

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for October, 1902, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: Regular stations of the Weather Bureau, 160; West Indian service stations, 17; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Government Survey, 75; Canadian Meteorological Service, 33; Jamaica Weather Service, 130; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Capt. François S. Chaves, Director of

the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; and Rev. Josef Algué, S. J., Director, Philippine Weather Service; H. H. Cousins, Chemist, and in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$, or $10^{\text{h}} 30^{\text{m}}$ west of Greenwich. The Costa Rican standard of time is that of San Jose, $0^{\text{h}} 36^{\text{m}} 13^{\text{s}}$ slower than seventy-fifth meridian time, corresponding to $5^{\text{h}} 36^{\text{m}}$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

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

The most important storm of the month appeared on the 6th in the Gulf of Campeachy, moved thence to the middle Gulf coast of the United States by the 10th, reached a position off the south New England coast by the morning of the 12th, and advanced over the Atlantic Ocean to a point near the north coast of Scotland by the 16th. The history of this storm previous to the 6th can not be positively determined. It is believed, however, that it originated within an area of low barometric pressure that covered the Gulf of Tehuantepec on October 3, when the barometer read 29.76 inches at Salina Cruz, a fall of .09 inch in twenty-four hours. By the morning of the 4th the low area had apparently shifted its position over the isthmus to the Gulf of Campeachy where, at Frontera, the barometer had fallen .05 in twenty-four hours and to 29.85 inches. During the 5th and 6th the barometric depression deepened over the Gulf of Campeachy and on the latter date acquired hurricane intensity and began a north-northeasterly course over the Gulf of Mexico. Inasmuch as the storms that are encountered over the extreme southern part of the Gulf of Mexico are usually straight northerly gales, or disturbances that are generated by a sweep of strong northerly winds over that region, and as there is no Weather Bureau record of a previous cyclonic development of equal intensity in the part of the Gulf of Mexico from which this disturbance advanced, the storm under consideration presents points of unusual interest. The strong northerly winds which appear to supply

one of the principal elements of storm generation over the southern part of the Gulf were not blowing from the 3d to the 6th; neither is there evidence that the storm moved westward over Yucatan from the Caribbean Sea. It may be allowable to assume, therefore, that the storm developed and intensified within the area of low barometric pressure that appeared first over the Gulf of Tehuantepec, on the Pacific coast, and later over the Gulf of Campeachy, which is the extreme southern bay of the Gulf of Mexico.

The following particulars regarding this storm, as witnessed in the Gulf of Campeachy, are furnished by Prof. A. E. Kennelly, of Harvard University:

On the 6th of October, 1902, we were laying cable from Campeachy toward Frontera de Tabasco in the steamer *Ydun*. On the 5th we had fair weather but with a marked westerly swell, for the first time in three weeks. On the 6th the weather became threatening and the glass fell slowly. The wind steadily increased from south. By 4 p. m., ship's time, the wind and sea had increased in violence to such a degree that it was necessary to cut and buoy our cable, in a position approximately latitude $19^{\circ} 30'$ north, longitude $92^{\circ} 10'$ west. The wind remained at approximately south. The gale increased in violence each hour until 3 a. m. the next morning, October 7, when the ship was evidently in the center of the hurricane with practically calm weather, but heavy sea. The barometer (aneroid) indicated 28.66 inches. Our position is not accurately known since we had drifted northward for nearly twelve hours, but it was in the center and probably about latitude $19^{\circ} 45'$ north, longitude $92^{\circ} 10'$ west. In the center of the hurricane where we had remained for two hours hundreds of birds of all kinds settled on the ship. They seemed all to be land birds, and varied in size from little reed birds to a large

stork. When daylight broke we could see that the sea was strewn with the bodies of birds that had apparently been caught in the gale ashore and had been carried out to sea. When the gale furiously recommenced at 5 a. m., it blew from the north. As the day wore on it turned slowly to the westward. We subsequently learned that the gale had passed over Frontera, and had done some damage farther south on the isthmus. The gale was over by the morning of the 8th, when the ship anchored near the Champotan Shoals.

The approach of the storm was indicated by reports from the middle Gulf coast on the morning of the 10th, and by the night of that date the center of disturbance had crossed the Gulf coast line near Mobile, Ala. At this time the storm had lost the hurricane intensity it possessed over the southern Gulf. The lowest barometer reading reported at 8 p. m. of the 10th was 29.72 inches at Mobile, and the maximum wind velocity noted on that date was 42 miles an hour at New Orleans, La. During the 11th the depression deepened, and in the evening the central pressure, 29.48 inches, appeared over southern Virginia and northern North Carolina. During the 12th the storm passed northeastward off the middle Atlantic and New England coasts with evidence of increased strength, and vessel reports show that the gales that attended its passage over the Atlantic were of unusual violence. Morning reports of the 15th from the British Isles showed 24-hour pressure falls of one-half to three-quarters of an inch on the west and north coasts. On the morning of the 16th pressures were below 29.00 inches at stations in the north of Scotland, and the presence of a storm center slightly to the southward of the Orkney Islands was indicated. From this position the disturbance passed eastward over the North Sea.

Ample and timely warnings were issued to all United States ports regarding the course and character of this storm.

A disturbance that appeared over the east part of the Gulf of Mexico on the 25th moved northeastward along the Atlantic coast to New England, where it deepened and caused high winds on the 28th.

On the Great Lakes the severest storm of the month occurred on the 12th and 13th. This storm first appeared as a shallow depression over the central valleys of California on the 10th. During the 10th and 11th the depression moved eastward to the middle Rocky Mountain region and during the 12th it deepened rapidly and passed north of east to eastern Iowa. By the morning of the 13th the center of disturbance had reached the northern part of Lake Huron, with minimum reported barometer 29.22 inches at Alpena, Mich., and wind velocities of 56 miles an hour at Chicago, Ill., and 42 miles an hour at Cleveland, Ohio, and Buffalo, N. Y. During the succeeding 24 hours the storm advanced over the St. Lawrence Valley with maximum wind velocity of 60 miles an hour at Buffalo, N. Y. Vessel interests were fully advised of the approach of the storms referred to.

On the Pacific coast the severest storm of the month occurred on the north coast on the 27th. Storm warnings were hoisted on the Washington coast the morning of the 27th and the wind increased to gale force in the afternoon without, however, causing any damage to shipping.

The most important frosts of the month occurred from the 14th to 16th and from the 28th to the 31st. On the 14th frost was reported in the lower Missouri Valley and in the Mississippi Valley as far south as northern Arkansas. On the morning of the 15th frost was noted generally from the Ohio Valley to central portions of the middle and east Gulf States. On the 16th frost occurred from the central parts of the east Gulf States over the interior of the South Atlantic States. On the morning of the 28th frost was observed in the Middle-western States. By the 29th the frost area had extended over the interior of the middle and east Gulf and South Atlantic States. On the 30th frost occurred in the interior of the east Gulf and South Atlantic States and thence to the North Carolina coast. Frost was also reported on the 31st generally over North Caro-

lina. In regions where crops were subject to damage by frost, warnings were distributed on the days preceding its occurrence.

In California rain warnings were of value to fruit dryers and raisin makers.

At the close of the month there was evidence of a disturbance south of eastern Cuba. This disturbance moved north-eastward over Santo Domingo and the Atlantic Ocean during the early days of November, 1902, and will be discussed in the MONTHLY WEATHER REVIEW for that month.

BOSTON FORECAST DISTRICT.

The storm of the 28th was quite severe along the northern coast, the wind being from east and southeast, and shipping was delayed and some damage resulted. Warnings were displayed well in advance of the storm. The first killing frost of the season occurred on the 22d, and was announced twenty-four hours in advance. Considerable benefit was derived from the warnings.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

Storm warnings were issued for the Louisiana and Mississippi coasts on the 10th and 22d, and both were fully justified. Two vessels were lost in the storm of the 22d. The steamer *Palor City* sunk in the river as a result of the steamer *Natches* being blown against her. A three-masted schooner, the *La Plata*, went aground on the Chandeleur Islands, Miss. Frost, for which warnings were issued, occurred in Arkansas on the 14th, 28th, and 29th.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The stormy season which set in earlier than usual during September continued through the month of October, with increasing severity. It is probable that the daily forecasts and storm warnings were of great benefit to marine interests, as no important casualties have been reported.—*H. J. Cox, Professor.*

DENVER FORECAST DISTRICT.

With the exception of a frost warning sent to a few points in the extreme southeastern part of Colorado on the morning of the 3d, no special warnings were issued.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

Rain warnings were issued to fruit dryers and raisin makers throughout the State, and at nearly all points trays were stacked before the rains began. Storm warnings were displayed on the northern California coast on the 21st and 22d. Incoming mariners reported severe weather outside on those dates.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

Frost forecasts were discontinued after the season of danger to crops had passed. Storm warnings were ordered for three disturbances, the most severe of which occurred on the 27th. *E. A. Beals, Forecast Official.*

RIVERS AND FLOODS.

The usual autumnal quiet of the rivers was not disturbed during October except in the Middle and South Atlantic States where there were occasional interruptions of limited duration and extent, caused by the heavy rains that are the almost invariable accompaniments of storms of the southwestern and Gulf of Mexico types. The first was a moderate flood in the James and Roanoke rivers from the 6th to the 8th, inclusive, the result of heavy rains over southern, and particularly over