HURRICANES OF 1952

GRADY NORTON
Weather Bureau Office, Miami, Fla.
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GENERAL SUMMARY

Hurricane activity in the Atlantic was below normal in 1952 for the first time since 1946. Six storms were charted and all of them attained hurricane force at some period in their histories. (See fig. 1.) Two of them would probably not have been discovered had it not been for the long arm of airplane reconnaissance because they remained over the Atlantic far to the east of the Lesser Antilles during their short life spans. The low hurricane activity was in keeping with past experience for summers with widespread drought over the eastern half of the United States. A study[1] of drought summers during the past half century indicates that on the average only about half as many hurricanes occur in the season following them as after normal or wet summers. This suggests that the general pressure distribution which causes widespread drought, reflects itself in lessened storm activity in the tropics as well.

As indicated above, only four of the hurricanes were charted west of 58° W. long. during the season, and only one of them reached the United States coast. This was the first storm of the season, designated "Able," which moved into South Carolina late on August 30, and advanced northward over the Atlantic Plain to die out over New England on September 2. Two persons lost their lives in South Carolina and one in Pennsylvania as an indirect result of this hurricane, while property and crop damage in the States affected has been estimated at $2,750,000, a very low damage figure. This hurricane was small and not unusually severe, but it had a small area of winds near 100 m. p. h. when it moved inland near Beaufort, S. C. The strongest winds occurred over a swampy area between Beaufort and Charleston, where there were few inhabitants and little property exposed [1].

The only other storm to strike land was hurricane "Fox" that passed over Cuba and the Bahama Islands in October. This was by far the most severe hurricane of the season when it reached the south Cuban coast 30 or 40 miles west of Cienfuegos. Lowest pressure was 933.6 mb. (27.57 inches) and maximum wind gusts reached 170 and 180 m. p. h. at the official weather station on Cayo Guano del Este just off the south Cuban coast. Aircraft flying into the hurricane reported torrential rain driven with such force by the wind that the paint was stripped from the nose and all leading surfaces of the plane, and turbulence was the most severe the crew had ever experienced. Fortunately no very large communities were hit in Cuba, but the rural areas affected were severely damaged. The excellent warning service is given credit for the fact that no lives were lost. Commander Millás of the National Observatory at Havana gave the Miami Hurricane Central the best possible cooperation, and the special surface and upper air observations furnished from Cuban stations made the excellent warnings possible. This was another of those very small but very severe hurricanes from the western Caribbean for which October is famous.

Hurricane Fox lost much of its violence in crossing Cuba, but retained winds of 100 m. p. h. or better as it moved on an erratic course through the Bahama Islands. (See fig. 2.) The erratic swing to east and east-southeast was not indicated by meteorological conditions, and even more unusual was its swing back northward to its normal course after reaching the vicinity of Watling Island.

The other two, of the four hurricanes that moved over the western Atlantic during the season, remained at sea and did not affect any land areas.

A total of 112 advisory bulletins was issued in connection with the season's storms, which was far below the number of recent years. Reconnaissance flights were correspondingly fewer than usual, and the work at the Central was the lightest since coordinated warning service and reconnaissance was established.

INDIVIDUAL HURRICANES

ABLE. August 25–September 2, 1952.—The first hurricane of the 1952 season was discovered as a slowly developing wave about 600 miles east of Puerto Rico on August 25. During the next several days, aircraft reported it to be a crescent-shaped, partially developed, squally wave, with winds of hurricane force on the northeastern side, but open in the southern semicircle, where winds were only about 25 knots. This state of development continued as it moved on a northwest course for about 2,000 miles until the 29th, when the first evidence of a more completed organization was observed. When it reached the vicinity of 30° N., 80° W., it turned northward, skirted the Georgia coast, and moved inland over South Carolina near Beaufort between 10 and 11 p. m., August 30. It was the

[1] An informal unpublished study.

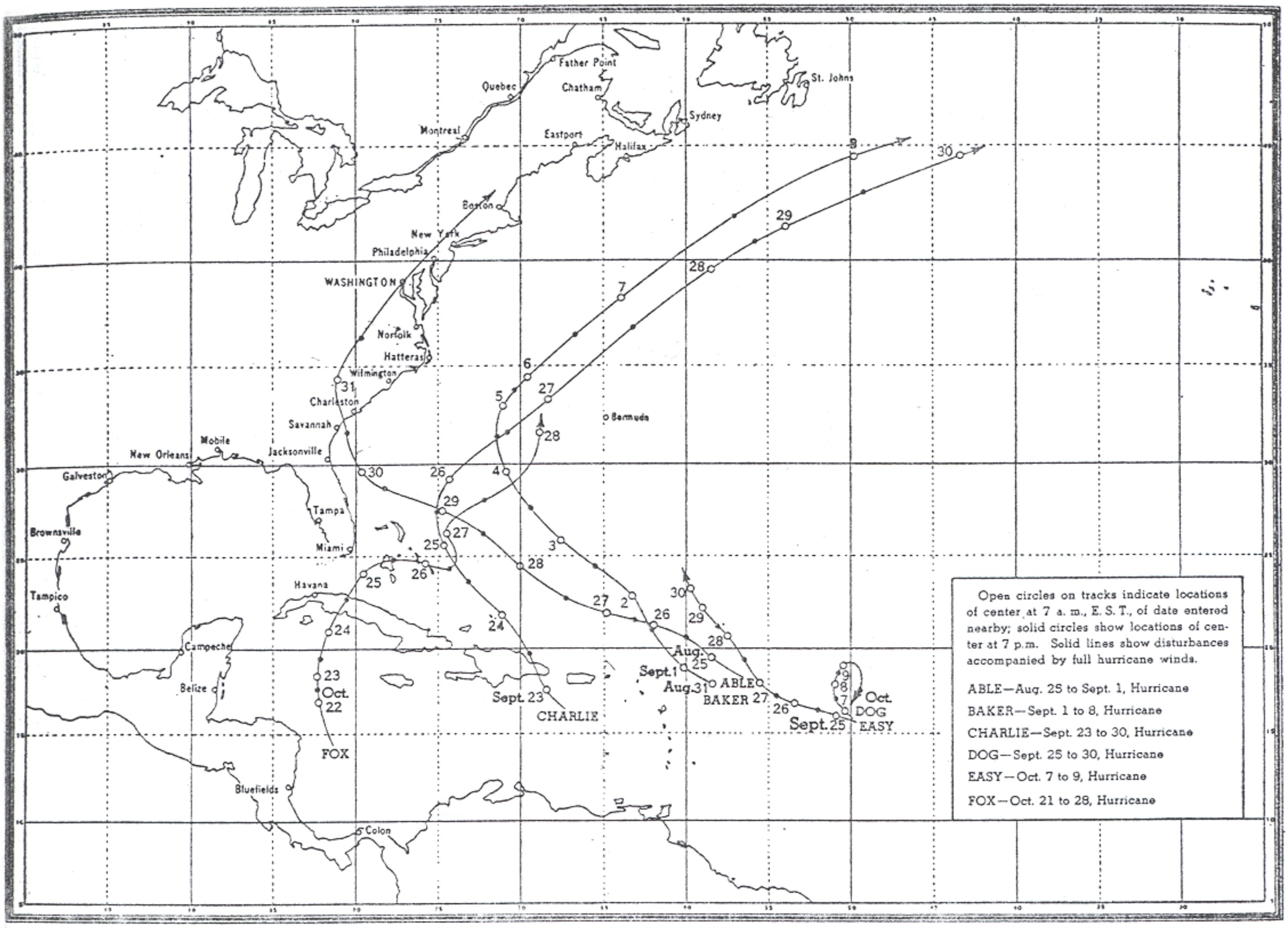

FIGURE 1.—Tracks of hurricanes observed during the 1952 season.

indirect cause of two deaths in South Carolina, and one death in Pennsylvania, and property and crop damage in the Atlantic States was estimated at $2,750,000. For an analysis of this hurricane and further detailed information, see *Monthly Weather Review* for August 1952, pages 138–143 [1].

BAKER. September 1–8, 1952.—The Norwegian S. S. *Fridtjof Nansen* located at 18°45′ N., 58°45′ W. in the early morning of September 1 sent a special report as follows: "Wind easterly force 7 to 8 in squalls, sea 5 increasing, barometer 30.02 inches at 0300Z, 29.90 at 0400Z. Fear tropical storm and have altered course to 70° 8 knots at 0400Z, after which barometer steady at 29.90 inches." This report was the first indication of the development of the second hurricane of the season. Reconnaissance aircraft dispatched to search later on the 1st, found that the storm had developed winds of hurricane force on its northern and eastern sides and was increasing and moving on a northwesterly course.

The course continued northwestward during the next several days, until it reached the vicinity of 32° N., 71° W., on September 5. Here it began curving along a course which carried the center about midway between Cape Hatteras and Bermuda on the 6th and then northeastward over the Atlantic. In the period September 2–6 winds were estimated at 100–115 m. p. h. with gusts to 140 m. p. h. This hurricane remained at sea and did not give strong winds at any land point. It moved out over the Atlantic several hundred miles south of Newfoundland on September 7 and 8, and passed beyond aircraft range. A total of 25 advisories were broadcast enabling shipping to avoid the hurricane or maneuver to miss the strongest part, and no reports of marine damage have been received.

CHARLIE. September 23–29, 1952.—An easterly wave moved into the eastern end of the Carribean Sea on September 22 and showed some signs of developing a center just south of Mona Passage on September 23. Just prior to this, the wave caused heavy flooding rains on Puerto Rico September 22–23, which caused four deaths and damage estimated at $1,000,000, but no strong winds were reported [2].

The incipient center noted on the 23d moved northwestward over the Dominican Republic during the day and lost its identity, but on the 24th there were signs of a re-forming center near Turks Island, with strongest winds about 20 to 30 knots. An airplane dispatched to reconnoiter the area east of the Bahama Islands on the 25th found the small hurricane with winds 80 to 90 knots near 26° N., 74°30′ W., moving north-northwestward. It recurved to the northeast on the 26th and passed some distance to the northwest of Bermuda on the 27th, continuing northeastward over the Atlantic to pass 400 miles or more southeast of Newfoundland on September 29 and 30. Strongest winds in connection with this hurricane were around 120 to 125 m. p. h. estimated by aircraft on the 26th. Thereafter it gradually lost force. With the exception of the flood damage noted above in Puerto Rico, no damage has been reported.

DOG. September 25–30, 1952.—An easterly wave was discovered over the Atlantic about 700 miles east of the Lesser Antilles on September 25. It showed signs of intensifying, and on the 26th aircraft searching the area encountered squalls of 68 knots over a considerable area in the northern quadrant of the wave around 16° to 18° N., and 54° W. Winds in the northeast quadrant were estimated at 100 m. p. h., but a closed center of circulation could not be found. By the 27th winds had weakened to 45 knots and it continued losing force as it moved northwestward and finally died out by September 30 near 23° N., 60° W. While winds of hurricane force in squalls were reported at one time, all evidence indicates that this storm remained a wave and did not develop an organized center of circulation.

EASY. October 7–9, 1952.—This storm flared briefly to hurricane intensity and then as rapidly dissipated over the Atlantic about 700 miles east of Antigua, B. W. I. It was located by reconnaissance aircraft on October 7 with maximum winds of only about 40 knots, but on the 8th, the plane encountered winds of 95 knots near the center. The flight on October 9 found that winds had dropped to 42 knots and thereafter it died out. The hurricane moved very little during its existence, but remained in the vicinity of 17°–18° N., and 50°–51° W. Without the extension of our view provided by B–29 reconnaissance planes, this hurricane would doubtless have gone undetected.

FOX. October 22–28, 1952.—The last hurricane of the 1952 season was the most severe. It developed from a perturbation on the intertropical convergence zone that was first noted in the western Caribbean Sea north of the Canal Zone on October 21. It increased to hurricane force on the 22d when it was about 150 miles east of Swan Island, and thereafter moved northward with increasing intensity and crossed Cuba on the 24th as the very severe small hurricane described earlier in this article. The passage over Cuba was through the rural sugar cane plantation section, and it was reported that 36 of Cuba's 161 sugar mills were in the storm area and suffered damage in addition to the heavy damage to the cane crops. The largest community struck was the inland town of Aguada de Pasajeros (25,000 population) where about 600 homes were destroyed, and a thousand or more damaged. No dollar estimate of the damage has been received, but no lives were lost. Strongest winds reported 180 m. p. h. and lowest pressure 933.6 mb. (27.57 inches) at Cayo Guano del Este.

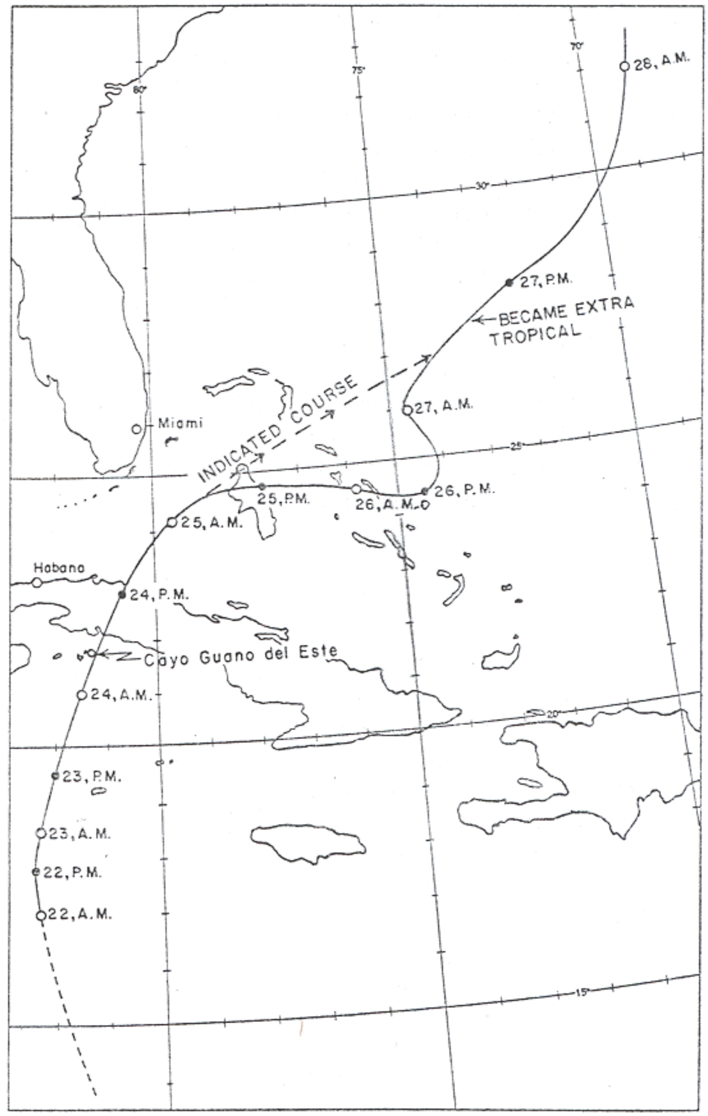

FIGURE 2.—Track of hurricane "Fox," October 1952. Note unusual path between 25th and 27th.

In the Bahamas, winds of 100 m. p. h. or a little higher attended the erratic course. The station on Cat Island reported 110 m. p. h. for the strongest wind, and about 100 m. p. h. was reached on Watling and Eleuthera Islands, and a few others. In the southern part of Eleuthera Island crops suffered severe damage from wind and heavy rain. It was estimated that 30 percent of the tomato crop was destroyed. After clearing the Bahamas the storm swung back north to resume a more normal course, it was joined by an old polar front and became a wave disturbance of extra-tropical character. It moved northeastward thereafter as a disturbance of no great violence and passed to the northwest of Bermuda on October 28. (See fig. 2.)

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HURRICANE ABLE, 1952

R. B. ROSS

WBAN Analysis Center, U. S. Weather Bureau, Washington, D. C

INTRODUCTION

The Miami Weather Bureau Office issued its first advisory for storm Able on August 25, 1952. Navy aerial reconnaissance had reported squally conditions with a poorly defined center located at 20° N. latitude and 59° W. longitude (about 420 miles east-northeast of San Juan, Puerto Rico). The storm, moving toward the west-northwest, developed hurricane force winds in squalls on August 27. Movement continued in this direction until the storm reached a point east-southeast of Jacksonville, Fla., August 30. Then as recurvature took place, the storm became a fully developed hurricane. It then moved toward the north and crossed the South Carolina coastline August 31. After moving inland this storm maintained its identity as a closed circulation as it continued up through the Atlantic Seaboard States into Maine where it finally dissipated. Hurricane tracks dating back to the beginning of the 19th century indicate that the path taken by this storm (fig. 1) was unusual. Tropical storm tracks, as reproduced by Tannehill [1], show one storm, in August 1893, with a track almost identical to the path taken by storm Able and only two other tracks with some similarity. Storm Able took a toll of two lives and left considerable damage in its wake as a result of heavy precipitation and high winds.

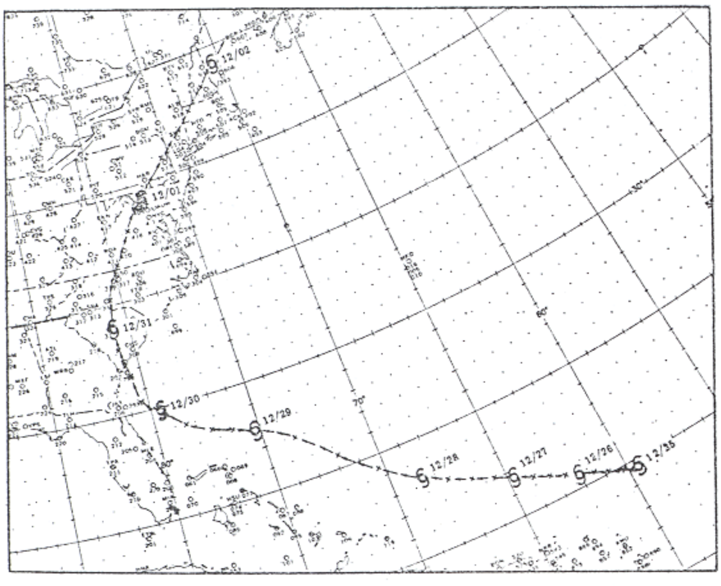

Figure 1.—Track of tropical storm Able. Hurricane symbols indicate 24-hour positions. Intervening 6-hour positions are indicated by an "X". Plotted number groups indicate time and date (GMT/Date) of positions.

EARLY DEVELOPMENT AND MOVEMENT

Storm Able originated from a development on a wave in the easterlies. When discovered on August 25, organization of the storm circulation was incomplete. Development was slow and until August 29 the southern semi-circle of the storm remained open with observed winds of not over 25 knots. The first winds of hurricane force, observed by aerial reconnaissance, were reported in squalls located in the northern semi-circle of the storm on August 27. On August 30, 1952, storm Able slowed down in its forward movement. Intensification with the formation of a definite eye took place and indications of recurvature were noted. The storm at this point was located about 130 miles east-southeast of Jacksonville, Fla. (fig. 2). Following recurvature the hurricane moved toward the north and crossed the South Carolina coast at Beaufort.

An interesting feature of storm Able, after recurvature took place, was the report of an apparent double eye structure. In a post-flight summary August 30, Navy reconnaissance reported a principal eye of 38 miles diameter and a secondary eye located just a few miles to

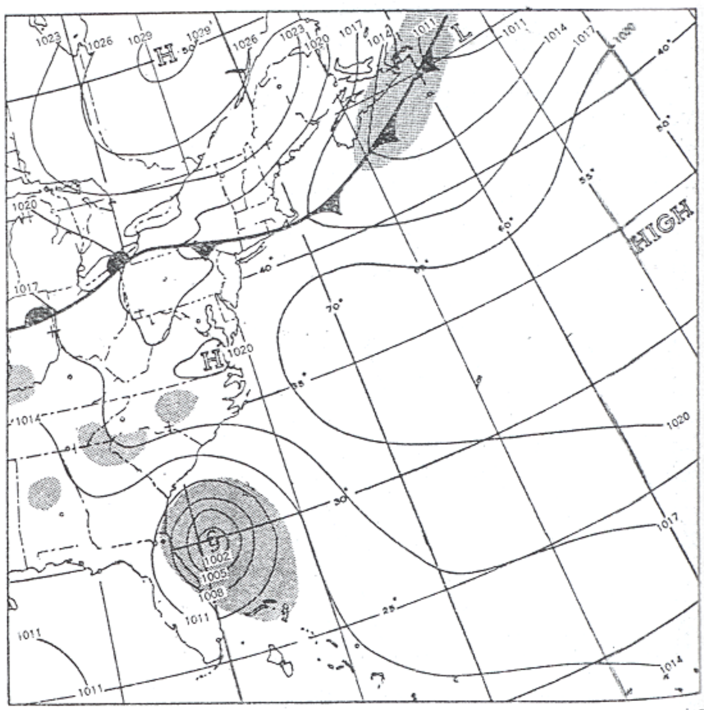

Figure 2.—Surface weather map for 1230 GMT, August 30, 1952. Shading indicates areas of active precipitation.

the southwest of the principal eye. Again, on August 31 a post-flight summary verified the existence of a secondary eye in the same relative position. This same summary reported maximum winds of 110 knots, the highest winds encountered during the existence of the storm.

RECURVATURE AND STEERING

At the time recurvature was indicated, the determination of the exact path that the storm might take posed a difficult problem. However, there were certain significant features in the synoptic situation which indicated that the storm might move with a more northerly component.

On August 30 a wave developed on a cold front just to the south of Newfoundland. Rapid cyclogenesis, associated with a strong surge of cold air aloft in the area, caused this wave to develop into a storm of major proportions within 24 hours (figs. 2 and 3). Although the entire wave structure is not shown in the figures, some idea of the intensity of the development is portrayed. With the intensification of this surface wave, a deepening and an apparent retrogression of the associated stationary trough aloft took place (figs. 4, 5, and 6). The upper air ridge located to the west of the trough, as shown in this sequence of 400-mb. charts, was displaced to the south and west, perhaps limiting the sharpness of the recurvature of the storm.

Another feature that may have influenced the path taken by storm Able, was a trough located over the Mississippi River region (see Boyce et al. [2]). In view of the weak circulation aloft in the immediate vicinity of storm Able, however, evidence that the steering was influenced by this trough to the west is not conclusive. Still another feature favorable (see [2]) for recurvature of the storm was the southward trend of the maximum westerlies at 600 mb. at this time as shown in figure 7.

Warm tongue steering of tropical cyclones has been suggested by Simpson [3]. The difference in height between the 700- and 500-mb. pressure surfaces appears to give the best results. Simpson says:

> "The analysis of temperature fields for this intermediate layer reveals that a tongue of warmer, lighter air is associated with the moving tropical cyclone and extends from 800 to 1200 miles in advance of the storm. The major axis of this tongue of warm air is parallel to the instantaneous direction of storm movement. Experience in testing this effect has shown that a good lag correlation exists between the present orientation of the warm tongue and the future path of the storm. In 139 synoptic cases analyzed the 24-hour movement given by this simple steering principle differed seriously from the observed movement in only four instances, and on many occasions important changes in direction were indicated as much as 48-hr. in advance."

To examine the warm tongue steering effect, thickness charts for the layer between 500 and 700 mb. for 0300 GMT on August 30, 31, and September 1, 1952, were constructed (figs. 8, 9, and 10). The path that the storm might follow is not definitely indicated by the first of these figures. The following two figures, however, clearly show that the major axis of the warm tongue was almost identical to the track taken by the storm (fig. 1).

Forecasters commonly make use of the high level wind flow to determine the future direction of motion of hurricanes. After reading a draft of this article, Mr. Grady Norton, Meteorologist in Charge of the Miami Weather Bureau Office, wrote, ". . . we thought this was a very good example of high-level wind 'steering'." Pointing out that wind steering is never used for longer than 30-hour periods, he further stated that their warnings for this hurricane were based on the winds at the 30,000- and 35,000-foot levels, where the hurricane circulation was absent. Figure 11 is a reproduction of a copy, furnished by Mr. Norton, of the 35,000-foot winds aloft working chart made at the Miami office at the time. Comparison of figures 1 and 11 reveals that the streamline through the hurricane is close to the path of the storm up to the time it passed inland about 24 hours later.

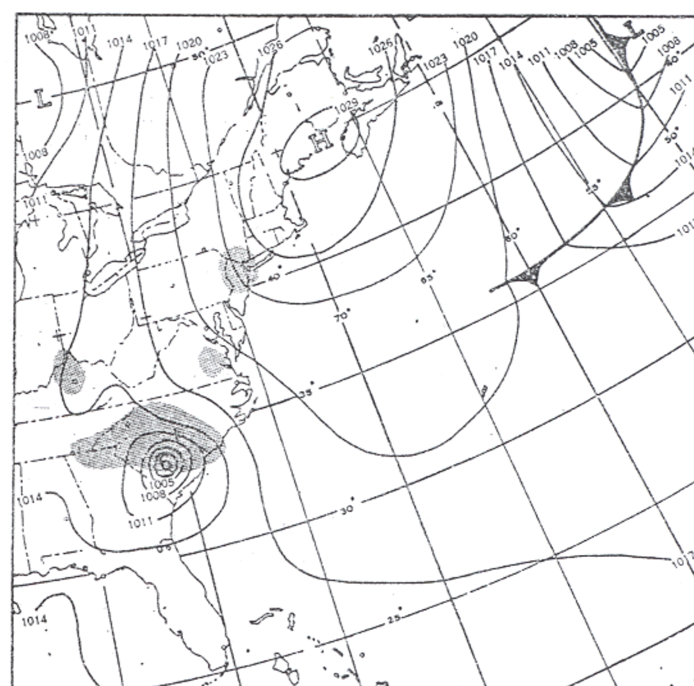

FIGURE 3.—Surface weather map for 1230 GMT, August 31, 1952.

THE STORM INLAND

On August 31, 1952 Navy reconnaissance reported the northwest edge of the storm's eye over the coastline at 0255 GMT. By 0345 GMT the eye of the storm had moved inland. A vertical cross section (fig. 12) was constructed using 0300 GMT, August 31, 1952 radiosonde data (very close to the time storm Able crossed the coastline). The stations used were Jacksonville, Fla., Charleston, S. C., and Greensboro, N. C. Unfortunately the Charleston sounding ended just short of the 500-mb. level so details of the structure above that level are missing. The eye of the storm passed close to, but not over, Charleston, so the central structure is not known. Arakawa [4] shows in detail the vertical structure of a mature typhoon. The data available to him consisted of a large number of radiosonde and wind observations from a network of closely spaced stations with one radiosonde flight near the core of the typhoon. According to Arakawa there is descending motion within the core and ascending motion just outside the core of the storm. The vertical cross section constructed for storm Able, although it does not show the central structure, shows cooling in the vicinity of Charleston which may be attributed to the vertical motion near the eye of the storm and to the heavy precipitation in advance of the eye. The lapse rate and the dew point curves for Charleston at 0300 GMT on the 31st are very similar to the findings of Jordan [5] on the low level structure of the typhoon.

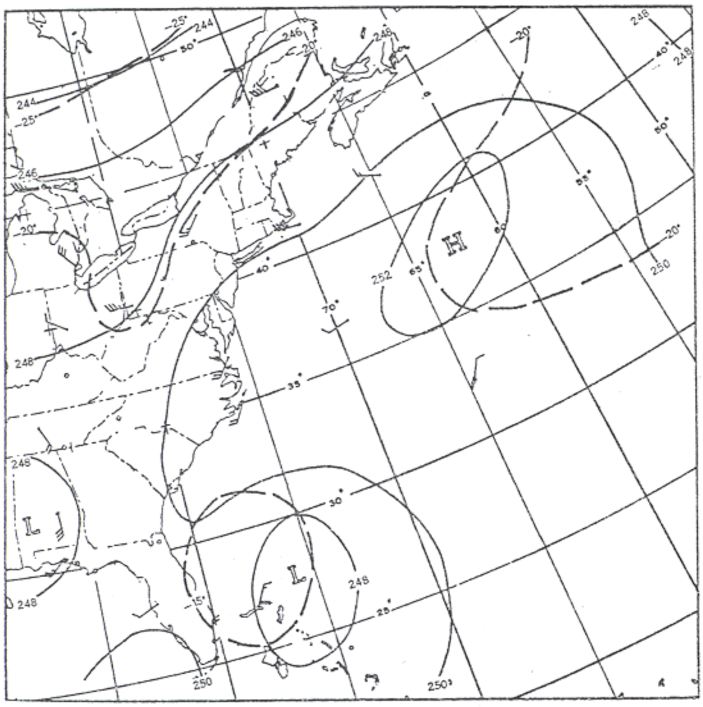

FIGURE 4.—400-mb. chart for 1500 GMT, August 29, 1952. Contours (solid lines) at 200-foot intervals are labeled in hundreds of geopotential feet. Isotherms (dashed lines) are at intervals of 5° C. Barbs on wind shafts are for wind speeds in knots; full barb for every 10 knots and half barb for 5 knots.

The following is quoted from the preliminary report on storm Able by Mr. Grady Norton:

> "Beaufort was in the western edge of the calm center with unofficial pressure of 29.09 inches (985 mb.) and strongest wind 80 to 90 m. p. h.

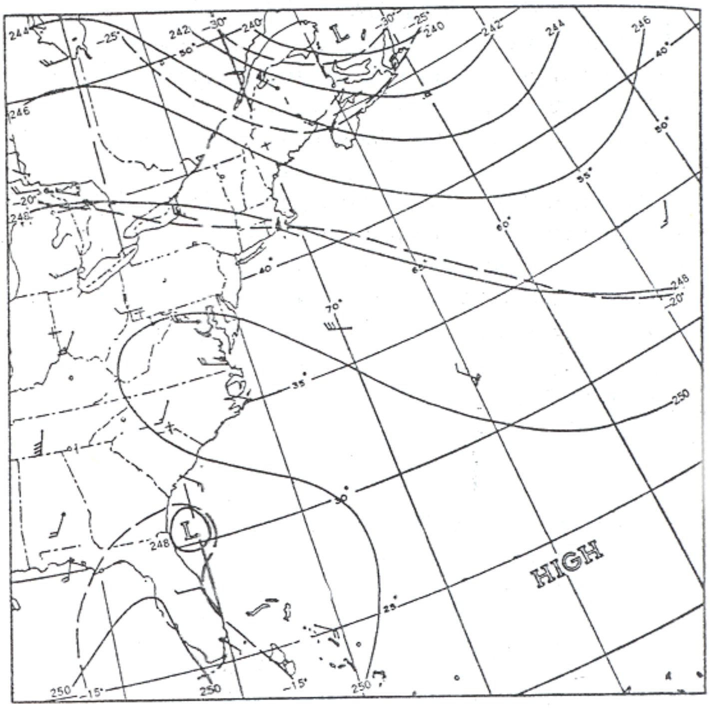

FIGURE 5.—400-mb. chart for 1500 GMT, August 30, 1952.

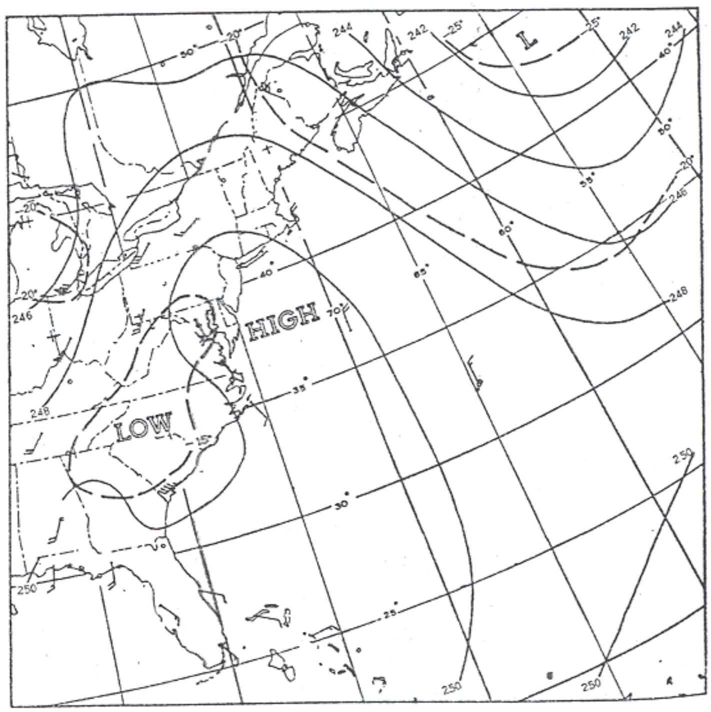

FIGURE 6.—400-mb. chart for 1500 GMT, August 31, 1952.

from WSW after the lull, which lasted about 10 minutes from 10:20 to 10:30 p. m. The strongest wind would be expected on the right or eastern side of the eye, but this was over the marsh and swamplands between Beaufort and Charleston where no measurements were obtainable. At Charleston, about 50 miles east of the center, the wind reached 63 m. p. h., while at Savannah, about 30 miles west, the highest gusts were only 35 m. p. h.

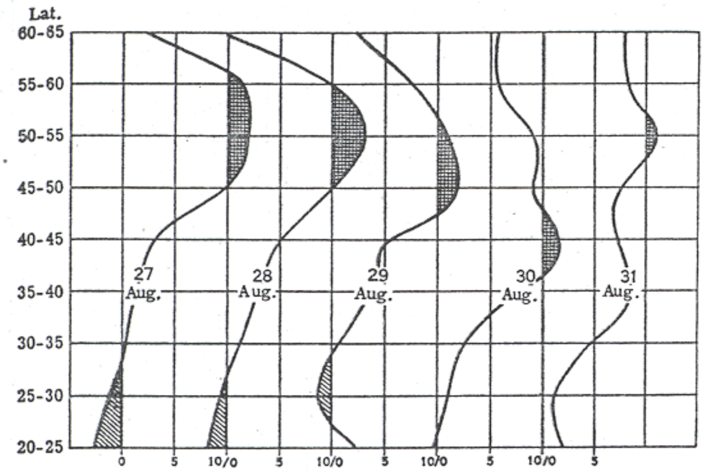

Figure 7.—Zonal wind profile curves at the 600-mb. level for the zone between 20° W. and 135° W. longitude. Curves derived by computing westerly component of the average wind for intervals of 5° of latitude. Magnitude of the westerlies is in degrees of latitude per day.

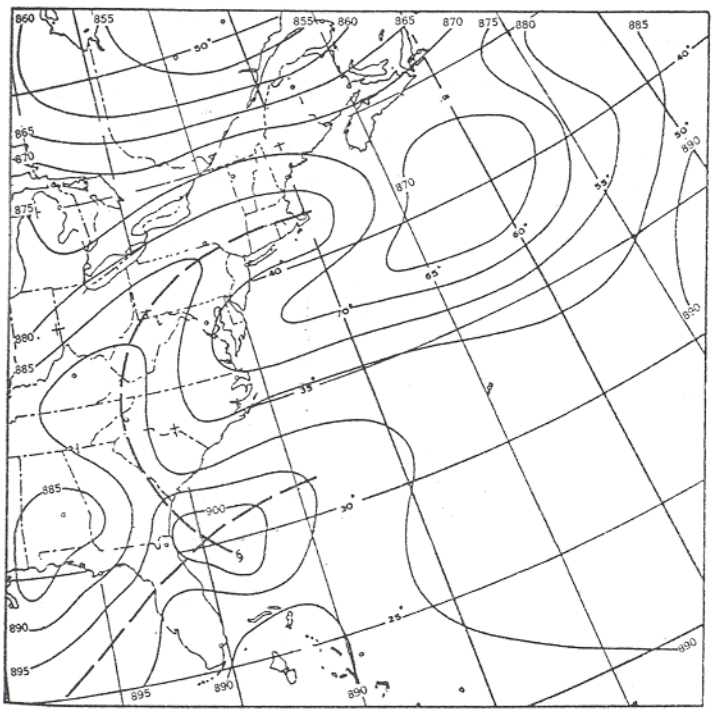

Figure 8.—Height difference chart between 700 and 500 mb. for 0300 GMT, August 30, 1952. Isopleths of mean virtual temperature (solid lines) are labeled in terms of height difference for 50-foot intervals. Axis of warm tongue indicated by heavy dashed line.

"Damage was estimated at about $2,200,000 in South Carolina, divided roughly $500,000 to property, $200,000 to communications, and $1,500,000 to crops. The crop damage was most-

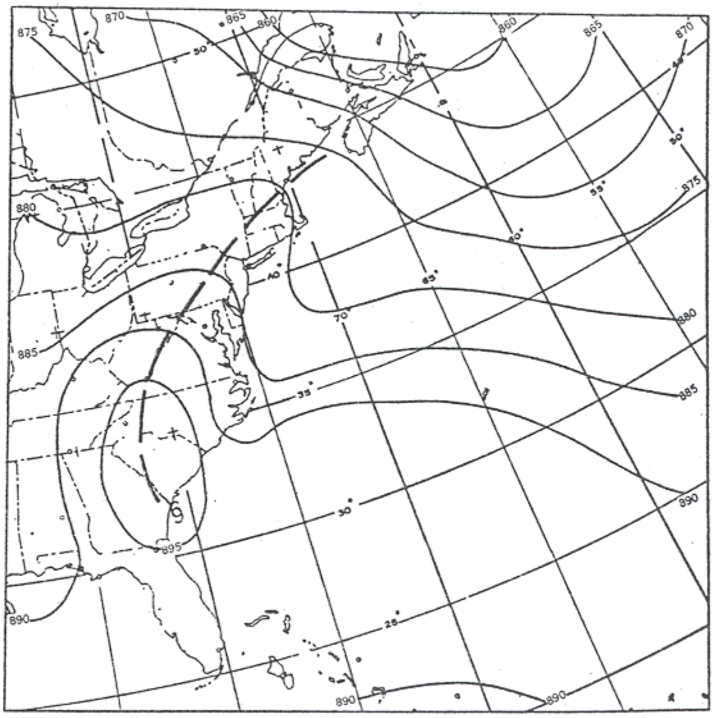

Figure 9.—Height difference chart between 700 and 500 mb. for 0300 GMT, August 31, 1952.

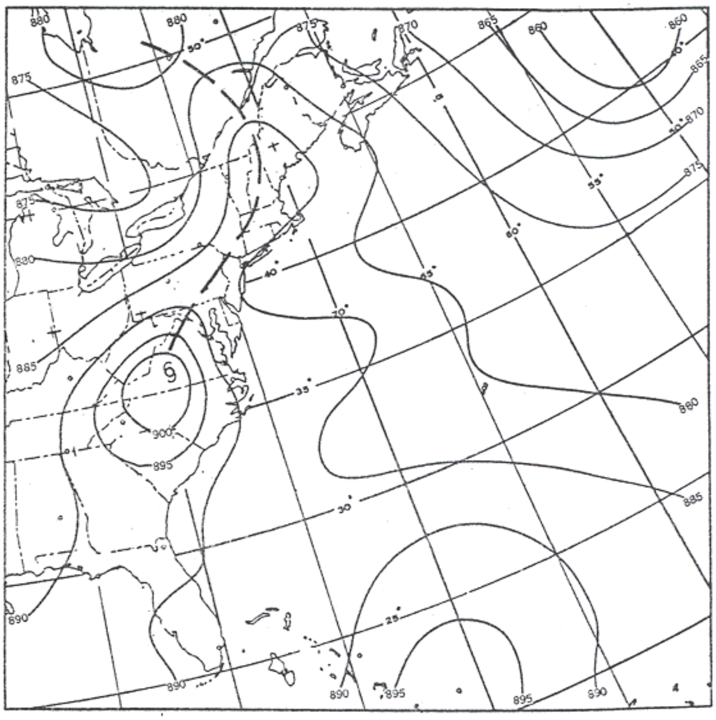

Figure 10.—Height difference chart between 700 and 500 mb. 0300 GMT, September 1, 1952.

ly to open cotton blown on the ground and damaged. Most of it was salvaged but beating by wind and rain in dirt lowered grade and price.

"In North Carolina, damage was given as 'minor' or 'light'. Highest winds over a rather widespread area of the State ranged around 40 m. p. h. and did little damage. A small tornado occurred in connection with the passage of the weakened hurricane in Stokes county and damaged a number of farm buildings. Torrential rains caused some flooding of lowlands, and a number of highways were flooded for a short time, and a few small bridges and embankments were washed out. The total actual damage probably did not exceed $50,000.

"Two persons lost their lives in the hurricane in South Carolina, one man was killed when he tried to remove a live wire that had fallen on his automobile, while another was killed when his car was

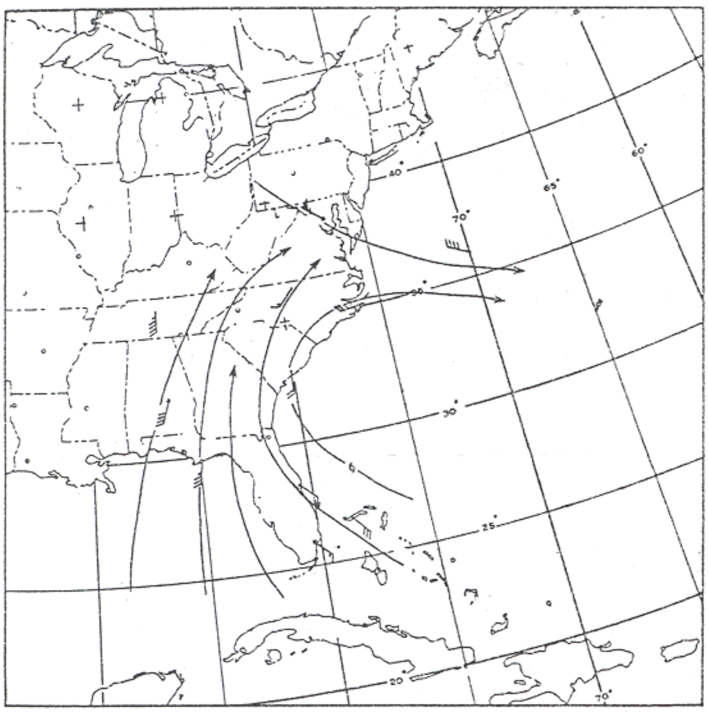

FIGURE 11.—Winds and streamlines at 35,000 feet, 0300 GMT, August 30, 1952. The hurricane symbol shows the surface position of the storm at this time.

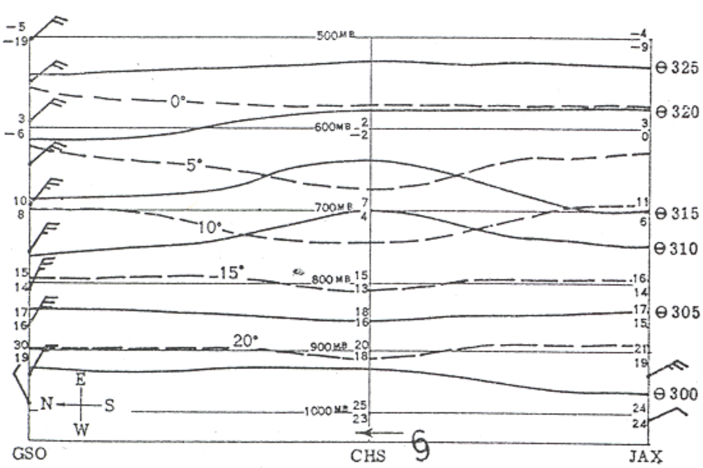

FIGURE 12.—Vertical cross section through hurricane Able for 0300 GMT, August 31, 1952. Temperature (dashed lines) is in ° C., potential temperature (solid lines) in ° A. Temperature and temperature of dew point in ° C. is shown at significant levels. Barbs on wind shafts are for wind speeds in knots; full barb for every 10 knots and half barb for 5 knots.

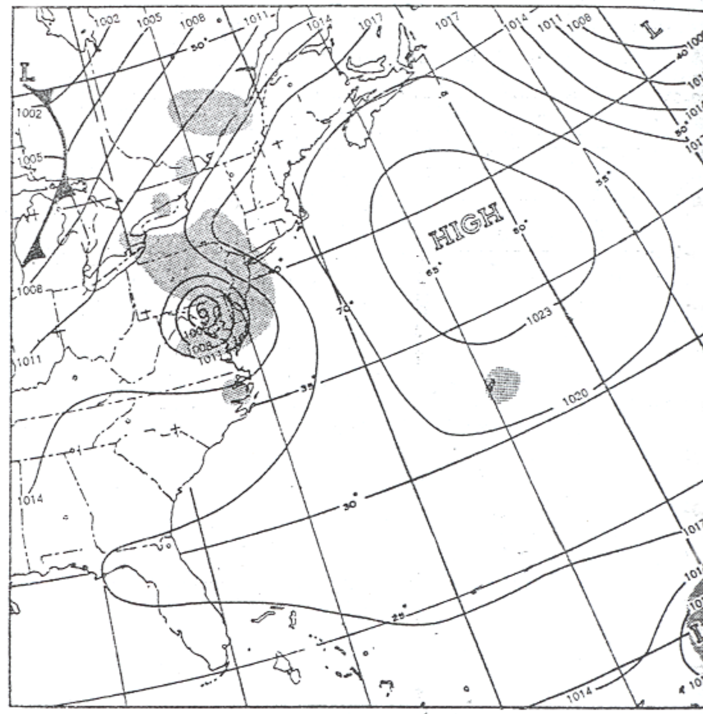

FIGURE 13.—Surface weather map for 1230 GMT, September 1, 1952.

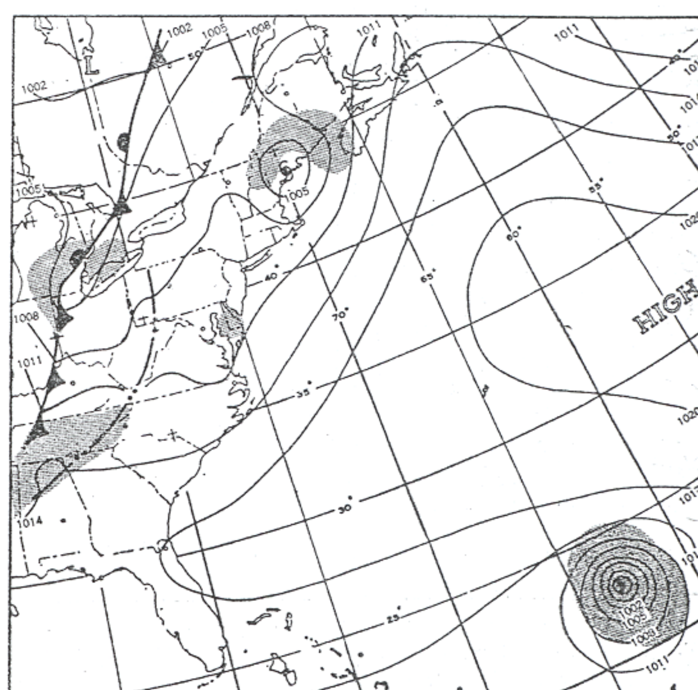

FIGURE 14.—Surface weather map for 1230 GMT, September 2, 1952.

wrecked in the blinding rain when it struck a tree that had fallen on the highway."

The storm center as shown in figure 3 was located just to the northeast of Columbia, S. C., at 1230 GMT, August 31, 1952; 24 hours later the center had moved to Frederick, Md., northwest of Washington, D. C. (fig. 13). The storm in the Washington, D. C., area was attended by winds 35 to 40 m. p. h., with occasional gusts up to 50 m. p. h. The peak gust reported at Washington National Airport was 60 m. p. h. A small tornado did considerable damage to dwellings at Franconia, Va., in Fairfax County. A tornado, which may have been the same one also struck with destructive force at Potomac, Md. Rainfall was heavy, ranging from 2 to over 3 inches. Property damage done in the area was estimated to be in excess of $500,000, caused primarily by flooding and the destructive force of the tornado. Falling trees and branches disrupted power and telephone facilities. There were no reports of personal injuries.

After leaving the Washington area the storm moved up into the New England States and was centered just to the northwest of Portland, Maine, at 1230 GMT, September 2, 1952 (fig. 14). It was in this area that the storm finally lost its closed circulation and dissipated. Pennsylvania, New York, and the New England States experienced winds of 30 to 40 m. p. h., with gusts to 50 m. p. h., with passage of the storm. Rainfall was moderate to heavy, resulting in some flooding in localized sections. Some unofficial rainfall amounts are shown in table 1 for stations affected by the storm.

Table 1.—*Some unofficial rainfall amounts associated with storm Able*

Station	Amount in inches	Station	Amount in inches
Jacksonville, Fla	1.69	Baltimore, Md	4.27
Savannah, Ga	1.16	Frederick, Md	3.70
Charleston, S. C	2.01	Harrisburg, Pa	3.60
Myrtle Beach, S. C	4.75	Allentown, Pa	5.08
Florence, S. C	3.83	Teterboro, N. J	2.07
Columbia, S. C	1.69	New York, N. Y	1.20
Charlotte, N. C	3.76	Albany, N. Y	2.47
Fort Bragg, N. C	6.33	Pittsfield, Mass	2.77
Raleigh, N. C	3.66	Chicoppee Falls, Mass	1.47
Greensboro, N. C	2.67	Summerset, Vt	3.27
Roanoke, Va	2.61	Montpelier, Vt	2.82
Lynchburg, Va	2.52	Mt. Washington, N. H	2.10
Gordonsville, Va	2.55	Portland, Maine	1.15
Martinsburg, W. Va	3.72	Rumford, Maine	2.37
Washington, D. C	3.47		

Storm Able, although never really developing into a large storm over the ocean maintained its circulation and identity as a tropical storm over a long land trajectory. Two important features can account for this. First, since the trajectory remained east of the Appalachian Mountains, the storm's circulation was not distorted appreciably by the terrain. Secondly, and of perhaps greater importance, the general circulation over the eastern seaboard, prior to and during the time the storm was inland, was characterized by southerly flow bringing warm moist tropical air into the area. The dew point temperatures ranged in the seventies as far north as New York City. This tropical maritime air supplied the energy required by the storm to maintain itself.

It is interesting to note that the second hurricane of the season, storm Baker, developed in the same region in which storm Able originated. This fully developed hurricane is shown inthe southeastern corner of figure 14. Initially, storm Baker followed very closely the track taken by Able but recurved farther to the east and moved to the north-northeast well off the Atlantic coastline.

ACKNOWLEDGMENTS

The writer is indebted to Mr. Grady Norton and Mr. Joseph Vederman for their helpful suggestions and review of the manuscript.

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