

In the meantime a shallow barometric depression advanced from the Caribbean Sea to the Gulf of Mexico from the 21st to 23d. Pressure continued low over the Gulf until the 25th when two centers of disturbance began to form, one over the west Gulf and the other near the east Florida coast. The west Gulf depression drifted slowly northward over the coast line without developing marked intensity. The disturbance near the Florida coast gradually deepened until the 29th, when a northward movement began and on the morning of the 30th a storm of marked intensity was central off the North Carolina coast. During the 30th the depression deepened rapidly and at 4:20 p. m. a reading of 29.18 inches was reported at Wilmington, N. C., and at the regular evening report of that date a reading of 29.22 inches was reported at that station. Storm advices had been sent to Atlantic ports for several days and storm warnings were displayed on the 30th from Wilmington, N. C., to Cape Cod. Based upon the 4:20 p. m. special report hurricane warnings were ordered from Hatteras to Norfolk. During the 31st the center of disturbance moved slowly northward and at the evening report had passed north of Hatteras where the barometer at the time of the regular evening observation read 29.32 inches. The subsequent course of this storm was northeast near the Middle Atlantic and New England coasts, and it disappeared over Newfoundland the night of August 2.

Concurrent with the passage of this storm along the Atlantic coast of the United States a destructive typhoon visited the China coast in the neighborhood of Hongkong and Canton.

The Jacksonville, Fla., Evening Metropolis, of July 30, 1908, comments as follows regarding this storm:

The storm that the Weather Bureau has been watching for three or four days has at last shown itself, and this morning is approaching the coast line near Wilmington, N. C. At 7 a. m. the wind velocity at North Carolina stations was between 40 and 50 miles an hour from the east and northeast. No doubt the disturbance has given some sailing vessels a hard time. The fact that the storm has at no time been near land, and yet located daily with almost absolute accuracy, shows the exactness with which the Weather Bureau makes its predictions. There are a number of vessels that delayed sailing on account of the display of storm warnings, and they now appreciate the wisdom of their conduct. The Weather Bureau was established to render service. Who will say it is not doing so?

The month closed with moderate temperature from the central valleys over the Atlantic coast States, and exceptionally high temperatures in the northern Rocky Mountain districts, where maximum readings ranged above 100°.

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No. 8.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

August opened with a storm of tropical origin near the North Carolina coast. The previous history of this storm is given in the MONTHLY WEATHER REVIEW for July. During August 1 and 2 the center of disturbance moved northeastward near the middle Atlantic and New England coasts and past over or near New Foundland the night of the 2d. High barometric pressure over mid-ocean deflected the storm toward the high latitudes of the Atlantic.

The Virginian-Pilot, Norfolk, Va., of August 2, remarks as follows regarding warnings issued in connection with this storm:

It was due to the magnificent work of the Weather Bureau that there were no wrecks along the coast. Many hours before the storm developed any great strength the Bureau had sent warnings along the coast to notify mariners that there was a blow off the Florida coast and advised caution about proceeding south. These warnings were sent to several wireless stations, which transmitted them to vessels at sea having the wireless apparatus, so that the news was flashed down the line.

The general weather conditions of the closing days of July and the first week in August conformed closely to the following forecast, that was issued July 29:

There are no indications of a prolonged period of abnormal heat for any portion of the United States. A cool wave that now covers the Northwest will advance over the central valleys and the Lake region during the next three days. A barometric disturbance with rain will cross the country from about August 1 to 5, preceded by rising temperature, and followed by a period of lower temperature that will continue over the eastern districts during the latter half of next week.

The cold wave referred to advanced as forecast and reached the Atlantic coast August 1. The barometric disturbance reached the Atlantic States August 5. It was preceded by rising temperature, attended by rather well-distributed rains that were heavy in parts of the Ohio Valley, Tennessee, Mississippi, the lower Lake region, and the Middle Atlantic and New England States, and was followed by lower temperature that continued over the eastern districts during the balance of the week ending August 8.

The Times-Democrat, New Orleans, La., of August 3, comments on the forecast as follows:

Professor Moore of the United States Weather Bureau, has commenced the issue of forecasts for periods of a week or more. The success which Professor Moore has achieved in his efforts to increase the efficiency of the Weather Bureau will cause the public to accept these forecasts with more confidence. The forecast issued July 29 for the succeeding ten days is being realized generally. The temperature which was between 70° and 80° over the northern portion of the country on the morning of July 30 was between 60° and 70°, as shown by the weather map issued yesterday. A disturbance with rain and preceded by warmer weather is expected to move across the country between August 1 and 5, and this is expected to be followed by cooler weather, which will continue over the eastern districts during the latter half of the week.

Such forecasts show a marked step forward by the Weather Bureau, and are in line with the many improvements made in the weather service.

The Herald, Rochester, N. Y., of August 10, states:

In this forecast, which predicted complicated weather conditions, including a warm wave which at that time did not appear on the weather map, Chief Moore made a perfect forecast.

Special forecasts were issued on the 9th and 13th. That of the 9th was in general terms. The forecast of the 13th specified the passage of a barometric disturbance from the Rocky Mountains to the Atlantic coast, from the 14th to 18th, that would be preceded by rising temperature, attended by copious rains that would cover the corn and spring wheat States, and followed by a period of lower temperature. The disturbance progressed as forecast and crossed the Atlantic coast on the 18th. It was preceded by rising temperature that at points in the interior was the highest of the present season, was attended by copious rains in the corn and spring wheat States, and was followed by a several day period of temperature below the seasonal average.

The St. Louis Times, of August 15, refers editorially as follows to weather forecasts in general, and to the forecast of the 13th in particular:

Close observers of weather conditions have noted in recent months that the Department of Meteorology at Washington has been indulging in some long-distance and wide-range forecasts.

Time was when the word chiefly employed by the forecasters was "probably." Now there is a certain note of positiveness in the 24-hour

forecast, and the long-distance, wide-range bulletins amount almost to predictions. Several weeks ago, for instance, the department announced that a blanket of rain would begin at the Rocky Mountains and stretch to the Atlantic. The forecast covered a period of a week, gave great cheer to the agriculturalist and business man generally, and was fulfilled exactly.

Yesterday the department made a prediction, technically called a forecast, covering a period of five days, ending next Wednesday morning. All of the spring wheat and corn States are to have needed hot weather, followed by needed rain, after which it will be cooler. It will be worth while noting the outcome of this prediction.

If the Department at Washington finds it possible to make a forecast covering the great growing section of the country for a week, it will have increased its usefulness immeasurably.

A special feature of a forecast issued on the 18th, was a prediction of well-distributed rains in the cotton belt where rain was needed. The rains occurred over the cotton belt as forecast, and in the Atlantic States the rains that set in were exceptionally heavy.

The following from the Daily Picayune, New Orleans, of August 26, 1908, indicates the demand for weather information that increases with recognition of the value of the forecasts:

The weather map issued by the United States Weather Bureau yesterday showed generally settled weather conditions over the greater portion of the country for the first time in several days. These conditions call attention to the special forecast issued by Chief Willis L. Moore of the Weather Bureau, Tuesday, August 18, and published in the Picayune on the 19th. Looking over the weather map we see that the barometric depression referred to in the forecast crossed the Rocky Mountain districts on the 20th and 21st, the Plains States on the 22d, the central valleys and the Lake region on the 23d and 24th and is now over the Atlantic States. The well-distributed rains forecast by Professor Moore have fallen, and those sections of the cotton belt where rain was needed have received copious showers. The map issued Tuesday shows the comparatively cool and settled weather moving eastward just as forecast eight days ago. Forecasts of this character, when so fully verified as has been the case with the Weather Bureau forecasts, are of great importance to agricultural and commercial interests, and the public will look keenly for information telling a week or more in advance what weather to expect as they look for the daily forecasts covering a period of thirty-six to forty-eight hours. Commercial interests attach such importance to the forecast that request¹ has been made that such forecasts be telegraphed as soon as issued at the expense of the recipient.

The beginning of the third decade of the month showed the first signs of a breaking up of the summer distribution of atmospheric pressure over the Northern Hemisphere. From the 18th to 21st the barometer rose over the Siberian area and reached a reported reading of 30.18 inches at Irkutsk on the 21st. During the 21st and 22d the first frost-bearing cool wave of the summer advanced from the British Northwest Territory over extreme north-central portions of the United States.

On the 25th a period of unusually cool weather set in over the eastern portion of the United States and continued during the balance of the month. During this period the barometer was low over the British Isles and the Iceland area with readings below 29.00 inches over northern Scotland on the 27th and 29th. Pressure continued high over the eastern portion of the North American Continent and adjacent ocean, and from the 26th to 28th pressure was again high over the Siberian area. Over western-interior portions of the United States the barometer was falling gradually. At the close of the month abnormally low barometer over Great Britain and northwestern Europe was attended by severe gales over the North Sea and the British coasts.

¹The request referred to was made by the New Orleans Cotton Exchange.

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FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

September opened with low barometric pressure and severe gales over the British Isles and the northwestern coasts of continental Europe. Over the Atlantic and Pacific oceans pressure was near the normal. An extensive area of high barometer covered western interior portions of the North American Continent, and a storm area was central near the middle Atlantic coast of the United States. The barometer had risen to 30.18 inches at Vladivostok and pressure was decreasing over the interior of Siberia.

During the first decade of the month there was a gradual tho well-marked change from summer to fall types of atmospheric pressure over the great Asiatic continental area. In the United States barometric movements were as a whole abnormally slow, and resulted in a period of stagnated dry weather over middle and northern districts east of the Rocky Mountains during which forest fires caused considerable damage in localities in the North-Central States, and a serious shortage of water was experienced in many sections.

From the 1st to 3d the Atlantic coast storm moved rapidly northeastward to the Canadian Maritime Provinces, and during the succeeding five days apparently crossed the Atlantic in the middle latitudes. From the 2d to 4th the interior American high area moved south of east to the middle Atlantic coast attended by a marked fall in temperature and light frost in the upper Lake region, in mountain districts and in lowlands of the Middle Atlantic and New England States. During the 5th and 6th a shallow barometric depression attended by heavy rains moved rapidly from the Gulf States along the Atlantic coast.

On the morning of the 9th there was evidence of a storm formation near the Leeward Islands of the Lesser Antilles, and during the afternoon and night of that date the center of the disturbance past on a northwesterly course near and to the eastward of Porto Rico. By the morning of the 10th the storm-center had advanced to a position north of Porto Rico, and by the morning of the 11th had past to the westward of Turk's Island, where wind velocities estimated at 80 miles,

or more, an hour caused destruction of life and property. Continuing a north-of-west course during the 12th and 13th, the center of the storm recurved northward during the 14th and past to the eastward of Nassau, Bahamas. From this region the disturbance moved northeastward between Bermuda and the American coast during the 15th and 16th, past south of the Canadian Maritime Provinces during the 17th, and disappeared over the Atlantic east of Newfoundland after the 18th, after which it apparently merged into an extensive area of low barometer that extended southward from Iceland.

Beginning the morning of the 10th advices regarding this storm were telegraphed daily until the 15th to Atlantic and Gulf ports. The advices of the 10th stated it would be dangerous for vessels during the next few days in the subtropical region of the Atlantic off the south Atlantic coast of the United States, north of the West Indies, and thence to the longitude of Bermuda. In view of a possible recurve of the storm somewhat farther to the westward than the longitude in which the turn to the northward was actually made, advices urged precautionary measures along the coasts of the Florida Peninsula. The exceptional severity of the storm during its westward passage over the Bahamas and attending its subsequent northeasterly course over the Atlantic is shown by reports of vessels that were caught within its vortex.

A remarkable period of dry weather over the northern half of the United States east of the Rocky Mountains set in during the latter portion of August and continued well into the third decade of September. In two or three instances during this period indications that as a rule presage rain partially or wholly failed. The rather remote causes of the dry spell are now recognized. It was not possible to detect and interpret them with previous imperfect knowledge of the operative influence of the greater barometric areas. On September 22d the following forecast based upon radical changes in pressure was issued:

A barometric disturbance will cross the country from about the 24th to 28th, attended by rains that will set in over the central valleys about

the close of this week and extend over the Atlantic States by the beginning of next week. Following the rains there will be a sharp fall in temperature, with frost in the central valleys and Eastern States north of the fortieth parallel.

The rains that attended this disturbance occurred as forecast and relieved the drought in northern and northeastern districts. The frosts that followed its passage extended over the Middle Western States and the States of the Ohio Valley and middle Atlantic coast.

The following comment on this storm and cool wave is made by the Market Growers Journal, Louisville, Ky., of September 30, 1908:

A general area of rain set in over practically the entire Rocky Mountain region the latter half of the week and moved gradually eastward, bringing rain to the Mississippi Valley States by Saturday night. The rain reached the Ohio Valley Sunday night of this week and the indications at this writing are that before this issue reaches our readers the drought in all sections of the country which have been suffering will have been brought to an end. An interesting fact of this rain period is that it was predicted early last week in a bulletin sent out by the Weather Bureau at Washington. * * * The general rains, which marked the end of the drought, are being followed by a period of cold weather which will mark the end of the unusually warm weather of September.

An editorial in the Albany, N. Y., Journal of September 29, reads as follows:

Just now there is in evidence the fulfilment of a forecast made a week ago. Early last week it was announced from Washington that conditions were favorable for the development of a general rain area in this part of the country by about the 28th instant. Because of the long absence of rain that prediction was of unusual interest, and the arrival of the time appointed for its fulfilment was awaited with mingled hope and apprehension.

There was a widespread feeling of relief when the sky became overcast and precipitation began, gradually as it nearly always does after a long period of dry weather.

The Weather Bureau is to be congratulated upon the accuracy of a "long distance" forecast, made at a critical time when all ordinary signs, even to that old standby, the sun's "crossing the line," seemed to fail.

The Kansas City, Mo., Star of September 27, remarks as follows:

An interesting fact about the storm area that is now moving across the country is that it was accurately predicted by the Weather Bureau last Tuesday evening (September 22), when a "long distance" forecast was put out saying that rains would fall in the central valleys about the close of this week, and in the Atlantic States at the beginning of next week, followed by frost north of the fortieth parallel.

The Weather Bureau's forecasts for a week ahead are still in the experimental stage, but they promise to be of great value. They are based on reports of barometric pressures in various parts of the world, indicating the progress of storm areas. Last Tuesday's forecast was based on reports of low barometric pressure at the time in Nome and Sitka, Alaska, and in Honolulu. But the present storm area first appeared over the Rocky Mountain regions with a bank of high barometer all week along the Pacific coast, so that it seems questionable as to whether it came from the conditions on which the Weather Bureau based its long distance forecast of last Tuesday.

The forecast was based on reports for several days preceding the date of its issue. On September 17 Pacific pressure was high over Honolulu and low over Nome. Three days later pressure was high over the Bering Sea region and low over the Hawaiian Islands. It has been observed that pressure changes over the Pacific Ocean forerun by several days certain changes on the Pacific coast and the American Continent as a whole. On September 23 a decided fall in the barometer occurred over the middle and south Pacific coast districts, and on the following day the barometric disturbance appeared, as stated, over the Rocky Mountain districts. It is true that pressure continued high over the north Pacific coast. That was expected. The predictions are based, not necessarily upon the progress of individual storm and high barometer areas, but upon a study of atmospheric conditions over the whole Northern Hemisphere, and more directly, at this season of the year, on the general circulation of the atmosphere over the Pacific and Atlantic oceans. In winter the great continental areas of high barometer, and more especially the Asiatic high

area, appear to dominate the general atmospheric changes of the Northern Hemisphere. By a study of the association and interrelation of the greater areas of high and low barometric pressure is the forecasting of weather changes for a week, or more, in advance made possible.

On September 24 West Indian stations were advised of the presence of a cyclonic disturbance east of the Lesser Antilles in latitude about 15° north. On the following morning West Indian ports and Atlantic and Gulf shipping interests were informed that a disturbance of marked intensity near the Leeward Islands of the Lesser Antilles was moving in a westerly direction. During the succeeding two days the hurricane center moved on a west-northwest course, and at 6 a. m. of the 28th past near Port au Prince, Haiti, with a reported minimum barometer reading at that place of 29.24 inches. Continuing a west-northwest course the vortex of the storm advanced over or near the Great Bahama Bank by the close of the month and recurved thence northward over the western Bahamas by October 1, with reported minimum barometric pressure 28.68 inches at 10 a. m., and wind exceeding 80 miles an hour from the south at Nassau. Assuming a northeasterly course the storm then advanced over the Atlantic in the direction of Bermuda. Further advices that may become available regarding this storm will be given in the October, 1908, MONTHLY WEATHER REVIEW.

It is interesting to note that during the present season three West Indian hurricanes have occurred simultaneously with typhoons in Asiatic waters. In the third decade of July a destructive typhoon struck Hongkong, and a severe storm that had its origin in the Caribbean Sea moved northward along the Atlantic coast of the United States. In the second decade of September a typhoon advanced from the Philippine Islands northward along the eastern Asiatic coast, and a hurricane devastated the eastern islands of the Bahama group, moving thence northeastward. In the third decade of September a hurricane swept west-northwest from the Lesser Antilles to the western Bahamas and recurved thence northeastward, and a typhoon past from the Philippine Islands westward over the China Sea.

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No. 10

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During the last seven days of September a hurricane advanced from the Lesser Antilles of the West Indies to the Great Bahama Bank. During October 1 the vortex of the hurricane recurved northward over the western Bahamas. The following notes regarding this storm are from the Nassau, New Providence Island, Bahamas, Guardian of October 3, 1908:

The first intelligence that another hurricane had made its appearance reached us last Saturday (September 26), when we were informed by cable from Washington that a storm was central near and south of Porto Rico moving westnorthwest. This information was confirmed by telegrams from the same source dated the 28th, 29th, and 30th, stating that a hurricane was central near the eastern extremity of Cuba, and finally that a hurricane was central near the great Bahama Bank moving west-northwest. These statements were entirely borne out by the weather here on September 30, which throughout the day wore an exceedingly threatening aspect. * * * By 8 a. m. of October 1 the barometer had fallen to 28.88 inches, while the wind southeast had risen to an estimated velocity of 80 miles an hour—estimated, because at 7:45 a. m. the wind-recording instruments at the Observatory were blown away. At this time squall succeeded squall with rapidly increasing velocity from the southeast, the rain falling in continuous torrents, being driven by the wind with a force that the few adventurous persons who were out found positively blinding. * * * Although much damage was done on land, interest centered on the shipping in the harbour, most of which was in sore straits. * * * At 10 a. m. the barometer reached a minimum of 28.68 inches with wind from the south blowing at an estimated velocity of 60 to 80 miles an hour. At noon the barometer had risen to 29.10 inches.

* * * * *
An instance of the value of the storm telegrams is afforded by information obtained from Mr. Wm. Hilton, who arrived this morning from Staniard Creek. He states that a great many of the sponging craft there had been launched and taken out of the creek to the North Side, but that on the receipt by the Rev. Mr. Dinsdale, on Sunday night, of a copy of Saturday's storm telegram, sent by the Port Officer, the vessels were all brought into the creek again and secured. Had this not been done the damage to shipping there would probably have been very great.

The telegrams referred to were sent by the Chief of the Weather Bureau to the Governor of the Bahamas, Nassau. They were begun September 26, 1908, and advised measures to protect shipping.

From the western Bahamas the storm recurved to the east-

ward over the Atlantic. During the 3d and 4th severe gales were experienced on the northeast coast of Cuba, and on the 6th a disturbance that was probably a continuation of the Bahamas hurricane past near Bermuda with a reported barometric pressure of 29.22 inches. After passing Bermuda the storm moved on a north of east course, and on the 6th the meteorological observatories at Horta, Fayal, Azores, and Lloyds, London, were advised regarding its character and probable course over the ocean. A forecast was also made that the storm would pass near and north of the Azores by the night of the 7th and reach the middle-western European coasts by the 9th. During the 7th the barometer fell to 29.66 inches at Horta and then rose rapidly to 30.16 by the morning of the 8th with wind shifting from southwest to northwest. During the succeeding two days the storm apparently moved north-eastward and past near and west of the British coasts. On the morning of the 9th it was central northwest of Scotland.

On the 4th, when this storm occupied the subtropical waters of the Atlantic north of the West Indies, a typhoon is reported to have visited the Island of Luzon, P. I.

During this storm period over the Atlantic the weather was unseasonably cool over the interior of the United States, and snow fell in the early part of the first decade of the month in the northern Rocky Mountain districts. The barometric depressions that appeared over the North American Continent possess slight intensity. It has been observed that in the presence over the western Atlantic of disturbances of tropical or subtropical origin the intensity of storms over the interior of the American Continent decreases as they advance eastward.

During the 8th a shallow barometric depression that had covered Cuban and Florida waters for several days moved northward over the South Atlantic States. On this date also the presence of a typhoon over the Philippine Islands was indicated by the Manila report. From the 8th to 11th the southeastern depression moved slowly over the Atlantic seaboard of the United States, and a disturbance from the British Northwest Territory advanced over the Lake region and St.

Lawrence Valley. Following the unsettled rainy weather that attended these disturbances an area of high barometer and cool, fair weather moved from the British Northwest Territory eastward and southeastward to the Atlantic and Gulf States, attended by freezing temperature as far south as northwestern Arkansas on the 13th and 14th, and by the first heavy frost of the season in the Middle Atlantic States.

Following this cool period a warm wave carried temperatures 10° to 20° above the seasonal average in middle and northern districts from the Rocky Mountains to the Atlantic coast. The warm wave resulted from abnormally low barometric pressure that existed for several days, beginning October 10, over the northern Pacific Ocean and adjacent parts of the American Continent. This distribution of pressure caused a strong flow of air currents from the warmer latitudes over the interior of the continent. The increasing warmth imparted by these currents to air overlying the region from the Great Plains eastward also contributed to the period of dry weather that began in the middle and northern districts east of the Rocky Mountains about October 11 and continued until about the middle of the third decade of the month.

Note was made in the general forecast of the evening of the 12th that a typhoon was approaching the Island of Luzon, P. I., from the east that would probably strike the Chinese coast near the Island of Hongkong. This storm was very severe over the northern portion of Luzon on the 12th and two days later it struck with destructive force the region about Amoy and Chang-chow, to the northward of Hongkong. This storm was encountered by the American battleship fleet off the north coast of Luzon during October 12 and 13 and there reached its height on the morning of the 13th.

From the 16th to 18th an area of high barometer moved from the interior of British America southward over the Rocky Mountain and Plains States and past thence eastward during the 19th and 20th over the Great Lakes, New York, and New England. From the 14th to 16th a depression crossed the Pacific States attended by the first rain of the season over the northern half of California. From the 18th to 20th a deep barometric depression moved northward along the eastern Rocky Mountain slope and on the morning of the 20th a barometer reading of 28.98 inches was reported at Williston, N. Dak. This depression, in conjunction with the preceding high-barometer area, caused general precipitation from the Mississippi River over the Rocky Mountain and Plateau districts, that in the mountain districts and the Northwest was in the form of snow.

On Tuesday, October 20, the following general forecast was issued:

The barometer has fallen rapidly over the southern Rocky Mountain region, and a well-defined storm will appear in that section Wednesday morning. This storm will move northeastward, attended by rain in the central valleys Thursday, and in the Atlantic States Friday or Saturday. The rains promise to be sufficiently heavy to extinguish the fires in the Allegheny and Adirondack mountains.

The rains set in as forecast, and in the eastern mountain districts, where forest fires were destroying property, they continued several days.

From the 19th to the 23d a period of exceptionally cool weather attended the presence of an area of high barometric pressure over continental Europe. Temperatures in Germany were reported the lowest experienced in October since 1866.

On the 21st and 22d, when the central portion of an area of high barometric pressure occupied the Middle Atlantic States, the kites at Mount Weather penetrated a stratum of relatively warm air half a mile above the station. On the following day the mountain was enveloped in a dense fog, with upper currents strong enough to crush the first kite that was sent up. These strong easterly currents flowed from the southern quadrants of an area of high barometer that was mov-

ing off the north Atlantic coast, thru the north quadrants of a low-pressure area that occupied the south Atlantic coast and toward a low area over Arkansas. This strong drift of air apparently carried the low-pressure area of the south Atlantic coast inland where it united on the 24th with the Arkansas low area that had moved northward to the upper Mississippi Valley. The upper currents in this case indicated at least a day in advance, the abnormal movement of the southeastern disturbance.

From the 28th to 30th a tropical disturbance, that had apparently advanced from the western portion of the Caribbean Sea, past from the eastern portion of the Gulf of Mexico northeastward along the Atlantic coast of the United States, attended by heavy rain and gales. During these dates an area of cool weather and frost advanced from the west Gulf States over the east Gulf and South Atlantic States. It is probable that the storm of the 28-30th was identical with a disturbance that visited the Central American coasts and Yucatan and past thence over the Gulf of Mexico.

October closed with fair weather, except over the extreme northwestern portions of the country, and temperature below the seasonal average from the central valleys over the Atlantic States.