Tropical Cyclone Report
Tropical Storm Arthur
14-16 July 2002

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Arthur was a tropical storm, with wind speeds up to 50 kt, that moved east-northeastward across the western North Atlantic Ocean.

a. Synoptic History

The origin of Arthur was a weak low-level circulation first detected in the eastern Gulf of Mexico on July 9th. This system was likely associated with a decaying frontal zone that had persisted in the area for several days. The circulation and associated low pressure meandered for a few days, then accelerated northeastward across the southeastern U.S. on the 13th. This was in response to a mid-level trough amplifying southward along the U.S. east coast.

The circulation moved along the coast of South and North Carolina on the 14th. By 1800 UTC of the 14th, the circulation and its associated convection were well enough organized to become Tropical Depression One, centered about 40 n mi west-southwest of Hatteras, North Carolina. The "best track" of the tropical cyclone's path begins on the 14th and is plotted in Fig. 1. Figures 2 and 3 are graphs of the wind and pressure histories as a function of time. Best track positions and intensities, every six hours, are listed in Table 1.

A mid-level low cut off from the westerlies and deepened as it dropped southward over the Canadian Maritimes. The depression responded by accelerating east-northeastward and slowly strengthening. It became a tropical storm on the 15th when its winds increased to 35 kt. By the time Arthur strengthened to its estimated peak winds of 50 kt on the 16th, it was centered about 350 n mi south of Nova Scotia and its forward speed was increasing to 35 kt. Arthur turned northward late on the 16th around the above-mentioned low and became extratropical as it moved northward over eastern Newfoundland. Thereafter, the extratropical storm was tracked until the 19th as it slowed and became nearly stationary between Newfoundland and Greenland and weakened below gale strength.

b. Meteorological Statistics

The best-track values of maximum 1-min, 10-m wind speeds, every six hours, are plotted in Table 2, along with satellite-based Dvorak technique wind speed estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA). Best-track minimum central pressures are plotted in Table 3, along with Dvorak technique pressure estimates. Selected ship and data buoy observations are also plotted in Figs. 2 and 3. In addition, several non-rain-contaminated ocean surface wind speeds in the 45- to 48-kt range were observed within

Arthur's circulation by the QuikSCAT scatterometer on the 15th and 16th. A Canadian data buoy 44141 observed a pressure of 997.5 mb as the center passed about 40 n mi to its south and also reported an 8-min wind speed of 39 kt with a gust to 52 kt as the center passed. The ship ***WESTON*** reported 44 kt on the 16th while located about 140 n mi south-southeast of the center of Arthur. Ship reports of wind speeds of 34 knots or greater are listed in Table 2.

Before Arthur became a tropical cyclone, its originating low pressure system spread heavy rain across portions of north Florida, Georgia and South Carolina on the 13th. Later, Arthur's extratropical stage produced rainfall over Newfoundland on the 17th ranging up to about one inch. Wind speeds along Newfoundland's east coast reached 34 kt at Bonavista on the 17th.

c. Casualty and Damage Statistics

There were no casualties or damage reported in association with Arthur.

d. Forecast and Warning Critique

Arthur was a tropical storm for less than 48 hours. Average official track forecast errors (number of cases in parentheses) for Arthur are 80 (5), 138 (3), and 184 (1) nautical miles for the 12-, 24-, and 36-hour forecast periods, respectively. These errors are considerably larger than the average official track errors for the 10-year period 1992-2001 of 43, 80, and 115 nautical miles. This is due primarily to the large increase in forward speed which was not correctly anticipated by the primary track guidance models nor by the official forecast.

Average official intensity forecast errors were 4, 7, and 5 knots for the 12-, 24-, and 36-hour forecasts, respectively. For comparison, the average official intensity forecast errors for the 10-year period 1992-2001 were 7, 11, and 14 knots.

Table 1. Best track for Tropical Storm Arthur, 14-16 July 2002.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
14 / 1800	34.3	76.8	1009	30	tropical depression
15 / 0000	35.0	75.1	1008	30	"
15 / 0600	35.5	73.3	1006	35	tropical storm
15 / 1200	36.1	71.0	1004	45	"
15 / 1800	36.8	68.2	1002	45	"
16 / 0000	37.9	65.1	1000	50	"
16 / 0600	38.6	61.7	998	50	"
16 / 1200	40.5	57.9	998	50	"
16 / 1800	42.5	54.5	997	50	"
17 / 0000	44.5	53.0	998	50	extratropical
17 / 0600	46.5	53.9	999	45	"
17 / 1200	48.0	54.0	1002	40	"
17 / 1800	49.0	53.0	1001	40	"
18 / 0000	50.5	52.5	999	40	"
18 / 0600	53.0	52.5	997	40	"
18 / 1200	55.5	53.0	995	35	"
18 / 1800	58.0	53.0	992	35	"
19 / 0000	57.0	52.0	996	35	"
19 / 0600	56.5	51.5	1000	35	"
19 / 1200	56.0	51.0	1005	35	"
16 / 1800	42.5	54.5	997	50	minimum pressure

Table 2. Selected ship reports with winds of at least 34 knots for Tropical Storm Arthur, 14-16 July 2002.

Date/Time (UTC)	***SHIP NAME*** or call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	pressure (mb)
16/0000	***WESTON***	35.7	64.1	200/44	1011.5
16/0000	***MAESK SANTES***	36.2	67.3	270/36	1011.0
16/1800	***BETSY***	39.8	53.2	220/37	1011.1
17/0600	P6038	46.4	48.4	100/35	1017.0
17/1800	***ALGOFAX***	45.7	59.9	xxx/41	1011.0

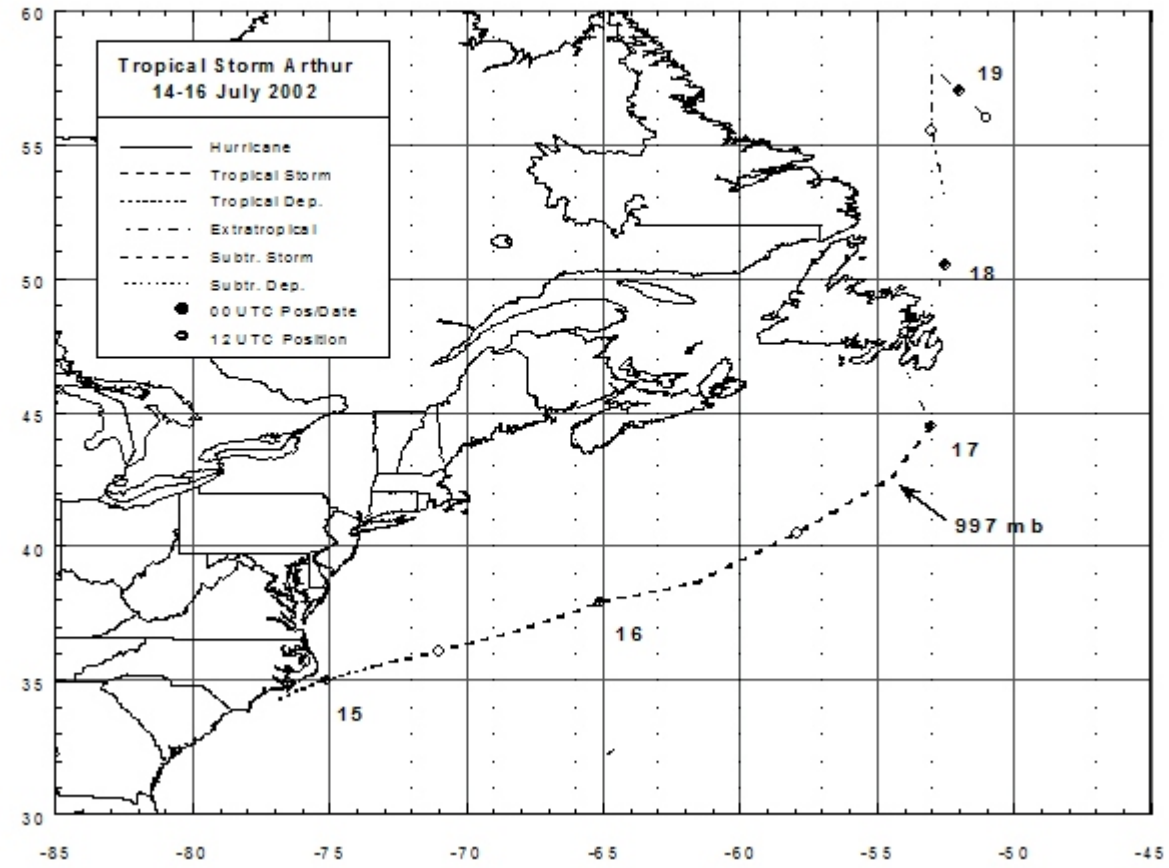

Figure 1. Best track positions for Tropical Storm Arthur, 14-16 July 2002. Arthur's extratropical stage track positions for 16-19 July are also plotted.

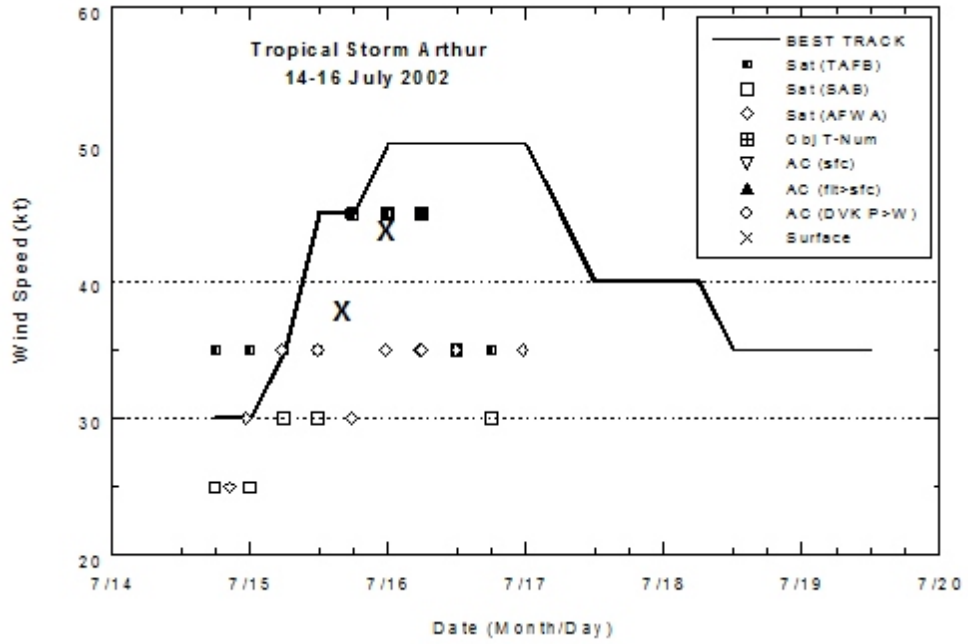

Figure 2. Selected wind speed observations and estimates and best-track maximum sustained surface wind speed curve for Tropical Storm Arthur, 14-16 July 2002. Arthur's extratropical stage best-track wind speeds for 16-19 July are also plotted.

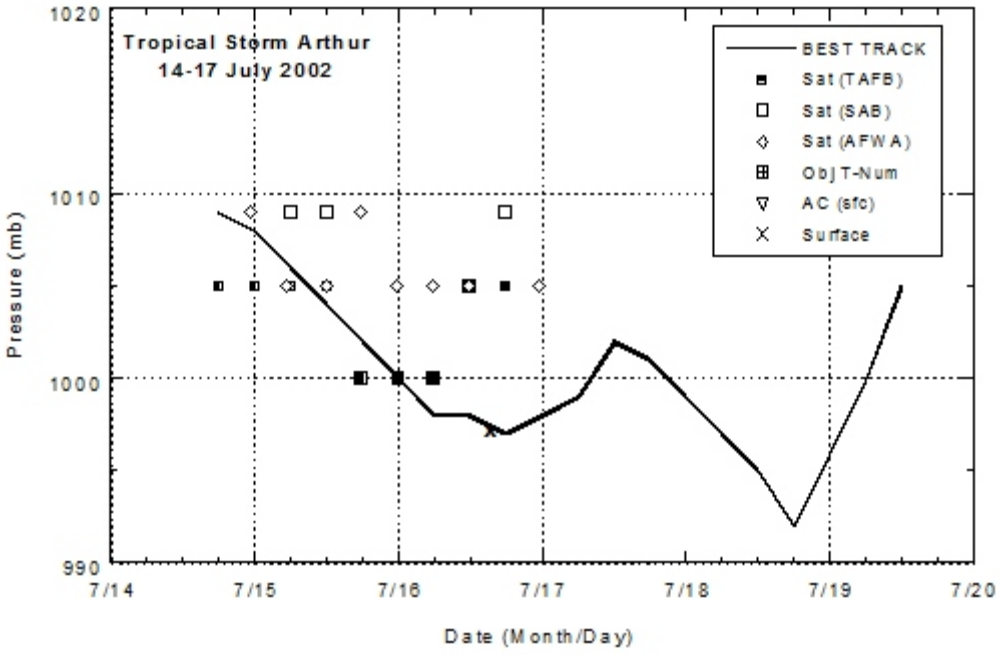

Figure 3. Selected pressure observations and estimates and best track minimum central pressure curve for Tropical Storm Arthur, 14-16 July 2002. Arthur's extratropical stage pressures for 16-19 July are also plotted.