

THE WEST INDIAN HURRICANE OF AUGUST 13-23, 1915.

Chart I. Weather map, 8 a. m., August 15, 1915.

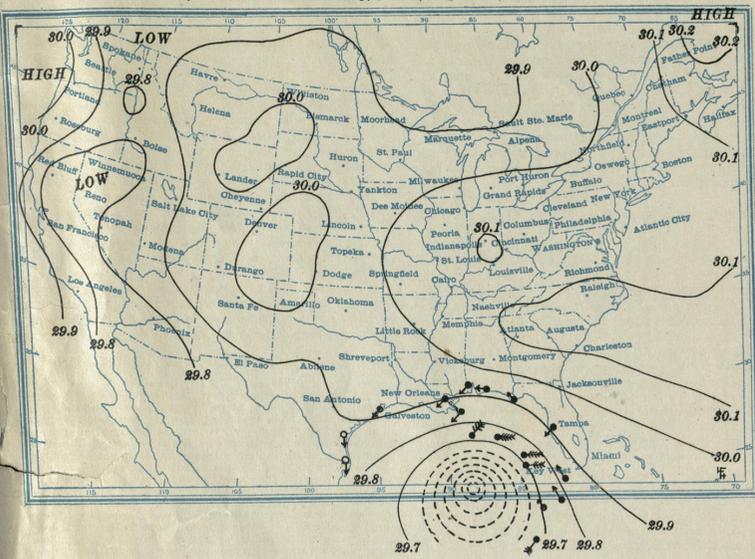
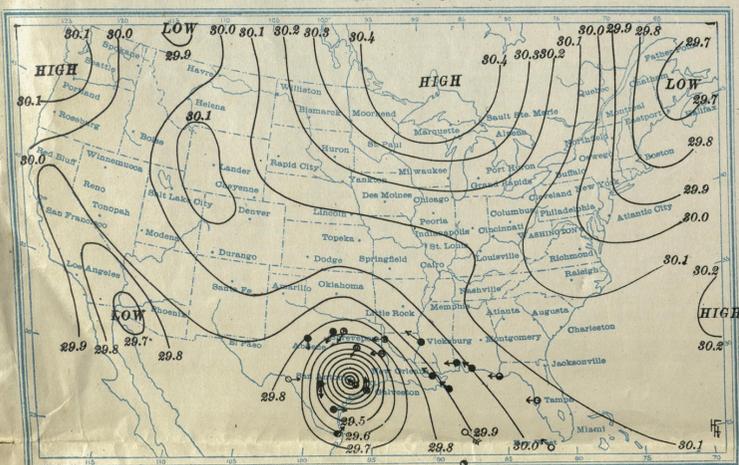


Chart III. Weather map, 8 a. m., August 17, 1915.



FOREWORD.

On the night of September 8, 1900, a tropical storm, or hurricane, of tremendous force reached the Texas coast in the vicinity of Galveston, and the tragic sequences are records of sorrowful history. Fifteen years later, lacking only three weeks, a similar storm visited the same locality, and that the consequences were not so terrible as in 1900 was due in greatest measure to the condition of preparedness that the experience of 1900 had dictated. During the interval of fifteen years no severe tropical disturbance had visited the Texas coast, although on July 21, 1909, a tropical storm passing into Texas south of Galveston caused severe northerly gales that did considerable damage to bathing pavilions, boat houses, etc., and to the bridges connecting Galveston with the mainland. Fortunately the tides were low and no lives were lost.

PLACE OF ORIGIN OF HURRICANES, OR TROPICAL STORMS.

It is thought that this question can not be better treated here than by quoting the following paragraph by the late Prof. E. B. Garratt in his special report on the West Indian hurricane of September 17-21, 1909. In this bulletin Professor Garratt stated as follows:

Aside from the fact that they commonly emerge from the region of equatorial rains, which lies between the Lesser Antilles and the African coast, little is known regarding the place of origin of West Indian hurricanes. It has seemed allowable in instances to assume that storms which have been encountered by vessels far to the eastward of the Lesser Antilles have subsequently visited the West Indies, but owing to the very meager amount of data which has been received from the tropical ocean such assumptions are not susceptible of definite proof. It is not improbable, however, that some of the West Indian hurricanes originate over the mid-Atlantic tropics and even over toward the Cape Verde Islands. The latitudinal limits of the region within which these storms originate may be safely represented by the parallels of 8° and 20° north, and it is believed that they have their origin along the line of the southern limit of the northeast trades. As the summer advances the North Atlantic area of high barometric pressure shifts southward over the eastern Atlantic, forcing the limit of the trade winds southward, and causing hurricanes to form farther and farther to the westward until October, when they develop or originate over the eastern Caribbean Sea or but a little distance east of the Lesser Antilles.

HISTORY OF THE STORM OF 1915.

This storm proved to be somewhat of an exception to the usual rule in that the pressure conditions that prevailed for a week or two previous were not such as to indicate any probability of the development of a tropical disturbance. It is true that pressure had been quite high over much of the United States and the North Atlantic Ocean during July, and relatively low over the eastern Atlantic as indicated by reports from the Azores Islands, but during the first decade of August these conditions were reversed over the Atlantic States and the western portion of the Atlantic Ocean, although not decidedly so over the ocean where the pressure was still slightly above normal. Thus, as has been said, there was nothing to indicate that conditions were favorable for the formation of a tropical storm, nor, should one form, was there anything pronounced to indicate its direction of progression whether northward to the south Atlantic coast or westward to the Gulf of Mexico, the slight preponderance of pressure over the North Atlantic not having been sufficient to enable this fact to be determined.

The storm was first observed on the morning of August 10 between the Windward Islands of Barbados and Dominica, and at 9:45 a. m. on that date the first warning notice of the storm was sent to West Indian stations. At 2 p. m. similar information was sent to all Atlantic and Gulf stations of the Weather Bureau, and in addition the information was disseminated by the radio station at Arlington, Va. Nothing more definite from the scene of trouble was received during the day, except a special report at 4 p. m. from Roseau, Dominica, which showed a barometer reading of 29.46 inches, with light air from the northwest. On the morning of August 11 the disturbance was apparently near and south of the

Island of St. Croix, at about latitude 16° N., longitude 66° W. At this time the barometer at San Juan, P. R., read 29.60 inches with a gale of 60 miles an hour from the northeast, indicating a much lower pressure to the southward, and pressure was falling more rapidly to the westward, as indicated by the observations at Santo Domingo, S. D., and Port au Prince, Haiti. The following information was then distributed over the West Indies generally and to Atlantic and Gulf ports:

Severe tropical disturbance at 8 a. m. apparently central near Island of St. Croix, moving west-northwest 15 or 20 miles an hour. Will probably cross Santo Domingo and Haiti, reaching southeastern Cuba about Thursday night or Friday (August 12-13).

On the morning of the 12th the storm was central a short distance south of Haiti at about latitude 17°, longitude 73°. The barometer reading at Port au Prince was 29.60 inches and the highest wind velocity was 32 miles an hour from the east. However, reports of damage over the southern portion of the Republic indicated that a severe gale must have occurred there with much lower pressure. On the same morning the barometer reading at Kingston, Jamaica, was 29.68 inches, and northerly gales were reported east of the island. The wind at Kingston was then light northwest, and pressure was also falling to the westward and northward, Songo (near Santiago), Cuba, reporting a barometer reading of 29.80 inches, a fall of 0.16 inch in 24 hours, with light northeast winds. Warnings were again issued at about 10 a. m. to the effect that the tropical storm was apparently central near southwest Haiti, moving a little north of west, and that it would probably reach southeast Cuba that (Thursday) night. Observations taken at 12 noon of the 12th indicated that the storm center was near the east coast of Jamaica, moving a little north of west, and advice was issued accordingly to all Gulf and Atlantic ports, and also to West Indian points that were likely to be affected.

During the night of the 12-13th the storm center passed north of the Island of Jamaica, and at 8 a. m. of the 13th a whole southeast gale was blowing at Kingston. Northeast storm warnings were then ordered at Key West and Miami, Fla., and advice issued stating that the storm would probably reach western Cuba Friday night and Saturday, and that hurricane warnings might be necessary later. All interested, and especially shipping, were advised at the same time to take every precaution necessary for safety. At this time the barometer reading at Key West was 29.92 inches, and the wind velocity 16 miles an hour from the east. Special observations received during Friday, the 13th, indicated that the storm was moving as forecast, and accordingly at 5 p. m., the warnings at Key West and Miami were changed to hurricane, and hurricane warnings were also ordered on the southwest coast of Florida as far north as Boca Grande. The warnings stated that easterly winds would increase that night possibly reaching hurricane force Saturday. All shipping and others interested were warned to take every precaution possible and vessels in port were warned to remain there.

On the morning of the 14th the storm was apparently central near the Isle of Pines, Cuba, with undiminished intensity and moving in a direction a little north of west. Advisory warnings on that morning, which were sent to all interested, stated that the storm would probably pass into the Gulf of Mexico that (Saturday) night. During Friday night the maximum wind velocity at Havana was 56 miles an hour from the east. It was apparent that during Sunday the storm center would probably reach the north-central Gulf of Mexico, and Gulf shipping was advised to take every precaution. At 5 p. m., Saturday, the 14th, hurricane warnings were continued from Key West to Boca Grande, but were lowered at Miami, as it was apparent that there was no longer any danger of winds of storm force at that station. As the next day would be Sunday, the officials in charge at Weather Bureau stations were ordered to make arrangements for Sunday telegraph service in their districts in order that any warnings that might be necessary could be received and distributed properly. On the morning of the 15th the storm was apparently central in the south-central Gulf of Mexico moving in a more northwesterly direction than before. The barometer at

all Gulf stations, was falling, and northeast storm warnings were therefore ordered on the Gulf coast from Apalachicola, Fla., to New Orleans, La. All Gulf stations, both regular and display stations, were notified accordingly, with warnings that all interested should take every precaution for safety, and that all vessels should remain in port. The special observations received during Sunday, the 15th, indicated the necessity of hurricane warnings on the west coast, and at 5 p. m. the northeast warning at New Orleans was changed to hurricane, and hurricane warnings were also ordered at all display stations westward as far as Brownsville, Tex. A radio report taken at 2 p. m. on the S. S. Antilles, at latitude 27°, longitude 86°, showed a barometer reading of 29.54 inches with wind velocity of 74 miles an hour from the east, and another radio report taken at 8 p. m. on the same date, at about latitude 26.5°, longitude 87.5°, showed a barometer of 29.48 inches, with wind velocity of 64 miles an hour from the east. On Monday morning, August 16, the storm center was apparently approaching the east Texas or west Louisiana coast and the warnings from Mobile to Apalachicola were changed from northeast to southeast. At this time the barometer at Galveston read 29.62 inches with maximum wind velocity of 34 miles an hour from the northeast. The conditions continued to intensify, and by noon the barometer at Galveston had fallen to 29.48 inches with maximum wind velocity of 56 miles an hour from the northeast. The tide was ebbing slowly and the sea was excessively rough. At 5 p. m. the hurricane warnings were ordered continued from Sabine, Tex., to Brownsville, Tex., and the warnings at New Orleans and Morgan City, La., changed from hurricane to storm southeast, as it was apparent that the winds at these places could no longer increase, the maximum wind velocity at Burrowood, La., at the mouth of the Mississippi River, being only 45 miles an hour from the east. At 8 p. m. Monday, August 16, the barometer at Galveston read 29.10 inches with maximum wind velocity of 72 miles an hour from the northeast, and heavy rain was falling. The storm passed into the interior during the night of August 16-17, and at 2:45 a. m. Tuesday, August 17, the barometer at Galveston read 28.63 inches, with maximum wind velocity of 93 miles an hour from the east at 2:37 a. m. At 5:30 a. m. of the 17th the barometer at Houston read 28.20 inches, the lowest barometer reading of the storm, with a maximum wind velocity of 80 miles an hour (estimated) from the northeast.

At 8 a. m. Tuesday, August 17, the barometer at Galveston read 29.12 inches, with the wind blowing 52 miles an hour from the northeast, while at Houston the reading was 28.72 inches, with a wind of 80 miles an hour (estimated) from the southeast. Torrential rains had fallen at both places and were extending into the interior of east Texas. The storm then recurved to the northward, with high winds over the interior of east Texas, reaching a maximum of 60 miles an hour from the north at San Antonio during the day. There was no occasion for further warnings, and those that were still displayed were allowed to expire at 5 p. m., Tuesday, August 17. On the morning of August 18 the storm was central over the northern portion of east Texas, with a barometer reading of 29.50 inches at Fort Worth and Dallas, with northeast gales of 44 to 48 miles an hour and with heavy rains. Warnings of high winds for the interior of east Texas had been issued on the afternoon of the 17th. During the next 24 hours the storm moved very slowly to extreme northeast Texas with somewhat diminished intensity, but with heavy rains continuing in that vicinity and extending into Arkansas. The storm was now moving northeastward, and on the morning of the 20th was central over southeast Missouri with somewhat increased intensity, and heavy rains had fallen in southern and eastern Missouri, the lower Ohio Valley, and west Tennessee, and northeasterly gales prevailed at St. Louis. During the next 24 hours the storm moved slowly to southern Indiana, again with diminishing intensity, but with general rains and some high winds to the southeastward. It then continued its northeastward movement with steadily diminishing intensity, and on the morning of August 24 was passing out into the Gulf of St. Lawrence, with a barometer reading of 29.80 inches at Father Point.

COMPARISON WITH THE STORM OF 1900.

Chart No. IV shows the paths of the storms of 1900 and 1915. An inspection of these paths discloses the fact that the total time occupied from the first to the last appearance of both storms within the field of observation was exactly fourteen days, and that the storm of 1900 moved with a slower velocity of progression before reaching its recurve than after, whereas in the storm of 1915 the reverse was true. The two paths are very similar in many respects, although that of 1915 lay a little to the southward of that of 1900 until the St. Lawrence Valley was reached. In previous published reports on the storm of 1900 the storm path shows a strong deflection toward the southwest Florida coast, but reports received from vessels and other sources after those publications indicated the fact that this deflection to the right was not so strong as has been supposed, and the track as here charted is thought to represent more nearly the true conditions. It was carefully plotted from all available observations. As to the comparative intensities of the two storms, it is perhaps idle to speculate. The wind velocities were not greatly different, and the effects of the two storms were much the same, except as modified by artificial conditions in the vicinity of Galveston. The barometer reading of 28.48 inches at Galveston in 1900 was 0.15 inch lower than the lowest reading recorded in 1915, whereas the lowest reading of 28.20 inches at Houston in 1915 was 0.28 inch lower than the lowest barometer reported in Galveston in 1900. Unfortunately there are no records from Houston for the year 1900 and a precise comparison can not be made.

In 1900 the maximum wind velocity of 84 miles an hour was from the south, while in 1915, that of 93 miles an hour was from the east, and this difference in direction of 90° largely accounts for the difference in the height of the tide, which in 1900 was estimated at 20 feet, while in 1915 it was only 12 feet. In 1900 the tide came directly from the south over the Gulf of Mexico, while in 1915 it came from the northeast across Galveston Bay.

DAMAGE FROM THE STORM.

At this early date it is impossible to furnish any accurate data as to loss of life and property due to the storm. The loss of life has been computed to be about 275, whereas in 1900 the loss at Galveston and vicinity alone was at least 6,000. The great difference in favor of the storm of 1915 was due in greatest measure to the sea wall which was constructed by the city of Galveston shortly after the flood of 1900. There can be no question but that this wall saved the lives of thousands of people. It should also be remarked that the personal efforts of the official in charge of the local office of the Weather Bureau at Galveston were instrumental in saving the lives of hundreds of dwellers on Galveston Island. The official at Galveston sent out men on motorcycles to all places that could be reached on Galveston Island, who warned the inhabitants of the coming of the storm and impressed upon them the fact that unless they immediately sought places of safety they would surely lose their lives. Subsequent occurrences confirmed the timeliness and correctness of this warning. Much commendation is also due to Prof. W. B. Stearns, cooperative observer and storm warning displayman at Seabrook, Tex. Upon the receipt of the first general warning on Sunday, August 15, and again Monday, August 16, Professor Stearns personally visited all the inhabitants at the low places in Seabrook and warned them to remove to places of safety they would surely lose their lives. Subsequent occurrences confirmed the timeliness and correctness of this warning. Much commendation is also due to Prof. W. B. Stearns, cooperative observer and storm warning displayman at Seabrook, Tex. 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