

Compared to the present hurricane the one of 1886 is said to have been mere "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 Guadalupe, September 6, 1865, the barometer at Marie Galante fell 1.693 inches (from 29.646 to 27.953 inches) between 6h. 30m. and 7h. 40m. a. m., i. e., in an hour and 10 minutes.

Report of William B. Stockman, Weather Bureau Forecast Official, 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 to the south-by-eastward of that station, but the apparent 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 specials 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 was only established a few 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 prognosticated 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 rains. Every one of these details has been substantiated. Fortunately, as we have seen, the warning was not required for the two more northerly of the 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, 1898, 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 forecasts 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.

The following is an extract from an editorial which appeared in the New Orleans Times-Democrat of September 24, 1898:

We were able to test this new service in the recent hurricane of September 10 and 11. The storm which prevailed then was first noticed in an inchoate condition near Barbados on September 10. All the other West Indian islands were notified from Washington, and it was in consequence of that notice that the Spanish vessels at San Juan de Porto Rico, which were to have sailed for Spain on that day, delayed doing so, escaping the storm and saving, in all probability, many lives by their delay. Every seaport that could be reached by telegraph was notified; the vessels remained in harbor, and the hurricane—a very severe one—swept through the Caribbean and Gulf of Mexico without injuring a single vessel. So much for our new weather stations. There was some loss of life in the interior of the islands where the warning could not reach in time, but this was infinitesimal compared with the damage that might have been done and would have been done had the approach of the storm not been known one or two days beforehand.

The hurricane was very severe among the smaller Antilles, and wasted most of its force before it reached Cuba. All we caught of it was a violent rainstorm. But although it was not as widespread as some other Gulf hurricanes, it was as severe in its intensity where it did rage. By the warning given by our weather service, property in value a hundred times the cost of the service was saved. The wisdom of the new stations is thus clearly proved. Louisiana ought to appreciate the improvement, for probably no part of the country is more affected and more directly interested in hearing of the approach of these hurricanes. With timely notice vessels will not leave here in the face of a storm. The thousands of fishermen along the coast can receive warning in time and escape the fate of their comrades at Cheniere Caminada. Finally, the sugar and rice crops are deeply interested in knowing of an approaching blow, which will give the planters and farmers a chance to care for the crops, to harvest the rice or cut the cane before the storm breaks over them.

In enumerating the benefits of the war we must not overlook the improvement it has assured us in our weather service on the Gulf and south Atlantic, an improvement that would scarcely have been made—certainly not made for years—if the safety of Sampson and Watson's fleets and Shafter's army had not demanded the establishment of additional weather stations in the West Indies.

#### THE CHICAGO FORECAST DISTRICT.

The frost warnings issued on the 5th, 6th, 8th, 9th, and 10th were, as a rule, verified, although in some instances the area covered by the warnings was too great.

No general windstorm passed over the upper Lake Region during the month. The wrecks which occurred on the 19th over the northern portion of the Lakes were mainly due to dense smoke, brought by the winds from the British Northwest. The winds were only fresh to brisk northwesterly, except at the "Soo," where a high wind prevailed for a short time. The wind force and direction were covered by the upper Lake forecast.—*H. J. Cox, Forecast Official.*

#### SAN FRANCISCO FORECAST DISTRICT.

California was visited by a general and quite heavy rain on September 24, 25, and 26. The approach of this storm was seen on the evening charts of September 23, and forecasts were issued for all points in California north of the Tehachapi Mountains. On the next morning warnings of the approach of this storm were sent to all points in southern California. Thousands of crates of raisins and prunes were exposed for drying. The warnings, which were twenty-four to forty-eight hours in advance of the rain, gave ample time for protection.

#### THE EARLY RAINS.

Referring to benefits derived from forecasts of early rains, issued by the Weather Bureau Office at San Francisco, Cal., the San Francisco Call of September 27, 1898, remarks, editorially, as follows:

Our early rains have begun this year with showers of such profusion as to give promise that we are to have anything rather than a dry winter this season. They have, moreover, been widespread, and have carried their blessings to almost every section of the State.

That some damage will result from such general rains this early in the year is certain. A considerable part of the prune crop is in process of drying, and the rain where it has been heavy will entail loss of some of the fruit and a good deal of expense in saving the rest that was exposed to the showers. Moreover, the grape crop may be more or less hurt, but reports are to the effect that the injury to that crop is not expected to be great in any part of the State.

It is worth noting that from nearly all the centers of the fruit and grape industry it is announced that the warnings of the Weather Bureau of the coming of the showers were given in time to enable the orchardists and vineyardists to prepare for them. Prunes that had been spread for drying were stacked before the rains came, and the loss, therefore, was much smaller than it would have been otherwise. The usefulness of the Bureau has thus been again demonstrated, and when all rural workers learn to pay attention to its reports the profit from its labors will be even greater than now.

In any case, however, the losses from the showers would have been slight in comparison with the gains that will result from the early coming of the beginning of the rainy season. The drought has been long and severe; it was beginning to tell upon the vitality of the orchards in many sections, and fears were expressed whether the trees would be able to form buds for the fruit of next year. The showers have come in time, it is to be hoped, to put an end to all anxieties on that score, and to give every rural industry reason for the hope of an abundant harvest in 1899.

W. H. Hammon, Forecast Official.

FORECASTS TO MILITARY CAMPS.

During September, 1898, provision was made, by direction of the Secretary of Agriculture, to telegraph from the Central Office of the Weather Bureau at Washington, forecasts to commanding officers of the several Army corps whenever weather conditions injurious to the health or comfort of troops under canvass were expected in the States where the Army corps were located. An appreciation of these forecasts is indicated by the following press notes:

New York Evening Telegram, September 16, 1898.

CAMP WIKOFF, MONTAUK POINT, L. I., September 16, 1898.

A severe storm set in here last night and continued this morning. The camp authorities had been warned of its approach by the Weather Bureau and were prepared for it. Every tent had been strengthened, and the storm did no damage in camp, except to make it cold and cheerless.

New York Times, September 24, 1898:

CAMP WIKOFF, MONTAUK POINT, L. I.

A storm, brief but violent, swept over the camp last night and this morning, but did no serious damage. The storm warning from the Weather Bureau saved a worse experience, for everything was made snug last night.

AREAS OF HIGH AND LOW PRESSURES.

During the month the paths of seven high areas and of nine low areas have been traced on Charts I and II. It should be noted that these conditions are often extremely indefinite, and it is an open question whether it is possible to trace them with anything like the accuracy assumed in these charts. Often a disturbed condition will cover many thousands of square miles, and the position of the lowest pressure in this region from day to day does not indicate a motion in a low center, but rather an effect of the disturbance. Whenever the path is on the edge of the region of observation it will be understood that the position of the center of high or low is somewhat indefinite, also the pressure recorded at such low center is only that at the nearest point of observation and may differ widely from the pressure at that exact point. The accompanying table gives the principal facts regarding the place of origin and disappearance, the duration and velocity of these highs and lows, and the following remarks are added.

**Highs.**—Four of the highs developed off the Pacific coast, two to the north of Montana, and one in the middle Missouri

valley. No. III disappeared in Texas, but all the others could be traced to the Atlantic coast. The temperature changes accompanying the highs were very moderate, only three of them showing any marked fall. As No. I approached the middle Rocky Mountain region the afternoon of the 6th a fall in twenty-four hours of 32° occurred at Oklahoma, and the fall of 20° covered a region of 250,000 square miles. As high area No. II moved to south Dakota, afternoon of 9th, a fall of 30° occurred all over Kansas.

**Lows.**—There is a remarkable uniformity in the motion of the continental lows in that all but two started north of the fiftieth parallel and maintained their courses to the north of the region of observation till they reached the north Atlantic coast. No. I began in south Idaho and was last noted in the middle Mississippi valley. No. VII was first noted in the west Gulf, afternoon of 17th. This was of slight intensity, as it was held back by high pressures to the north and east; for this reason, also, its velocity, 15.2 miles an hour, was the slowest of the month. During the 9th, 10th, and 11th a storm center moved from the central part of the Gulf of Mexico north-westward to the Louisiana coast, attended by heavy rain and high northeast winds along the middle Gulf coast. During the 12th this storm passed rapidly northward and joined low area No. IV, over eastern Nebraska, by the morning of the 13th.

The highest winds of the month were as follows: 44 miles an hour at Milwaukee, a. m. of 6th, as No. III moved to the north of Lake Superior, and a wind of 40 miles at Pensacola, afternoon of 30th, caused by a disturbance in the Gulf. The heaviest rain of the month was 7.70 inches in twenty-four hours, at Pensacola, 29–30th of month; the heavy rains of the middle Gulf coast on those dates were caused by a storm which apparently remained nearly stationary over the west Gulf from the 27th to the close of the month.—H. A. Hazen, Professor.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	1, p. m.	37	124	8, p. m.	40	72	4,080	7.0	583	24.3
II.....	7, p. m.	55	109	15, a. m.	46	59	3,390	7.5	452	18.8
III.....	14, a. m.	47	127	18, p. m.	34	101	1,770	4.5	393	16.4
IV.....	15, a. m.	45	100	17, p. m.	36	78	1,330	2.5	528	22.0
V.....	17, p. m.	49	125	21, p. m.	41	72	2,820	4.0	705	29.4
VI.....	21, a. m.	54	117	25, a. m.	47	60	3,330	4.0	880	34.6
VII.....	21, p. m.	36	123	29, a. m.	38	74	4,080	7.5	583	24.3
Total.....							20,780	37.0	4,074	169.8
Mean of 6 paths.....							2,969		582	24.3
Mean of 31.5 days.....									562	23.4
<b>Low areas.</b>										
I.....	31, p. m.*	42	114	3, p. m.	40	94	1,230	3.0	410	17.1
II.....	3, a. m.	51	101	5, p. m.	49	61	1,800	2.5	720	30.0
III.....	5, a. m.	51	98	8, a. m.	48	61	1,650	3.0	550	22.9
IV.....	11, p. m.	53	116	14, p. m.	48	87	1,920	3.0	640	26.7
V.....	13, p. m.	51	117	17, p. m.	48	52	2,880	4.0	720	30.0
VI.....	16, a. m.	54	107	19, p. m.	49	57	2,160	3.5	617	25.7
VII.....	17, p. m.	26	98	24, a. m.	41	69	2,370	6.5	365	15.2
VIII.....	25, p. m.	50	84	28, p. m.	47	59	1,440	3.0	480	20.0
IX.....	26, a. m.	54	111	28, p. m.	53	96	960	2.5	384	16.0
Total.....							16,410	31.0	4,886	203.6
Mean of 8 paths.....							1,823		543	22.6
Mean of 40 days.....									529	22.0

\* August.

RIVERS AND FLOODS.

The light precipitation incidental to the season in the Missouri and middle and upper Mississippi valleys caused the