

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: H. H. KIMBALL.

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JUNE, 1902.

No. 6

FORECASTS AND WARNINGS.

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

One of these storms first appeared over the Gulf of Mexico, passed northeastward along the Atlantic coast of the United States during the 15th and 16th, was central over the Canadian Maritime Provinces on the 17th, and passed northeast of Newfoundland during the 18th. This disturbance was located over mid ocean on the 19th, and on the 20th its approach was indicated by reports from stations on the west coast of Ireland, where a barometric pressure of 29.24 inches was reported at Valentia. During the 21st and 22d this storm moved northward off the west coasts of Ireland and Scotland. From the 11th to the 13th a disturbance moved southeastward over the British Isles, with barometric pressure of 29.40 inches at London on the 13th; during the 14th and 15th this storm area passed northeastward over the North Sea. From the 23d to the 29th a well-marked disturbance moved slowly from New England over the Canadian Maritime Provinces and Newfoundland, with lowest reported barometric pressure, 29.20 inches, at Montreal on the 26th.

Five storms of moderate intensity advanced from the coast of the United States over or near Newfoundland in June.

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OCTOBER, 1902.

No. 10

FORECASTS AND WARNINGS.

By Prof. E. B. 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 *Ydem*. 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 northeastward 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.

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NOVEMBER, 1902.

No. 11

FORECASTS AND WARNINGS.

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

Unusually stormy weather prevailed over the North Atlantic Ocean during November, 1902. On the British coast gales prevailed from the 5th to the 12th and during the last decade of the month. Three storms of marked strength moved eastward over Newfoundland from the 23d to the 28th. The gales that began on the west coast of the British Isles on the 5th attended the passage of a storm that appeared over the Caribbean Sea on the morning of October 31. This storm passed northeastward over Santo Domingo during November 1, and advanced thence northeastward over the Atlantic with a gradual increase in intensity. On October 31 the following message was telegraphed West Indian Weather Bureau stations from San Juan, Porto Rico, to Havana, Cuba, and to coast Weather Bureau stations from New Orleans, La., to Boston, Mass.:

Evidence of a disturbance south of eastern Cuba which may develop strength and move northward. Not considered safe for vessels to leave Cuban ports or to sail for Cuban waters during the next twenty-four hours.

On November 1, the same disposition was made of the following message:

Center of disturbance moving northeastward over Santo Domingo. No indication of hurricane in the West Indies, but strong north to northeast winds will prevail over the ocean north of the West Indies and off the United States coast.

The observatory at Horta, Fayal, Azores, was cabled as follows:

Disturbance moving northeastward from the West Indies. Unsettled, stormy weather indicated over middle and western Atlantic next few days.

The following message was cabled to Lloyds, London:

Westward bound vessels will experience strong north to northeast winds, and possibly severe gales.

The storm referred to apparently moved northeastward over the Atlantic Ocean, and its approach to European waters was indicated on the morning of the 5th by reports from the British Isles.

On the 23d, Lloyds, London, was cabled as follows:

Storm of marked strength moving eastward over Newfoundland will probably be met by westward bound steamers.

This information was also telegraphed to Boston, New York, and Philadelphia for the information of transatlantic shipping interests. Exceptionally severe gales were encountered by transatlantic steamers during the closing days of November.

The storms of the month were not of marked severity on the immediate coasts and Great Lakes of the United States. From the 7th to the 10th a disturbance moved northeastward from off the Florida coast to Newfoundland, which developed considerable strength when off Hatteras. A squadron of United States warships that sailed from Fort Monroe, Va., November 5 for Culebra Island, West Indies, encountered a gale southeast of Cape Hatteras, during which two coal barges were lost. On the 25th and 26th a storm that had advanced

from the Rio Grande Valley caused gales along the middle Atlantic and New England coasts.

Three disturbances that first appeared over the west part of the Gulf of Mexico moved northeastward to the Great Lakes, and one of these was the storm before referred to as having moved eastward over Newfoundland on the 23d.

Several vessels were lost on the Great Lakes during the third decade of the month. On the night of the 23d the steamer *Sylvanus J. Macy* sprung a leak off Point Burwell, Ontario, and sank. On the 25th the steamer *Quito* ran ashore in a northeast gale, while trying to make the harbor at Lorain, Ohio. During the night of the 29th the steamer *Charles Hebard* was wrecked at Point Mamainse, Lake Superior.

A number of barometric depressions appeared on the north Pacific coast, notable among which were those of the 8-10th, and 16-18th. The storm of the 16-17th was particularly severe, and a number of expressions of appreciation have been received regarding the value to shipping interests of the warnings issued in connection therewith.

Ample warnings were issued of all storms that visited the Atlantic, Pacific, and Gulf coasts and the Lake region.

The first important cold wave of the season swept southward and eastward from the British Northwest Territory over the interior of the country from the 26th to the 28th, carrying the line of freezing temperature almost to the coast line of the Gulf of Mexico. Timely warning was given to all interests that were subject to damage or loss by frost and cold. The following comment is made by the New Orleans press on the warnings issued for the Gulf district, the only section east of the Pacific coast States in which agricultural products were endangered by frost:

The Times-Democrat of November 28, 1902:

The warnings sent out by Dr. Cline Wednesday morning were timely for all parts of this extensive district. Freezing weather occurred over Arkansas, Oklahoma, and northwest Texas. Heavy frosts occurred over the interior of Texas, and frost occurred generally over southern Texas and all of Louisiana. Frost was in evidence in New Orleans, and on the outskirts was quite heavy. The warnings of these severe conditions were issued by the Weather Bureau well in advance, and all business interests were prepared for the frosts and freezing.

The Daily Picayune of November 29, 1902:

This season's special forecasts were inaugurated Wednesday by the forwarding of frost warnings to every station in the west Gulf district, with the result that planters and farmers, relying implicitly upon Dr. Cline's forecasts, which were so accurate in past seasons, had time to protect their crops from the low temperatures. This warning, in ample time, was a thanksgiving offering to southern industrial and agricultural interests, and its value can hardly be estimated in cold cash.

From the 25th to the 30th frost was general in California. The frosts of this period, and also the rains of the month were covered by forecasts and special warnings issued from San Francisco.

During the third decade of the month heavy rains caused destructive freshets in eastern Texas, and large areas of bottom lands along the Red River above Shreveport were inundated. The floods in the Red River continued into December, and will be referred to in the MONTHLY WEATHER REVIEW for that month.