

Preliminary Report
Tropical Storm Arthur
17-21 June 1996

Max Mayfield
19 August 1996

Arthur was a minimal tropical storm that brought locally heavy rains to coastal areas of the Carolinas. There was no significant damage.

a. Synoptic History

Satellite imagery showed an increase in cloudiness and showers just east of the Bahamas on 16 June. This activity may have been associated with a tropical wave that brought pressure falls to Puerto Rico and the Dominican Republic on the previous day. On the 17th, increased organization of the system at low levels was observed in surface data, animation of satellite imagery and the first aircraft reconnaissance reports. The "best track" (Figure 1 and Table 1) indicates that the Atlantic's first tropical depression of the year formed from this system at 1800 UTC, centered near the eastern end of Grand Bahama Island. The depression initially moved toward the north-northwest to north, steered by the low-level flow around the western periphery of the Atlantic subtropical ridge. The depression experienced considerable shear at this time due to strong upper-level winds associated with a cold low over the eastern Gulf of Mexico.

Deep convection increased in a small area mainly to the north of the center on 18 June. The depression became Tropical Storm Arthur at 0000 UTC on the 19th, based on analysis of reconnaissance data. Maximum winds of 40 knots are based on a ship report received on this day. The storm began to turn more toward the northeast with time.

Arthur's center crossed over Cape Lookout, North Carolina near 0000 UTC 20 June. As the storm continued moving toward the northeast, locally heavy rains occurred over portions of the Carolinas in advance of the cyclone's center. The center moved over the Pamlico Sound and the Cape Hatteras National Seashore and exited into the Atlantic. Satellite imagery indicated that the storm had a very well-defined low-level circulation with minimal

deep convection. It is likely that most of the tropical storm force winds associated with Arthur remained offshore over the Atlantic waters. The tropical storm weakened to a tropical depression about 100 n mi northeast of Cape Hatteras.

Arthur began moving toward the east-northeast and accelerated when westerly steering currents increased on the 20th. Deep convection developed on 21 June, but the cloud pattern was not very symmetrical in appearance, suggesting that the system was losing tropical characteristics. Forward motion increased to greater than 35 knots and Arthur became an extratropical gale at 1200 UTC 21 June while centered about 350 n mi north-northeast of Bermuda. The remnant of Arthur was tracked for another 36 hours and was last identified about midway between Newfoundland and the Azores, where it was absorbed by a much larger extratropical low over the North Atlantic.

b. Meteorological Statistics

Figures 2 and 3 show best track curves of minimum central pressure and maximum one-minute surface wind speed, respectively, as a function of time. The observations on which the curves are based are also plotted and consist of Dvorak-technique estimates using satellite imagery, aircraft reconnaissance data on 17, 18 and 19 June, surface reports and a few synoptic fixes from TPC surface maps.

Intensity estimates derived from satellite data never exceeded 35 knots. The maximum wind reported by U.S. Air Force reserve aircraft was 45 knots at a flight-level of 1500 feet at 0023 UTC 19 June. The ship **Atlantic Huron** reported a sustained wind of 42 knots at 1500 UTC 19 June while located 35 n mi southeast of the cyclone's center. The C-MAN station at Frying Pan Shoals reported sustained winds of 34 knots and a gust to 40 knots at 1700 UTC on 19 June. This automated reporting station is located about 30 n mi southeast of Cape Fear, North Carolina, and the winds were measured at an elevation of approximately 80 feet. A sustained wind of 33 knots and a gust to 39 knots were reported from Ocracoke Island on the North Carolina Outer Banks at 0512 UTC 20 June.

The largest rainfall total, 5 inches, occurred in Georgetown County, South Carolina. Several areas over the coastal plains of South Carolina and North Carolina reported between 2 and 4 inches.

Surf as high as 5 to 7 feet occurred off the North Carolina coast in the vicinity of Cape Lookout. No significant beach erosion was reported.

c. Casualty and Damage Statistics

No reports of casualties or significant damage associated with Arthur have been received at the NHC.

d. Forecast and Warning Critique

Arthur was a tropical storm for only a day and a half, so no meaningful quantitative forecast evaluations are possible. The first three advisories indicated that the tropical cyclone would move into the Carolinas and dissipate, but thereafter the official track forecasts as well as the model guidance were fairly consistent in recurving Arthur around the western periphery of the Atlantic subtropical ridge.

The intensity forecasts were, in general, good. The tropical cyclone was never forecast to be more than a minimal tropical storm.

Table 2 lists the watches and warnings issued for Tropical Storm Arthur.

Table 1. Best track, Tropical Storm Arthur, 17 - 21 June, 1996

Date/Time (UTC)	Position		Pressure (mb)	Wind Speed (kt)	Stage
	Lat. (°N)	Lon. (°W)			
17/1800	26.8	77.8	1010	25	tropical depression
18/0000	27.7	78.3	1010	25	“
0600	28.6	78.8	1009	25	“
1200	29.7	78.8	1008	25	“
1800	30.6	78.7	1008	30	“
19/0000	31.5	78.7	1004	35	tropical storm
0600	32.3	78.6	1006	35	“
1200	33.2	78.1	1005	40	“
1800	33.9	77.3	1005	40	“
20/0000	34.7	76.4	1005	35	“
0600	35.5	75.4	1005	35	“
1200	36.4	74.1	1005	30	tropical depression
1800	36.9	72.5	1004	30	“
21/0000	37.3	70.3	1003	30	“
0600	37.3	66.5	1002	30	“
1200	37.5	62.0	1001	35	extratropical
1800	37.8	56.2	1000	45	“
22/0000	38.5	50.5	998	45	“
0600	40.0	47.0	995	45	“
1200	41.0	43.0	993	45	“
1800	42.5	40.0	992	45	“
23/0000	44.0	37.0	996	45	“
0600					absorbed
19/0000	31.5	78.7	1004	35	minimum pressure as a tropical storm
19/1200	33.2	78.1	1005	40	maximum wind as a tropical storm
19/1800	33.9	77.3	1005	40	maximum wind as a tropical storm
20/0000	34.7	76.4	1005	35	landfall near Cape Lookout on the North Carolina Outer Banks

Table 2. Watch and warning summary, Tropical Storm Arthur,
June 1996.

Date/time (UTC)	Action	Location
18/1500	tropical storm warning	Edisto Beach, SC to Cape Lookout, NC
18/1500	tropical storm watch	north of Cape Lookout, NC to NC/VA border including Pamlico and Albemarle Sounds
19/0900	tropical storm warning extended northward	north of Cape Lookout, NC to NC/VA border including Pamlico and Albemarle Sounds
19/0900	tropical storm warning discontinued	south of Cape Romain, SC
19/0900	tropical storm watch	NC/VA border to Cape Charles, VA including Virginia Beach
19/1500	tropical storm warning discontinued	south of Little River Inlet, SC
19/2100	tropical storm warning discontinued	southwest of New River Inlet, NC
19/2100	tropical storm watch discontinued	NC/VA border northward
20/0000	tropical storm warning discontinued	remainder of NC coast

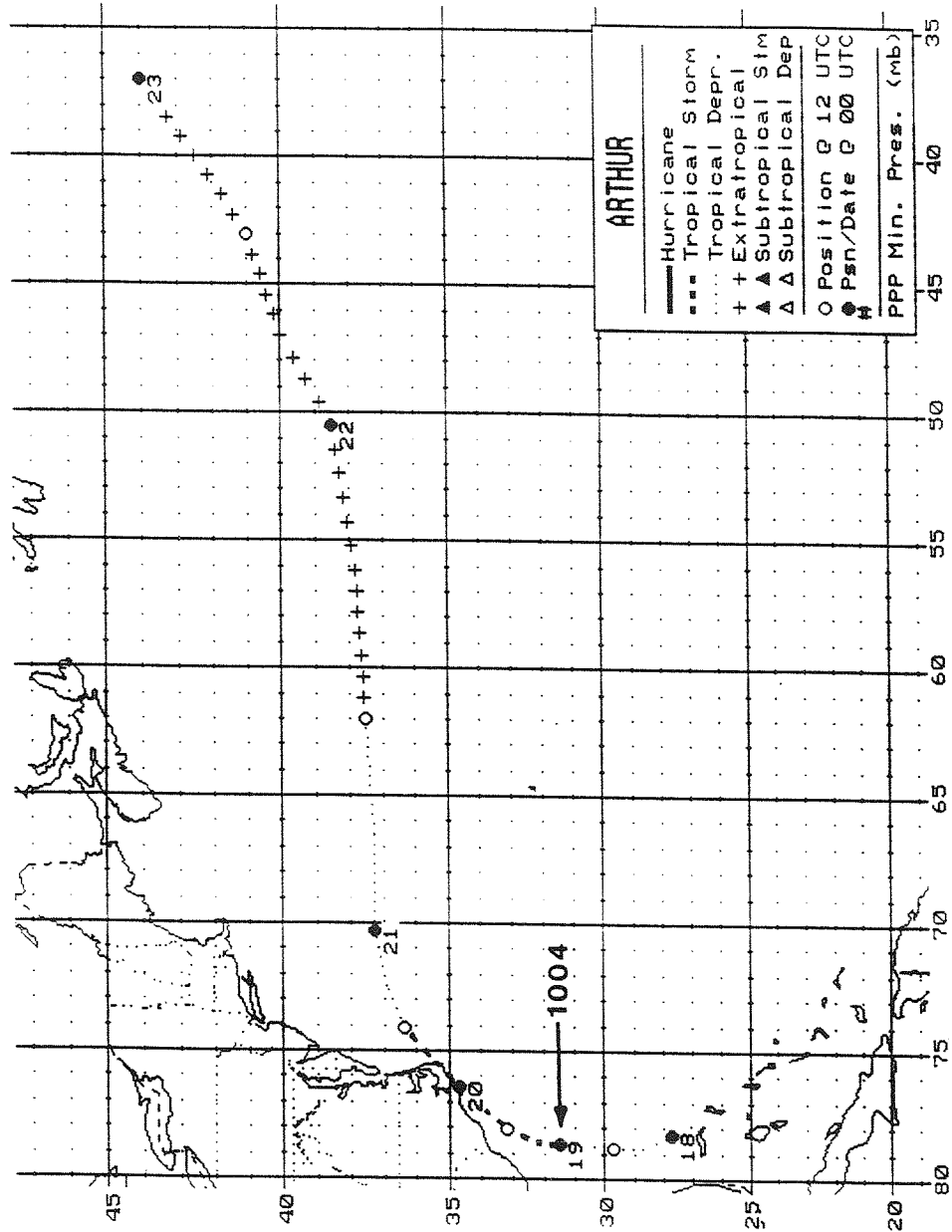


Figure 1. Best track positions for Tropical Storm Arthur, 17 - 21 June 1996.

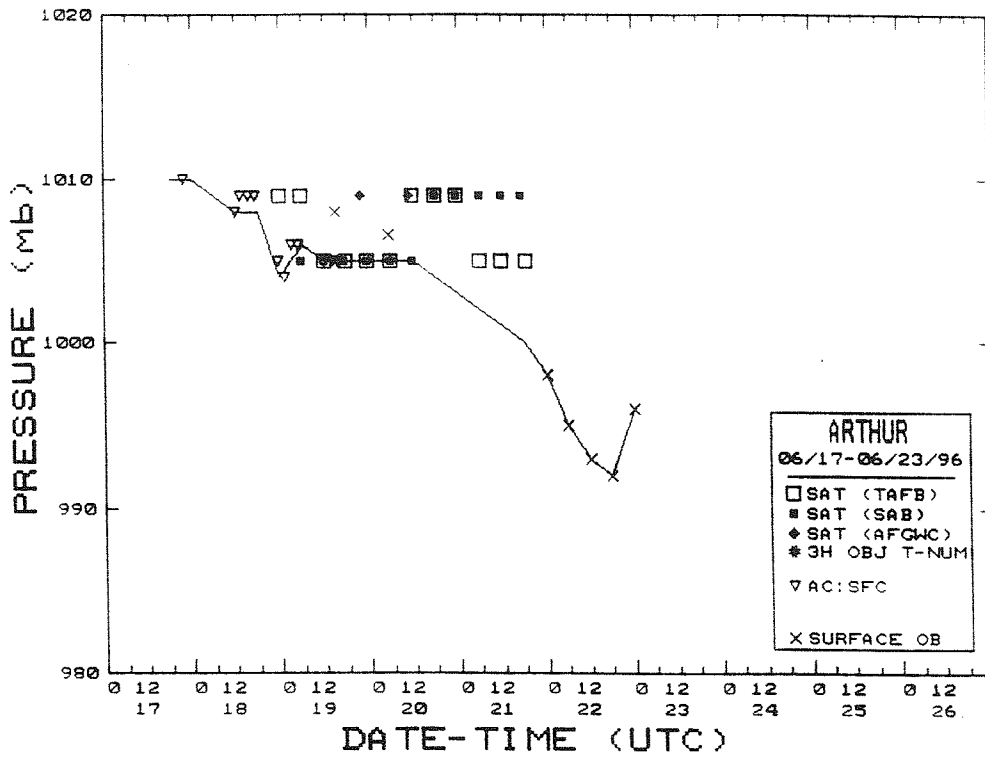


Figure 2. Best track minimum central pressure curve for Tropical Storm Arthur.

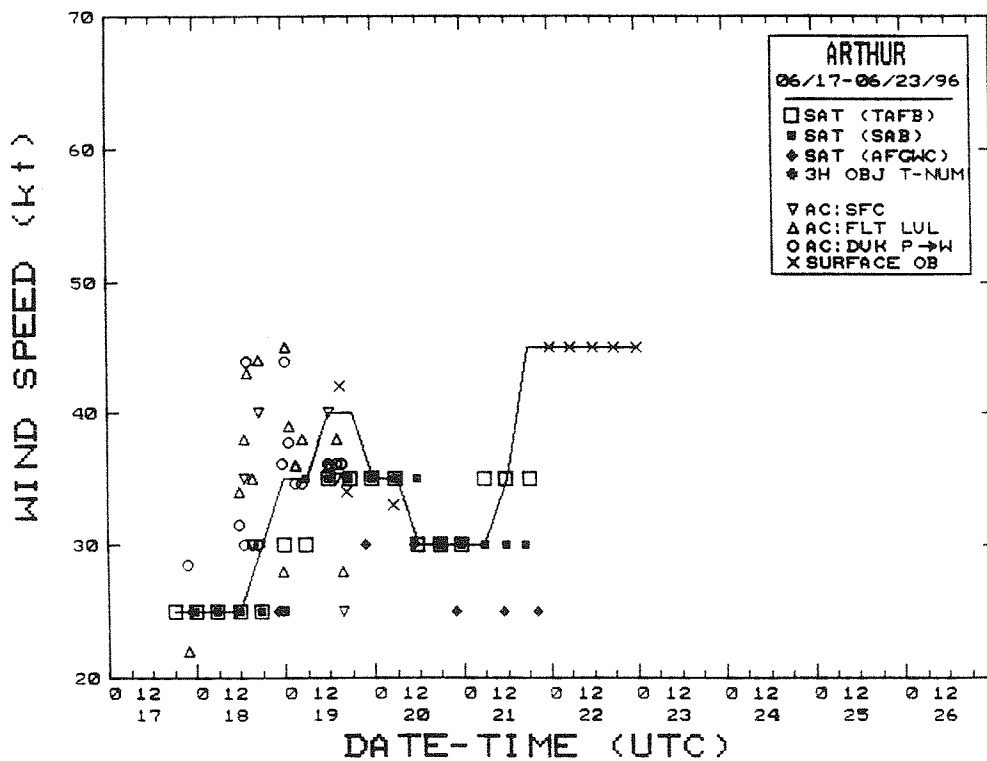


Figure 3. Best track maximum sustained wind speed curve for Tropical Storm Arthur.