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FORECASTS AND WARNINGS.

By Prof. P. H. Bixhlow, in charge of Forecast Division.

WIND SIGNALS.

No storm signals were ordered on the Pacific coast and the Great Lakes during August, 1898, and no severe wind storms appeared during the month in the West Indies or over the Caribbean Sea.

Two rather severe storms visited the southeastern coasts of the United States, one passing over western Florida the night of the 2-3d, and the other crossing the Georgia and southern South Carolina coasts the night of the 30th-31st.

The Florida storm first appeared as a feeble disturbance near Jupiter on the night of the 1st, and passed thence northward to the vicinity of Tampa by the morning of the 2d. Anticipating a development of strength on the part of this disturbance information signals were ordered on the Florida, Alabama, and Louisiana coasts the morning of the 2d, and interests in those sections were telegraphed that "a storm appears to be developing in the east Gulf." That the signals and warnings were warranted and timely is shown by the following report of Mr. A. J. Mitchelli, Observer and Section Director, Weather Bureau, Jacksonville, Fla.:

The storm approached the coast in the vicinity of St. Josephs Bay during the evening of the 2d. No marked premonition of an existing disturbance was observed during the early hours of the day. The wind velocity gradually increased from about 8 p. m. of the 2d and continued until 3 or 4 a. m. of the 3d. Near the coast the maximum wind was felt about 2 a. m. from the southeast. The storm track was about 60 miles wide and embraced mainly the section of country between the Choctawhatchee and Apalachicola rivers. Throughout this section great damage was done to crops, turpentine farms, and other property. Three barges, four tug boats, several pile drivers, and a number of sailing craft were sunk, and wharves and dwellings were damaged. The inland progress of the storm was characterized by diminishing force, and the disturbance was practically dissipated before it reached the Alabama line.

During August 27, 28, and 29, a feeble disturbance drifted eastward over the Gulf of Mexico, and on the morning of the 30th there were premonitory signs of a storm formation off the south Atlantic coast. The regular morning and special reports of the 30th located the point of the storm's inception off, and not far distant from, the Georgia coast; although these reports did not indicate the hurricane intensity of the storm over the very limited area it covered, northeast storm signals were ordered, and storm warnings were telegraphed to south Atlantic ports from Jacksonville, Fla., to Norfolk, Va., and the Chief of Bureau of Navigation, Navy Department, was notified of the threatening conditions in that section, during the afternoon of the 30th, twelve hours before the storm center reached the coast line. The greatest wind force was apparently experienced at Tybee Island, where a velocity of 84 miles per hour was recorded about 4:30 a. m. of the 31st. In addition to destruction and damage by wind heavy losses were caused by torrential rains and floods along the Georgia coast, and to river plantations between Augusta and Savannah. The territory ravaged by this storm was confined to Savannah and vicinity, and the following extract from the report of the observer at that point indicates the general weather conditions:

"During the afternoon of the 30th and throughout the 31st, 74 inches of rain fell in the vicinity of Savannah, mostly in the form of heavy showers and occasional steady rains. The storm was accompanied by severe and destructive floods along many of the streams, and great destruction of life and property was sustained throughout the state. The waters of the Savannah, Ogeechee, and other streams rose to unprecedented levels, and the effect of the storm was felt for many miles around the coast."
character of the storm. It will be observed that the lowest barometer reading, 29.28, occurred at 4:30 a.m., indicating that at that time the center of the storm passed over that city:

30th.—Wind fresh from north to northeast during the morning with a shower and slowly falling barometer; thunder, with very heavy rain in the afternoon, with a northeast wind squall of 34 miles per hour. As the afternoon advanced the general conditions became threatening and the wind began to show a backing tendency to the northwest. The barometer fell slowly during the evening until 10 p.m., when a very rapid decline began, with wind increasing from the northwest. At midnight the wind velocity had risen to 48 miles per hour from the northwest, and the barometer had fallen to 29.75.

31st.—Until 3:30 a.m. the wind continued from the northwest increasing steadily in force, with squalls, steady rain, and rapidly falling barometer. At 3:30 a.m. a terrific wind squall occurred, during which a velocity of 76 miles per hour was recorded for five minutes with an extreme velocity (one mile) of 88 miles per hour. From that hour there was a slow but perceptible decrease in the wind force, although heavy gusts and squalls continued, and the barometer fell until 4:30 a.m. At 4:05 a.m. the wind shifted from northwest to west, to southeast at 5:40 a.m., and to south at 8 a.m., with rapidly rising barometer. During the nine hours ending 3 p.m. the rainfall amounted to 5.41 inches. Great damage was done to roofs, etc., the streets being littered with débris. The damage to shipping was considerable; lighters were blown ashore, dredges went adrift, and two barges were stranded on the river front; railroad roadbeds were washed out and telegraph and telephone lines were prostrated, leaving the city without communication. The estimated damage in the city of Savannah was $250,000, and rice plantations suffered to the extent of over $150,000.

The storm was not severely felt at Charleston, S. C., and did not extend to Jacksonville, Fla.
LOCAL STORMS.

2d-3d.—A Gulf hurricane having a comparatively narrow track struck the Florida coast at Apalachicola about midnight of the 2d. The velocity of the wind for a time was estimated at 80 miles per hour, and considerable damage was done to vessel property. The tug Ocean Gem was wrecked, becoming a total loss, three other tugs were sunk and a number of sailing-boats were damaged. The casualties of the storm in the Gulf were as follows: Tug Keyser foundered 15 miles off Cape San Blas with a loss of three lives; the dredge Herndon was cut adrift when the Keyser went down and afterward foundered with the loss of one life. The hurricane passed inland and broke up into general rains in western Florida and southeastern Alabama.
FORECASTS AND WARNINGS.
By Prof. E. B. Gannett, in charge of Forecast Division.

The most important meteorological event of September, 1898, was the hurricane which visited the Windward Islands of the West Indies on the 10th and 11th.

As shown by the report, published herewith, of the United States Weather Bureau observer at Bridgetown, the storm was particularly destructive throughout the Island of Barbados, where 88 persons were killed, 150 injured, and property to the estimated value of $2,500,000 was destroyed. At St. Vincent and St. Lucia the violence of the hurricane during the 11th appears, from a report rendered by Mr. H. Powell, Curator of the Botanic Garden at Kingston, St. Vincent, to have equaled or exceeded that manifested at Barbados the night of September 10. Accurate information regarding losses on these islands is not, however, at hand. After the 11th the hurricane center moved north-westward with a very marked loss of strength, and finally disappeared east of the Bahamas during September 14.

The action of the Weather Bureau in issuing warnings and advisory reports in connection with this hurricane is detailed in the description of the storm which follows, and the hurricane track, together with the general distribution of atmospheric pressure which attended the progress of the storm is plotted on special charts which appear in this issue of the Review.

On September 25 a second storm of tropical origin appeared as a feeble disturbance over the eastern part of the Gulf of Mexico. During the 26th this storm moved northeastward over the Bahamas, where it developed almost hurricane violence and caused considerable damage on some of the more northern islands of that group. Atlantic coast ports and interests were advised of the progress and character of this storm, which was not, however, severely felt on the United States coasts. Unfortunately the Nassau, Bahamas, morning report of the 26th was not received, and warning of the storm’s increasing intensity could not, therefore, be given until the receipt of a special noon report from Nassau. The path of this storm is platted as low area X.

During the last two days of September a storm developed in the vicinity of the island of Santo Domingo, and moved thence northwestward to the south Atlantic coast of the United States, where it raged with hurricane violence during October 2. This storm will be made the subject of a descriptive article in the MONTHLY WEATHER REVIEW for October, 1898.

No reports showing severe storms have been received from the Pacific coast districts, and no serious disturbance occurred in the Chicago forecasting district.

THE WINDWARD ISLANDS HURRICANE OF SEPTEMBER 10-11, 1898.

Although the weather over the Lesser Antilles had been unsettled for several days there was no certain evidence of an approaching hurricane until September 10, when the
Cirrus clouds were observed moving rapidly from the south in the morning of the 10th, changing formation to strato-cumulus and nimbus from the northeast early in the forenoon. The weather was foggy and the temperature relatively low. The barometer showed little change, particularly during the night. The wind blew steadily from the north by northeast, but backing to the north. The barometer rose slightly, until about 9 a.m., and began to fall from about 11 a.m. The wind in the meantime became very threatening, with light sprinkling rain. The sea became heavy, with a heavy swell from the southeast. From 2 p.m. to 4 p.m. the wind fell very rapidly, and there was no increase in the wind force, which changed to the north. Immediately after 6 p.m. the barometer fell very rapidly, the wind freshening up, and almost suddenly attained the velocity of a gale, with a heavy downpour of rain, which continued for several hours. The wind blew steadily from the northeast until 7 p.m., then changed to the north. While the wind may appear from the records to have increased in force steadily, yet it is characteristic of the wind at this place to blow in strong gusts, and during the passage of the hurricane these gusts were frequent and of the greatest velocity that is shown on the anemometer record sheet. It was one of these gusts that carried the instrument shelter from the roof, and blew down the wind vane and anemometer support. The greatest velocity for five minutes, 73.8 miles per hour, was registered at 10:30 a.m.; and for one minute, when the apparatus was blown down, 10:18 p.m., was at the rate of 75 miles per hour. The instrument shelter was destroyed and the instruments within it were broken or rendered unserviceable. The wind vane support was bent out of shape and vane was broken. The observation station was almost submerged in rushing waters. There was no self record of wind or rainfall from 10:18 p.m. until after the a.m. observation on the morning of the 11th, as the wind blew with such violence during the night of the 10th that it was impossible to make any temporary repairs by which the record could be continued. On the 11th, the barometer fell to 29.462 at 9:30 a.m., after which it rose rapidly.

During the storm there was a remarkable electric display over the entire heavens, but no thunder was heard. In the southwest, at a great distance, there appeared a brilliant, permanent light, but no explanation can be given of this phenomenon. Many persons have reported having experienced an earthquake shock, but none was felt at this office. The rainfall from 6 p.m. of the 10th to 10:30 a.m. of the 12th was very heavy, 11.42 inches falling in that time. In the table which follows will be found the most salient meteorological features connected with the storms.
and wind went to southwest, blowing exceedingly strong. At 11 p.m., relative calm, but tremendous sea. On the 10th, about 320 miles from the east of Barbados, 7 a.m., the barometer read 29.7. Calm until midnight, wind afterwards going to the northeast. From 10th to 12th, vessel driven 50 miles northward out of her course. Strong current during first 3 days, vessel driven about 50 miles in the harbor and bay. On the 14th, observed that another current, but not so strong, was moving toward the northwest. The vessel lost all sail, and her cargo of rice nearly a total loss. The vessel reached Barbados on the 15th. While on board, several times the following day, the captain of the barometer and it was found to read about 0.25 too low.

It was very fortunate that there were few vessels in the bay and harbor on the day of the storm, as it affords little or no protection. The British man-of-war Alert departed at about 6 p.m. to avoid the storm. On this vessel, the barometer was not disturbed. The pilots took precautions to weather the storm by putting out extra anchors and lines, which proved of little value, as most of them were driven out to sea or else beached. The following ships were anchored in the bay, but were rendered useless by being driven before the wind and totally wrecked on the reefs at St. Vincent, about 100 miles to the westward:

- Full-rigged ship Lazo, 1,448 tons; bark Ladyland, 692 tons; and barkantine Grace Lynam, 620 tons. The crews of these vessels were saved.

- Barkantine Lanzada, 623 tons; local vessels, Kate Florence, Florence, B. Parr. Governor water boat Florence, steam crane and dredger all were driven out to sea and have not been heard from.

The following local vessels were driven on the reefs in this manner:

- Campana, Elmo, Ocean Traveller, and a large number of lighters, all of which are a total loss. The water department steamer, Ida, was also driven on the reefs here, but was gotten off without much damage, a large number of shore boats and lighters were driven out to sea and have not been heard from.

The destruction of property throughout the island has been very great. Every part of the island suffered, but the eastern and southern portions most. It will take some time to get anything like an accurate estimate as to.

In this city the damage to property has been very great, especially in the suburbs. The business part of the city suffered very little, other than that caused by rain. The residential and unprotected portions of the city, to this considerable extent, have given a detailed description of the houses and trees throughout the various streets in those sections of the city on the morning of the 11th. Such chaos I have never witnessed, and have no desire to experience anything of the kind again. While the houses blown down are chiefly those on the northeast, the largest kind of trees were either blown in two or lifted out of the ground by the roots. Nearly all the trees that were blown down, as far as I have seen, were blown down toward the east or south, and a large number of the houses fell outward. The trees were torn out of the earth, and were found with a knife or an axe, this is especially true of the palms. Two stone bridges are seriously damaged, one so badly that it has been rolled off to prevent traffic. A portion of the wharf was undermined and carried away, and during the night of the 10th the sea came over portions of the wharf into the harbor.

Many of the streets were impassible for several days after the storm, especially for vehicles. The street car service was prostrated on the 11th, and little service given on the 12th.

The telephone system was paralyzed, thousands of poles being blown down and the repairs necessary will be almost equal to establishing a new plant.

No storm of like nature is remembered by the oldest reputable citizens, and many compare it to that of 1891, but statistics do not support them in that assertion as will be seen from the following comparative data:

**Hurricane of August 10-11, 1851, total killed, 1,417 outright; total injured, 310, of which 114 died; value of property destroyed, $7,897,352.**

**Hurricane of August 10-11, 1851, total killed, 1,417 outright; total injured, 310, of which 114 died; value of property destroyed, $7,897,352. Estimated damage, $10,000,000; estimated value of property destroyed, $9,500,000; total number of houses totally destroyed, 5,062, and number more or less damaged, 2,553.**

The number of people estimated to be rendered homeless is set at between 40,000 and 45,000, and this is not an overestimate. It is too early to get an estimate as to the damage to the sugar cane crops, but it is expected to be considerable. The damage done to the various plantations in the eleven parishes of the island is very great and manifest.

On Saturday afternoon of the 10th the public, as far as I could do, was informed of the impending conditions. It being so long since this island was visited by a very destructive storm many believed it unnecessary to inform such destructive agencies, and pooh-poohed the information given out.

It is not known as to the extent the general public benefited by the information obtained from this office, but I have been informed by some that by acting upon the information given them they were enabled to take measures to protect their property which otherwise might have been lost.

Between 4 and 6 p.m. of the 10th there were about 200 personal inquiries made at this office, no early any telephone calls during the afternoon, relative to the approaching storm, and all were advised as to the danger anticipated.

Extract from report of the hurricane at St. Vincent, W. I., September 11, 1898, by H. Powell, curator, Botanical Gardens:

The barometrical readings have been corrected for index error, elevation, and temperature. Station: Botanic Gardens, Kingston, St. Vincent, W. I. Height above sea level, 203 feet; latitude, 13° 10' N.

The indications of the coming storm were manifest in the usual barometrical disturbance. The readings ranged from 29.388 at 5 a.m. on the 8th to 29.388 at 5 a.m. on the 10th.

The latter reading at once caused alarm, and notice of same was sent through the telephone to the police headquarters and other centers, for information.

Later in the evening the barometer continued to fall, and messages were again sent in the usual manner.

At 5:35 on the following morning (Sunday, September 11) the readings were 29.128. By this time the blowing in short but fitful gusts from north and northwest. ** The barometer continued to fall slowly, and the wind, still blowing from the same quarter, freshened considerably, so much so that a tall cabbage palm was snapped in two and branches of the softer wooded trees were torn off shortly after 7 a.m.

At 8 a.m., the barometer had dropped to 29.090, but the wind was of rapid and irregular velocity. At 9 a.m., the usual ordinary hour of recording observations, the barometrical reading was 29.066. The wind was then rushing from between north and west. At 10 a.m. the barometer had fallen to 29.399, and the wind continued to be of variable velocity. By 1 p.m. the barometer had increased to 29.399, and the wind had become fresh and at times violent.

Large branches of trees were being torn off and carried away. The first part of the storm lasted from 10 a.m. to 11:40 a.m. The wind still continued blowing from north, northwest, and west, and increased in force at 11 a.m. that the largest trees were snapping.

The following barometrical readings taken at the time specified, show the rapid fall of the mercury and the awful violence of the storm:

<table>
<thead>
<tr>
<th>Time</th>
<th>Barometer (inches)</th>
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<tbody>
<tr>
<td>11:40 a.m.</td>
<td>29.059</td>
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<tr>
<td>11:30</td>
<td>29.049</td>
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<tr>
<td>11:40</td>
<td>29.039</td>
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<tr>
<td>11:30</td>
<td>29.029</td>
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<td>11:40</td>
<td>29.019</td>
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</tbody>
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At 11:40 a.m. there was a lull and almost a dead calm for about three-quarters of an hour. ** The rain gauge was emptied, and 4.94 inches were found to have fallen between 9 a.m. and 12 noon. At about 11:40 a.m. the storm began to blow from due south and increased in force every minute. Trees and houses in the same exposed positions which had withstood the first part of the hurricane were now hurled to the ground. Between 1 and 2 p.m. the storm was at its highest point, and the wind continued to be of almost immediate effect, and lasted far exceeding that of the preceding. This continued until about 2:30 p.m., when the trees began to slacken considerably. During the lull between 11:40 and 12:30 the barometer remained steady at 28.380, and then commenced to rise slowly, and afterwards arose as rapidly as it had previously moved down, the barometer reaching 29.352. The wind had risen to 29.352, and the storm had so abated as to render it safe to go outside. Up to now the rain had descended in torrents, but, unfortunately, the rain gauge had been knocked over by a large branch of a tree.

From 12 noon to 3 p.m. fully as much rain must have fallen as that registered between the hours of 9 a.m. and 12 noon. From 3 p.m. of the 11th to 9 a.m. on the 12th, 4.23 inches fell, the total rainfall thus actually measured during the twenty-four hours was 9.17 inches. The actual time of the duration of the hurricane was as follows: 10 a.m. to 11:40 a.m., 12:25 p.m. to 3 p.m. From 10 a.m. to 11:40 a.m. the mercurial barometer fell 1.09 inches, viz., from 29.352 to 28.259. As previously stated the wind at the commencement of the storm blew from south and south-southwest. When the first part of the storm was at its highest it was blowing from northwest to west, but was hardly stationary at any point. After the lull between 11:40 and 12:25 it blew directly from the south and then sudwest, at the commencement of the storm, and then came to the southeast, it blew very slowly, and at 7 p.m. the reading was 29.771. Distant thunder and lightning was recorded at intervals during the afternoon and evening.

**As illustrating the violence of the wind the heavy garden seats were tippled over as though they were playthings, and the tops of the large trees in the Botanic Garden and Government House Grounds, and also in the surrounding country, were either completely destroyed or thrown down.**

The velocity of the wind during the first part of the storm, between 11:40 a.m. and 12:30 p.m., was about 50 miles an hour, and during the second part of the storm it was fully 90 to 100 miles.

There are persons still living in St. Vincent who clearly remember the "Great Hurricane of the 11th of August, 1851," and who state that the present one is in every way far more destructive.

The cyclone of the 18th August, 1898, is said to have lasted but a few minutes. Aeroid readings taken at that time are given as 29.300.
Compared to the present hurricane the one of 1886 is said to have been much "child's play."

Out of a total number of 356 hurricanes recorded as having taken place in the West Indies during the last 308 years, 246 occurred in the months of August, September, and October.

It is recorded that in the hurricane of Guadeloupe, September 6, 1885, the barometer at Marie Galante fell 1.035 inches (from 29.648 to 28.614 inches) between 6A. 30M. and 7A. 40M. a.m., i.e., in an hour and 10 minutes.

Report of William B. Stockman, Weather Bureau Forecast Officer, at the Central Station of the West Indian Weather Service at Kingston, Jamaica:

The conditions obtaining at Port of Spain on the morning of Saturday, September 10, led me to believe that hurricane conditions were indicated at that point, but the absence of a rise in barometer from the preceding evening caused me to deliberate, feeling assured that were I correct the conditions would develop sufficiently to insure the voluntary sending of special from Port of Spain or Bridgetown. Immediately upon the receipt of the p.m. reports of the 10th, I ordered hurricane signals hoisted at Bridgetown, St. Pierre, St. Kitts, and St. Thomas.

From the Daily Gleaner, Kingston, Jamaica, September 16, 1898:

Among the most notable features attending the hurricane, was the action of the United States Weather Station at Half Way Tree. This station, some weeks ago, under the scheme of the Washington Bureau for covering the meteorological observation of the West Indies more effectually than heretofore; and already the new station has more than justified its existence. From the data which, with more or less regularity, have been coming to hand, Mr. Stockman, on Saturday night, cabled hurricane warnings to Barbados, Martinique, St. Kitts, and St. Thomas. The message prophesied a hurricane, immediately, the central portion of which was south of Barbados, that its direction was moving north-northwesterly and increasing with northerly wind and rain. Every one of these details has been substantiated.

Fortunately, as we have seen, the warning was not required for the two more northerly of these islands notified; the hurricane abating its force somewhere in the region of St. Kitts. The Weather Bureau has distinctly shown that it can not alone inform people that a hurricane has taken place, after the damage is done, but can give sufficient warning before hand to prepare masters of vessels for impending danger.

The storm did not attain great severity at other of the Windward Islands, except in the effect of heavy sea swells, high tides, and heavy rain. The Weather Bureau Observer at St. Kitts reports that—

While the hurricane passed that island with only a slight brush, doing no material damage, the public expressed a high appreciation of the warning of the approach of the storm, and that the warning, being verified, established confidence in the Service.

After September 11 this storm lost strength rapidly, and there is no evidence at hand to show that during its subsequent northwesterly course over the eastern Caribbean Sea and the ocean to the northward it exhibited destructive violence.

The distribution of atmospheric pressure, as shown by the morning and evening reports of September 10 and 11, is presented on Charts XIV and XV, and the path of the disturbance, after the 11th, is plotted on Chart XV.

In referring to the work of the Weather Bureau in connection with the hurricane of September 10–11, and the south Atlantic coast storm of October 2, the New York Times of October 5, 1895, commented, editorially, as follows:

There is full justification for the pride with which the Weather Bureau officials call attention to the triumphs of their new West Indian service. Though hardly well established yet, that service has already demonstrated its value beyond all question by giving timely warning of two great storms. To be sure, enormous damage was done in the one case at Barbados and St. Vincent, and in the other on our own southern coast, but of course hurricanes will not be made harmless, even when accurate predictions of their approach are made. The most that can be expected is to save many vessels at sea and many lives on shore. That both of these things were done by the Weather Bureau's forecast of the recent tempests is certain. The new stations have begun extremely well. Even now they have paid expenses for years to come, and it is a source of gratification that their benefits, instead of being monopolized at home, have been shared by friends beyond our frontiers.
FORECASTS AND WARNINGS.
By Prof. E. B. Garriott, in charge of Forecast Division.

During the last two days of September, 1898, a storm developed in the vicinity of the island of Santo Domingo, and moved thence northwestern to the south Atlantic coast of the United States, where it raged with hurricane violence during October 2. A detailed account of this disturbance, and of the action of the Weather Bureau in issuing warnings of its approach is given in the description of the storm which follows, and its track is plotted on Chart II.

Conservative estimates place the damage caused by this storm in Georgia and Florida at $1,500,000. The value of vessels and cargoes detained by the Weather Bureau warnings of Saturday, October 1, was $380,000, and the crews numbered 56. These were sailing vessels and would doubtless have suffered the fate of those caught at sea. At Savannah the warnings prompted active measures for the protection of shipping and merchandise, and credit is given the warnings by representatives of business and marine interests, for a saving of many thousands of dollars. At Charleston vessels and cargoes valued at nearly $1,000,000, remained in port.

Two storms of unusual severity crossed the upper lakes, one on the 17th and 18th, and the other on the 25th and 26th; on the lower Lakes the severest storm of the month occurred on the 26th and 27th.

No wind storms of marked severity occurred on the Pacific coast during October, 1898.

THE WEST INDIAN HURRICANE OF SEPTEMBER 29-
OCTOBER 2.

The Weather Bureau West Indian reports of September 28, 1898, indicated the formation of a cyclonic storm in the neighborhood of Puerto Rico, and during September 29 the circulation of the winds, the character and movement of the clouds, and the action of the barometer showed that the central area of the disturbance had moved to a position off the northern coast of Santo Domingo. During September 30 the center moved north of west over the old Bahamas Channel and began to recurve northward. Conforming to one of the laws of cyclonic disturbances the storm-center deepened during the recurve, and by the morning of October 1 its influence had extended to the Florida coast. Advisory messages were sent to south Atlantic ports at 9:50 a.m., giving the position of the storm and stating that high north to northeast winds would prevail along those coasts. Special noon and 3 p.m. observations showed that the center of disturbance was approaching our southeastern coasts. Storm northeast signals were ordered from Key West to Norfolk, and the following warning was communicated to the Bureau of Navigation, Navy Department, Washington, the New York and Philadelphia Maritime Exchanges, and generally to Atlantic coast and east Gulf maritime interests:

Storm approaching the Florida coast near Jupiter. Dangerous short-
At Thunderbolt, about 6 miles from Savannah, and on the Wilmington, one life was lost. Small sailing craft were sunk or blown into the marshes, and wharves were damaged; the property loss being estimated at $500,000 to $5,000. At the Isle of Hope the water rose 15 feet, washing away bath-houses and boat-houses. Down the Savannah river, at Augusta, more than 200 houses were washed away. At Savannah the wharves were badly damaged, and the British steamer Savannah and the schooners Flannia, Chalda and Millelue, and the Italian bark Frangien were blown ashore. The loss to wharves and tramway was $5,000. At Tybee Island Mr. Lovell's house was blown away, and at least 24 feet of sand piled up inside the works. The Tybee railroad was badly washed. At Savannah the barracks were washed out, and a depth of 4 feet of water was reported in the magazine. The sea islands off the Carolina coast escaped severe injury, although the tide was very high and the wind heavy. At Savannah the water came up into the streets. At Port Royal, S.C., the damage was slight. At the naval station considerable sand was washed into the dry dock. The greatest loss was sustained south of Savannah and nearer the storm center. Great havoc was caused at Brunswick, where a conservative estimate places the losses at $850,000. Nearly every business house and warehouse in the city was flooded. At noon, on the 20th, the principal residence and business thoroughfares were 4 to 8 feet under water. Nearly all docks suffered from lifting; one to two hundred thousand feet of lumber and hundreds of barrels of naval stores were washed away, and five vessels were washed ashore. At New Town, records kept by the family of Egbert Dart, show that not since 1812 has such a flood been known in that section.

Campbell Island, 12 miles from Darien, on the Atchafall, was swept by water, and all of its inhabitants, except three, were drowned—not less than 20 and perhaps 50. At Darien there were 51 persons drowned swept away by the loss to rice, stock, lumber, vessels, etc., aggregating $500,000. The height of the tidal wave at that place was about 18 feet above mean high water mark, inland, and 18 feet at Sapelo Lighthouse.

The property damaged at Brunswick, Darien, and the surrounding country, is estimated at $1,000,000, and the loss in the State is incalculable.

At Savannah the information signal was ordered at 10:20 a.m. of October 1, and storm northeast signals at 1:30 p.m. Every effort was made to disseminate the warnings. The storm winds began 2:30 a.m. of September 2, and continued until 11:30 p.m. of that day, with a maximum velocity of 60 miles per hour from the northeast at 11:30 p.m. No damage was sustained by the shipping in port. The Savannah Morning News of October 3 remarked as follows in connection with the work of the Weather Bureau: "To these (Weather Bureau) warnings the safety of the shipping in the harbor was due. * * * Every precaution had been taken to warn shipping circles and considerable damage was averted by the advice from the Capital."

Mr. Boyer cites many highly commendatory statements by representatives of the maritime and business interests of Savannah and vicinity, wherein a saving of many thousands of dollars is shown to have resulted from precautionary measures, which were based upon advice received from the Weather Bureau.

L. N. Jesufofsky, Local Forecast Official, Charleston, S.C.: The order to hoist storm northeast signals was received 6:07 p.m. of the 1st, and the information the accompanying message contained regarding the approaching storm was given the widest distribution. Very little damage was caused in Charleston and vicinity, although damage was caused to sailing craft and a number of persons were drowned along the South Carolina coast.

Mariners were all warned Saturday, the day preceding the storm that navigation would be dangerous within the following forty-eight hours, and vessels and cargoes to the value of nearly $1,000,000 were detained in port, and many tugs, schooners, barks, brigs, and steam vessels were taken up the Ashley and Cooper rivers late Saturday and early Sunday to avoid the high seas. Rice planters lost heavily from the high tides, and the sea-island cotton growers had their crops injured by sea spray.

After the 2d the storm passed inland and lost force rapidly.