

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for February, 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, 162; West Indian service stations, 13; 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 ~~Railway~~ Company, 96; Hawaiian Government Survey, 200; Canadian Meteorological Service, 33; Jamaica Weather Office, 160; 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; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; 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.

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 always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

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

The month opened with a storm of marked intensity central near the Azores. At Horta, the barometer had fallen rapidly to 29.42 inches and a gale was blowing from the southeast. At 10:50 a. m. of the 1st, Lloyds, London, and Atlantic ports of the United States from Boston to Norfolk, were advised with regard to this storm, and informed that it would probably be encountered by west bound vessels which left European ports that day. During the next three days the center of this disturbance moved eastward and disappeared over southern Europe, its passage being attended by northeast gales between the fortieth and fiftieth parallels east of the thirtieth meridian. The barometer continued abnormally low, with prevailing gales, from the Atlantic coast of the United States eastward to southern Europe, until the 7th, with minimum pressure, 29.18 inches, at Horta, Azores, on the 5th; from the 8th to the 11th the presence of a deep barometric depression over the Canadian Maritime Provinces caused a continuation of stormy weather over the western Atlantic. Moving slowly eastward this latter depression reached the Grand Banks on the 13th; it apparently remained nearly stationary during forty-eight hours, with barometric pressure below 29.00 inches, and then moved north of east over mid-ocean in high latitudes. On the morning of the 13th advices were cabled Lloyds, London, and telegraphed to

United States Atlantic ports regarding the character and probable course of this storm.

This disturbance was followed by another of exceptional strength, which passed northeastward along the Atlantic coast from Georgia to Nova Scotia from the 15th to the 18th, crossed Newfoundland during the 19th, and moving thence eastward was felt over the British Isles from the 22d to the 26th. On the 17th Lloyds, London, were notified of the position, character, and calculated course of this disturbance.

The storms of February in the United States first appeared either in the middle Rocky Mountain districts, or on the north Pacific coast; with one exception they passed southeastward over the Southern States, and thence northeastward over the Atlantic seaboard, where they developed great strength.

The most important of these storms in the Atlantic coast districts were those of the 2-3d and the 17-18th; they were attended on the middle and north Atlantic coasts by gales of unusual severity, and on the extreme north Atlantic coast by barometric pressure below 29.00 inches.

The severest storm of the month in the west and northwest districts appeared off the north Pacific coast during the 23d. By the 25th the barometer had fallen rapidly in the middle and north Pacific coast districts, with a minimum of 28.84

inches at Neah Bay, Wash., on the 24th. Gales of exceptional severity prevailed along the Pacific coast during the 23d, 24th, and 25th. The highest velocity reported occurred at Point Reyes, Cal., where, during a 5-minute period at 11 a. m. on the 25th, 98 miles an hour was recorded, with an extreme velocity for one mile at the rate of 103 miles an hour. By the morning of the 26th, the center of this storm had reached Wyoming, and during the succeeding twenty-four hours it passed southeastward to southern Missouri, where, on the morning of the 28th, the center of disturbance had moved northeastward over the upper Mississippi Valley, with minimum reported barometric pressure of 28.68 inches at Davenport, Iowa. It then passed northeastward over Lake Superior, with gradually diminishing energy. The Pacific storm just referred to caused the heaviest gales of the month in the Gulf and South Atlantic States.

A storm that appeared over extreme northwest Texas on the morning of the 22d, reached the lower Mississippi Valley on the morning of the 24th, and passing thence northeastward over the Atlantic coast States from the 25th to the 28th, was attended by heavy precipitation and high temperature, which resulted in destructive floods in the Apalachian Mountain districts.

Warnings were displayed well in advance of the gales of the month, and no severe storms occurred for which warnings were not issued.

The destructive floods in the Appalachian Mountain streams during the closing days of the month constituted a notable feature of February. A detailed account of these floods and of action taken by the Weather Bureau in issuing warnings in connection therewith will appear in the March REVIEW under the heading Rivers and Floods. Preliminary advices regarding flood prospects were issued from Washington on February 22 and 23, and on the morning of the latter date the following information was telegraphed Weather Bureau stations in Pennsylvania and West Virginia:

Warmer weather indicated for next two days, with conditions favorable for rain by Monday night. These conditions will be most favorable for a general breaking up of ice in the mountain rivers and streams of Pennsylvania, western Maryland, and West Virginia. Notify all interests concerned that danger from flood in low lying land is imminent.

The following extracts indicate the character and value of the warnings issued at stations of the Weather Bureau in Pennsylvania and West Virginia:

Pittsburg Dispatch, March 2, 1902.

WEATHER BUREAU'S GOOD SERVICE.

Seldom has the value of the Weather Bureau been more effectively demonstrated than during the present flood. The first warning sent from Washington headquarters was issued as early as last Sunday, February 23. The local bureau at once notified every one likely to be interested—railroads, trolley lines, police headquarters, and river operators—to expect very high water. This was followed by securing reliable and early reports from all points in the watershed, the Pittsburg observer remaining on duty continuously Thursday and Friday nights, receiving and distributing the latest reports. Thanks to this valuable and efficient service transportation companies, warehouses, commission merchants, and the river interests were enabled to save a considerable amount of property.

The police of the two cities also rendered splendid service. When, on Friday, the 28th, it was seen that there would be a 30-foot stage, the Weather Bureau promptly advised the heads of the police departments in Pittsburg and Allegheny, and officers were at once instructed to notify persons having residences or property in the districts in danger. As a result when the flood did come there was very little property in the cellars, and as far as possible that in danger elsewhere had been removed to safety. That the damage did not far exceed what it does is due to the early warnings of the forecast officials and the excellent work performed by the local office.

Parkersburg News, March 4, 1902:

The accuracy of the weather department's prognostications has been remarkable, and gives the public an added faith in the efficiency of that important and valuable branch of the Federal Government.

The following is an extract from a report made by the official in charge of the Weather Bureau office at Scranton, Pa.:

At 11:38 a. m., February 23, a flood warning was received from the Central Office; it was immediately given to the chief dispatcher of the Delaware, Lackawanna, and Western Railroad, telephoned to the chief dispatcher of the Delaware and Hudson Railroad at Carbondale, to the director of public safety of the city, and to the chief operator of each of the telephone companies, and the warning in full was printed on about 400 cards and mailed to as many addresses throughout this section of the State; copies were also delivered to all the local newspapers. By these means the warning was so widely disseminated throughout northeastern Pennsylvania that no one need have been ignorant of the effect of a rain or sudden thaw on the streams and rivers.

A rapid thaw did not occur until February 28, when a rain set in accompanied by high temperature which melted the snow and ice very rapidly, and caused alarming floods in all streams and rivers throughout this section of the State. The flood continued throughout March 1 and 2, and in the Susquehanna River during the 3d. At this time it is impracticable to obtain an accurate estimate of the damage done, but a fairly approximate estimate of the damage to city property, made by the director of public works, is \$50,000.

BOSTON FORECAST DISTRICT.

The weather of the month was quite stormy, with sudden and decided changes in temperature, which were announced in the forecasts. The most notable storms occurred on the 2d and 17th. The first caused high southerly and westerly winds, while the storm of the 17th was accompanied by easterly winds of great force. The depression of the barometer in each storm was remarkably low. Warnings were displayed well in advance of the high winds, and no storm winds occurred for which warnings were not displayed. It is believed that shipping was greatly benefited by the warnings.—*J. W. Smith, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The temperature continued much colder than usual during the first three weeks of the month, but the last week was marked by a rapid rise in temperature.

Warnings were issued well in advance of the cold wave which overspread the district the first part of the month, but similar warnings were not required during the remainder of the month.

Advisory messages were sent to open ports on Lake Michigan on the 2d and 3d for high northwest winds which occurred in connection with an advancing cold wave. No other storm of marked importance approached the Lake region during the month until the last few days, the western storms generally being diverted to the south of the district. On the 26th a storm of remarkable extent and intensity crossed the country from the Pacific coast and slowly approached the Lake region with constant and increasing energy. Storm warnings were sent to all ports with the advice to hold the vessels in safe harbors, and no casualty has been reported.—*H. J. Cox, Professor.*

NEW ORLEANS FORECAST DISTRICT.

The month was characterized in this district by a number of moderate storms, for which warnings were displayed. No storm occurred without warnings, and, as a rule, those issued were verified. Cold wave warnings were ordered in portions of the district on the 3d and 4th, and no cold waves occurred without warnings. Frost warnings were issued for the sugar and truck growing districts on the 10th, 16th, 20th, and 21st. Timely warnings were issued for all frosts that occurred.

The forecasts of temperature and rainfall proved satisfactory to interests which make use of such information.—*I. M. Cline, Forecast Official.*

DENVER FORECAST DISTRICT.

The weather conditions during February were very unsettled as a result of the development of a large number of low areas

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