buoy 41029 (32.81N 79.63W)	29/1208	1008.8	29/1108	23	33				

Public/Other									
Downtown Charleston (KCXM) 32.78N 79.93W	29/1240	1009.5	28/2300	19	23				
Pineville (PNSO1) 33.25N 80.03W			29/1410	25	29				
NWS Charleston 32.89N 80.03W									5.42
NWS Cooperative Observer Program (COOP) Sites									
1 SW Furman-Youmands Farm (YMFS1) 32.67N 81.20W									7.87
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
5.8 ESE Ridgeland 32.45N 80.89W									10.36
6.3 SSW Varnville 32.76N 81.10W									9.10
2.6 NW Charleston 32.93N 80.07W									8.61
2.9 WNW N Charleston 32.93N 80.08W									8.52
1.6 SSW Brunson 32.90N 81.20W									6.45
2.5 SW Folly Beach 32.65N 79.96W									6.28
1.7 SE Allendale 32.99N 81.29W									6.14
7.6 NW Yemassee 32.78N 80.76W									6.11
5.8 ENE Okatie 32.33N 80.86W									6.05
5.3 NNE Georgetown 33.44N 79.26W									2.79
1 NE Surfside Beach 33.60N 78.97W									2.71
Georgia									
National Ocean Service (NOS) Sites									
Fort Pulaski (FPKG1) 32.03N 80.90W	31/0806	1011.3	29/1700	30	35	1.42	3.95	0.50	
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Marlow 32.27N 81.39W									7.46
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
1 SW Oliver (OLVG1) 32.49N 81.56W									7.74

2 SW Eden (EDEG1) 32.19N 81.42W									4.62
Florida									
National Ocean Service (NOS) Sites									
Fernandina Beach (FRDF1) 30.67N 81.47W						1.66	3.30	0.56	
Mayport Bar Pilots Dock (MYPF1) 30.40N 81.43W						1.32	2.56	0.62	
Offshore Marine Observations									
National Data Buoy Center (NDBC)									
Buoy 41004 32.50N 79.10W	31/0650	1009.6	29/1010	28	35				

[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 reports are 2 min; buoy averaging periods are 8 min.
[c] Storm surge is water height above normal astronomical tide level.
[d] For most locations, storm tide is water height above the North American Vertical Datum of 1988 (NAVD88).
[e] Estimated inundation is the maximum height of water above ground. For NOS tide gauges, the height of the water above Mean Higher High Water (MHHW) is used as a proxy for inundation.

Table 3. Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the "Low" category do not include forecasts of a 0% chance of genesis.

	Hours Before Genesis	
	48-Hour Outlook	**120-Hour Outlook**
Low (<40%)	42	72
Medium (40%-60%)	30	42
High (>60%)	18	30

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Bonnie. Mean errors for the previous 5-yr period 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	26.9	**31.7**	**35.7**	**51.8**	**69.4**	**78.4**	**79.0**
OCD5	47.1	81.5	123.3	139.2	177.2	345.0	395.3
Forecasts	17	13	9	5	2	6	10
OFCL (2011-15)	26.3	42.0	56.9	73.8	109.7	159.5	221.7
OCD5 (2011-15)	46.3	98.5	158.7	217.9	323.7	419.0	498.0

Table 4b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Bonnie. 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	26.9	31.7	35.7	51.8	69.4	87.7	82.3
OCD5	47.1	81.5	123.3	139.2	177.2	320.2	387.7
GFSI	**24.1**	**27.5**	44.0	56.6	94.8	131.0	200.5
GHMI	27.4	34.6	62.7	74.8	159.8	216.0	488.3
HWFI	32.5	37.3	46.3	68.7	123.2	177.9	195.6
EMXI	**26.2**	**30.4**	**34.9**	55.7	75.5	94.6	99.5
CMCI	37.5	59.8	64.5	73.1	82.6	119.4	181.0
NVGI	31.5	**30.1**	58.5	79.4	**40.4**	171.1	248.1
AEMI	**25.2**	**26.4**	39.3	**51.6**	71.0	**75.3**	134.1
TVCA	27.2	**31.0**	44.1	62.9	96.7	131.4	189.9
BAMD	55.8	100.5	158.8	182.9	724.4	1487.4	2059.1
BAMM	38.7	51.5	75.4	71.1	224.8	316.3	347.7
BAMS	30.4	37.6	50.3	63.8	79.1	150.8	261.0
TABD	42.3	68.4	102.5	203.0	302.5	900.6	1687.8
TABM	40.6	43.9	46.9	73.8	149.8	155.5	242.6
TABS	42.6	48.0	54.8	40.0	101.0	75.8	142.2
Forecasts	17	13	9	5	2	5	7

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Bonnie. Mean errors for the previous 5-yr period 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	**3.2**	**3.1**	**4.4**	**6.0**	**2.5**	**3.3**	**6.0**
OCD5	4.3	5.1	3.6	7.0	8.0	13.2	6.5
Forecasts	17	13	9	5	2	6	10
OFCL (2011-15)	5.5	8.3	10.5	12.3	14.1	14.1	14.4
OCD5 (2011-15)	6.7	10.0	12.3	14.3	16.8	16.7	16.4

Table 5b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Bonnie. 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 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	3.2	3.1	4.4	6.0	2.5	3.3	5.6
OCD5	4.3	5.1	**3.6**	7.0	8.0	13.2	5.9
HWFI	**2.8**	**2.9**	4.7	6.8	5.0	9.8	10.4
GHMI	3.4	3.2	**2.7**	**4.8**	4.0	8.8	9.6
LGEM	4.0	4.5	5.1	9.4	11.0	13.0	16.1
DSHP	3.6	3.9	7.7	12.0	10.0	5.7	5.9
IVCN	3.3	**3.0**	**2.7**	**5.0**	3.5	3.7	**3.8**
GFSI	4.6	6.5	6.1	**5.8**	**0.5**	3.5	9.7
EMXI	4.8	6.2	**3.7**	**2.6**	4.5	5.7	6.1
Forecasts	17	13	9	5	2	6	9

Table 6. Watch and warning summary for Tropical Storm Bonnie, 27 May–4 June 2016.

Date/Time (UTC)	Action	Location
27 / 2100	Tropical Storm Warning Issued	Savannah River to Little River Inlet
29 / 1200	Tropical Storm Warning Discontinued	Savannah River to Little River Inlet

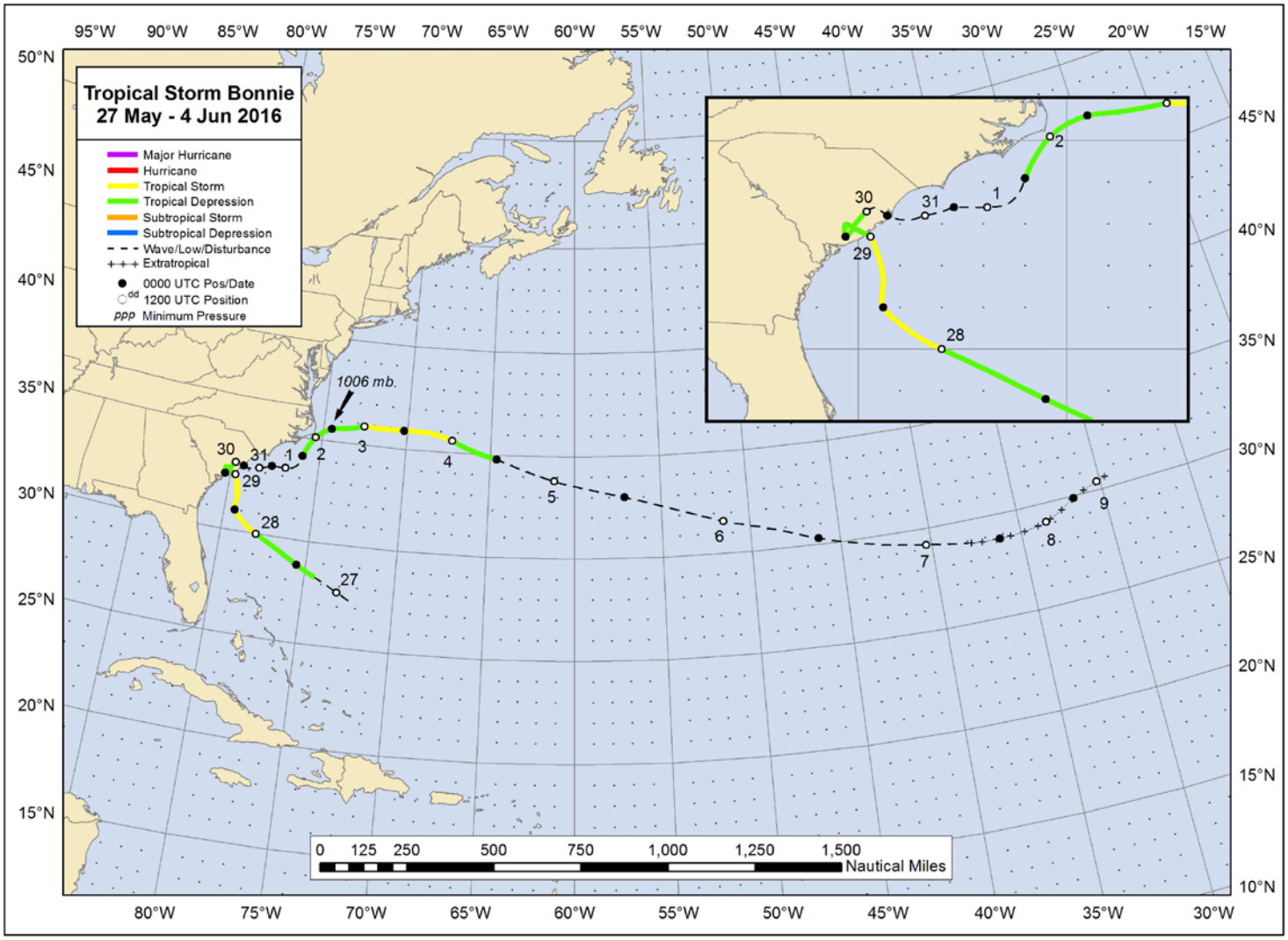

Figure 1. Best track positions for Tropical Storm Bonnie, 27 May–4 June 2016. The track during the post-tropical stage starting on 4 June is based partly on analyses from the NOAA Ocean Prediction Center and NHC's Tropical Analysis and Forecast Branch. The inset shows closer details of Bonnie's track from 27 May through 2 June.

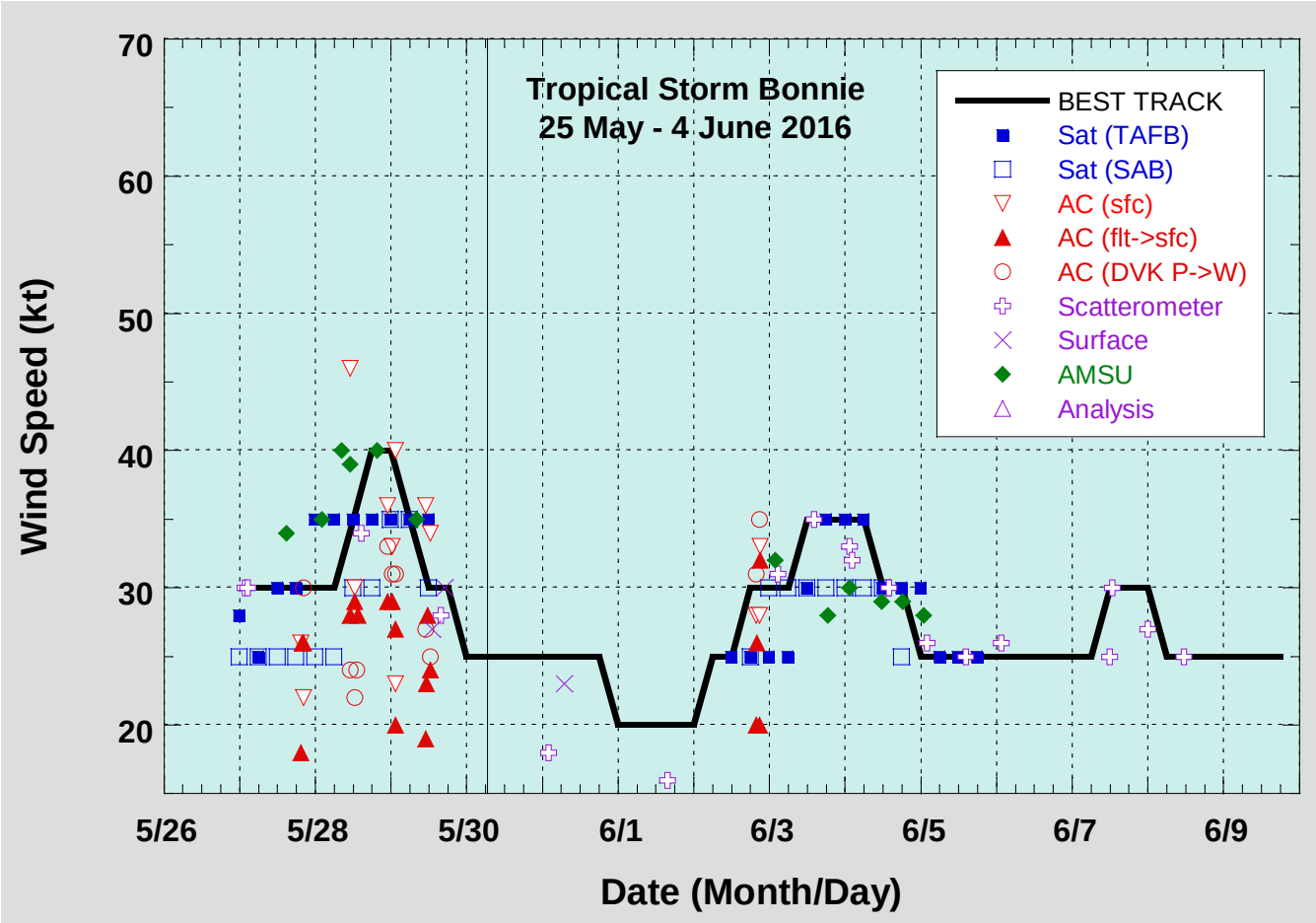

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Bonnie, 27 May–4 June 2016. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC, and the solid vertical line corresponds to landfall.

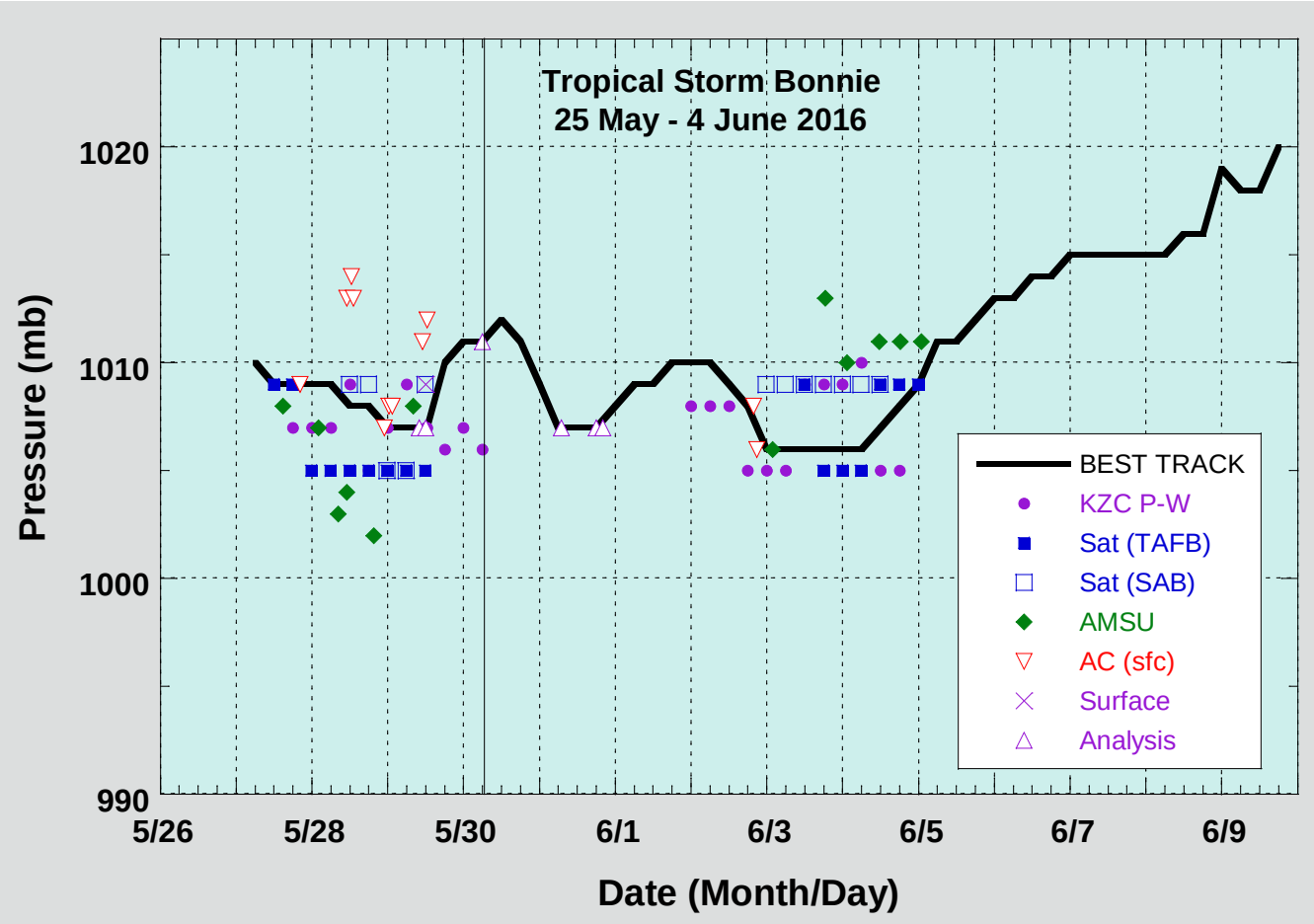

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Bonnie, 27 May–4 June 2016. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC, and the solid vertical line corresponds to landfall.

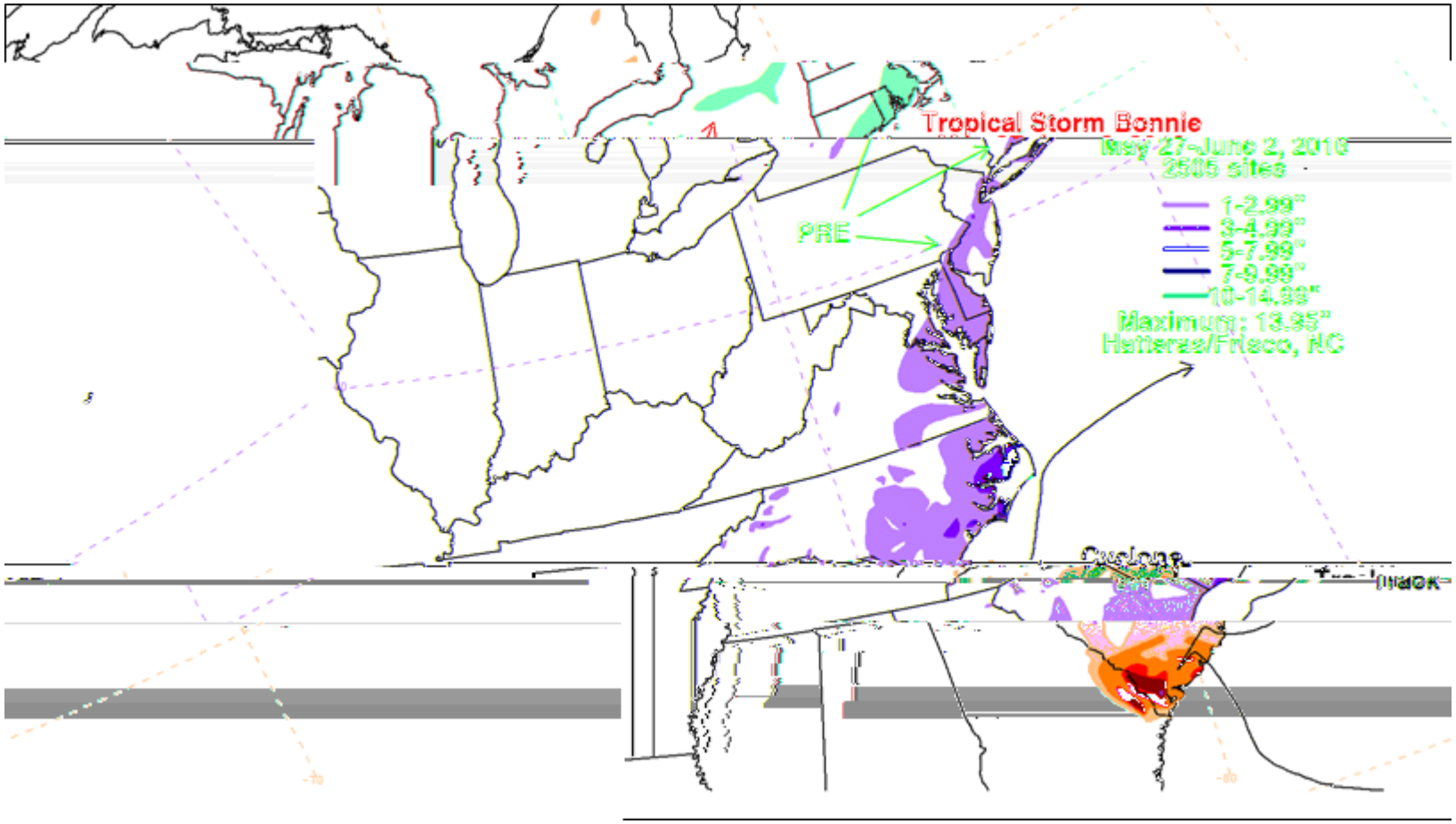

Figure 4. Analyzed total rainfall (inches) from Bonnie during the period from 27 May–2 June 2016. Analysis courtesy of the NOAA Weather Prediction Center.