

MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW summarizes the current manuscript data received from about 3,500 land stations in the United States and about 1,250 ocean vessels; it also gives the general results of the study of daily weather maps based on telegrams or cablegrams from about 200 North American and 40 European, Asiatic, and oceanic stations.

The hearty interest shown by all observers and correspondents is gratefully recognized.

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As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea-level and latitude 45°.

FORECASTS AND WARNINGS.

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

Barometric movements over the Northern Hemisphere were unusually rapid during April, 1909. In the Asiatic area the alternations of high and low pressure were quite regular and the intervals between the crests and troughs averaged, respectively, about five days. During the first decade of the month high barometer and settled fair weather prevailed over west-central Europe. During the second decade and until the closing days of the month, however, there was a rapid succession of barometric disturbances over that region. The Atlantic and Pacific areas also showed a rather uniform succession of high and low pressure.

In the United States the month was marked by periods of unusually low temperature, and at its close the line of freezing weather was traced from the upper Lake region to New Mexico and snow was falling in the upper Lake region and upper Mississippi Valley. From the 5th to the 8th a storm of marked intensity advanced from the southern Plateau to the St. Lawrence Valley, attended by snow in the middle Rocky Mountain districts and by heavy rain from the States of the lower Missouri Valley over the Ohio Valley and the Gulf and Atlantic coast States, and by severe windstorms from the Southwest over the Great Lakes and the Middle Atlantic and New England States. On the 7th the following special forecast was issued:

Several days of comparatively cool weather are indicated for the eastern half of the United States, with frost in the middle and upper Mississippi and Ohio valleys and the Lake region, and thence over the Middle Atlantic and New England States. Frost is also likely to occur in the interior of the Gulf and South Atlantic States.

Following the disturbance of the 5-8th an area of high barometer swept south and east from the British Northwest Territory attended by frost-bearing temperatures that reached the west Gulf States the morning of the 9th and covered the east Gulf and Atlantic States the morning of the 10th. On that date frosts were general in the South, including northwestern Florida, and on the morning of the 11th the minimum reading of 26° was noted at Washington, D. C. The princi-

pal storms of the second decade of the month advanced from the middle Rocky Mountain region to the north Atlantic coast from the 11th to the 14th, and from the 17th to the 19th. The storm of the 11-14th was attended by heavy snow in the middle Rocky Mountain districts, by heavy rain in districts east of the Rockies, and was followed by a cool wave that caused frost in central portions of Louisiana and Mississippi. A storm that advanced from the middle Rocky Mountains to the Lake region from the 20th to the 22d was attended by heavy snow and was followed the night of the 22-23d by frost in Colorado. On the 21st a warning of freezing temperature was issued for that section and on the morning of the 23d the temperature fell to 27° at Pueblo and in the Arkansas Valley. The Star-Journal, Pueblo, Colo., of April 23, 1909, comments as follows regarding the frost:

The Weather Bureau predicted the frost more than twenty-four hours ahead and every effort was made to give the warning to the farmers. Almost without exception fruit growers whose crops were endangered heeded the warning of the Weather Bureau and protected every early-blooming fruit tree with plenty of smudge fires and so prevented any loss by frost.

From the 28th to the 30th a storm of exceptional severity advanced from the middle Rocky Mountain region to the Great Lakes, attended by snow in northern districts from the Rocky Mountains to New England, and by heavy rain, high winds, and severe local storms in the central valleys and the Lake region. Following this disturbance a period of unseasonably cold weather set in over the country generally east of the Rocky Mountains.

BOSTON FORECAST DISTRICT.*

[New England.]

Temperature was somewhat below normal in Maine, New Hampshire, and Vermont and slightly above normal in the three southern States. Precipitation was generally above normal, the excess ranging from 1 inch to 2 inches in northern portions to 2 and 3 inches in Rhode Island and Connecticut. Snowfall in measurable amounts was quite general, except in

Massachusetts and Rhode Island, where there was very little. The greatest amount for the month was 30 inches, at Patten, Me. There were no prolonged and destructive gales and no great delay to shipping from stress of weather. There were no storms without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.*

[Louisiana, Texas, Oklahoma, and Arkansas.]

Temperature was generally below the normal, and, except over eastern portions of Louisiana and Arkansas, precipitation was deficient. Frost warnings were issued on eleven dates, and warnings were issued for all frosts that occurred in the apple-growing section of Arkansas. High winds occurred over the interior on the 6th and 30th, forecasts for which were issued on the previous dates, and strong winds occurred along the Gulf coast on a few dates, for which warning had, as a rule, been issued.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.*

[Kentucky and Tennessee.]

With the exception of two quite warm periods, the 4-6th and 16th-21st, unusually cold weather predominated, with frequent frosts in the first and last decades of the month. Frost warnings were issued on seven occasions, but damage was confined mostly to the first decade. Precipitation was in excess, and over much of Kentucky it was nearly double the normal amount. There were four rain periods and many thunderstorms, a number of which were attended by violent wind squalls and excessive rains. There was also considerable destruction by lightning. The storm of the 29-30th was of unusual severity and the damage by wind and water extensive.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.*

[Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, and Montana.]

Precipitation was above the average over the eastern half and below normal over the western section of the district, while temperature was quite generally below the average, the deficiency in the Northwest being considerable. Storms crossed the district with great frequency, causing the excess of rainfall above referred to in the eastern section. Four of the storms were attended by high winds. The first reached the Lake region the night of the 6th and crossed it during the 7th. Storms also crossed the Lakes during the 11-12th, 21st, 29-30th. The usual advices were sent to open ports in connection with the first storm mentioned, and storm warnings were ordered after the 10th, when the storm-warning season began. Frost warnings were issued for several days for Illinois, Indiana, Missouri, and Kansas, and when exceptionally low temperatures seemed imminent for the Northern States special forecasts for temperatures of freezing or below were made.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.*

[Wyoming, Colorado, Utah, New Mexico, and Arizona.]

Except in southern portions of Arizona and New Mexico, the weather was cooler than usual. Precipitation was in excess in north-central and northwestern Colorado and deficient in other portions of the district. In southern New Mexico and southern Arizona no rain fell. Following the passage of areas of low pressure, the weather was decidedly cold over the greater portion of the district on the 5-8th, 11-12th, 20th-23d, and 29-30th. On the morning of the 30th a destructive frost occurred in Wyoming, Utah, Colorado, and northern portions of New Mexico and Arizona. All important weather conditions were covered by the forecasts.—*P. McDonough, Local Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.†

[California and Nevada.]

The month was abnormally dry. No storms crossed the State from the ocean and there were no southerly extensions of North Pacific low areas. Unusually warm weather prevailed over southern California at the beginning of the month. A

few thunderstorms were reported in the mountain districts on the 28th. There were no frost nor storm warnings issued during the month.—*Alexander G. McAdie, Professor of Meteorology.*

PORTLAND, OREG., FORECAST DISTRICT.†

[Oregon, Washington, and Idaho.]

The month was cool and dry, with frequent frosty mornings. Warnings were issued for practically all the frost that occurred. The interest taken in frost warnings is constantly increasing and more smudging was done this year than ever before. There are still, however, large fruit sections in the district where no attempt is made to protect the crops from frost by any of the methods in vogue. A new method of smudging, which consists of placing a large number of small pots in the orchard and burning crude petroleum in them, has been tried. Fires thus produced make a dense smoke and heat to some extent the surrounding air, and it is claimed that the plan has been very successful.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The month was characterized by the usual seasonal floods east of the Mississippi River, but none of them was in any way marked, except in portions of New England, where warm rains and melted snow and ice on the 6th and 7th caused a decided rise in all the rivers, with considerable resulting damage. Flood stages were general along the Connecticut River, with a crest of 19.1 feet, 3.1 feet above flood stage, at Hartford, Conn., on the 10th. Similar conditions on the 13th and 14th caused a second and more pronounced rise, with a crest stage of 24.7 feet at Hartford, on the 17th. All the tributary streams in northern New Hampshire, northern Vermont, and western Maine were in flood, and much damage of the usual character resulted. Warnings were issued whenever possible, and through them a large amount of portable property was saved. Warnings were also issued during the latter half of the month for the moderate floods in the Susquehanna and James rivers. The damage was insignificant, and property to the amount of \$10,000 was saved along the James River.

Over the Black Warrior and lower Tombigbee watersheds heavy rains from the 22d to the 27th, inclusive, were followed by a flood of considerable proportions, beginning on the 26th and continuing through the early days of the following month. On the 1st day of May the stage of the river at Demopolis, Ala., was 50 feet, 15 feet above flood stage, with a further rise of 1.2 feet indicated. The first warnings were issued on the 24th, and supplementary ones frequently thereafter. The losses amounted to about \$40,000, about equally divided between crops and suspension of farm and other work. To the lumber interests the flood was very welcome, as it permitted the movement of a large quantity of logs. Losses by erosion were offset by alluvial deposits. The value of property saved through the Weather Bureau warnings was about \$200,000.

In the Pearl and Pascagoula rivers the floods were more moderate, with losses amounting to about \$12,500, and property saved to the value of about \$10,000.

Nothing of special interest occurred along the three great rivers of the interior. There was a moderate flood in the Mississippi River in the vicinity of Hannibal, Mo., beginning on April 12 and lasting well into May, but little or no damage resulted. A sharp rise set in over the upper Ohio and tributaries on the last day of the month, and on the morning of May 1 a moderate flood was in progress.

ICE.

No ice was reported on the 11th day of the month, when the Penobscot River opened at Mattawankeag, Me. The Connecticut River at Wells River, Vt., opened on the 5th, and the

* Morning forecasts made at district center, night forecasts made at Washington, D. C.

† Morning and night forecasts made at district center.