

THE WEATHER ELEMENTS.

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PRESSURE AND WINDS.

The greater part of October, 1921, was notably free from violent atmospheric disturbances, and on the whole the reputation of the month as one of the best of the year was fully maintained. Moderately high pressure with fair and mild weather continued almost unbroken during the first three weeks over nearly all central and southern districts.

No storms of importance occurred during this period and precipitation after the first few days was usually confined to small areas along the northern border, and in portions of the upper Mississippi Valley, Great Lake region, and thence eastward. About the 23d a storm of the West Indian hurricane type crossed the western end of Cuba and by the morning of the 25th was approaching the west Florida coast near Tampa. During the following 24 hours it crossed the central portion of the Florida Peninsula attended by high winds and heavy rainfall over much of the State. A full account of this storm will be found in another portion of this REVIEW. (See pp. 567-570.)

About the time the storm referred to above approached the Florida coast, a second storm had developed over the Southwest, and by the morning of the 25th it had advanced to western Kansas, increased greatly in intensity and was attended by rain or snow over much of the Rocky Mountains and western portions of the Plains region. During the following 24 hours this storm moved slowly northeastward into the lower Missouri Valley, but the southward prolongation of a high-pressure area from the Hudson Bay region blocked its eastward progress and it soon dissipated. For the same reason the advance northward of the West Indian hurricane, central over Florida on the 25th and 26th, along the Atlantic coast—the usual course of such storms—was effectually obstructed.

During the last few days of the month low pressure developed over the middle Plains region and drifting slowly eastward caused unsettled and rainy weather over most districts from the Mississippi Valley eastward.

The average pressure for the month was highest over the southern drainage basin of the Ohio, and in the northern portions of the Plateau and Rocky Mountains. It was below normal almost universally to eastward of the Rocky Mountains both in the United States and Canada, and generally above normal to the westward.

The persistent high pressure over Tennessee and adjacent portions of the Gulf States favored southerly winds from the Ohio and middle Mississippi Valleys northward to near the Canadian boundary, while much of the region to the southward and eastward of the high area had northerly or northeasterly winds. Northwesterly winds prevailed generally along the northern border from the upper Lakes to the Rocky Mountains. West of the Rocky Mountains the winds as usual were greatly diversified.

High winds were of infrequent occurrence and usually affected but small areas, save during the passage of the West Indian hurricane over the Florida Peninsula, where they covered an extensive area and caused much damage.

TEMPERATURE.

Marked variations to colder or warmer were infrequent during the month and changes of as much as 20° in 24 hours were observed in but few instances, these being confined mainly to the early portion of the month.

The first decade was moderately cool over the districts from the Great Plains eastward, and this condition persisted over the southeastern districts till after the middle of the month. This was mainly due to the clear weather, particularly at night, whereby radiation became unduly active, causing lower night temperatures than usually prevail, the days being generally warm.

Over the more western districts the month was al-
wholly warmer than the average, particularly in central and northern portions of the Rocky Mountain and Plateau regions, where temperatures below normal were confined mainly to three or four days only.

The latter half of the month was warmer than usual in nearly all portions, the week ending October 25 being particularly warm in the Rocky Mountain and Plateau regions, and the last week shows nearly as much excess in the great central valleys.

The warmest and coolest periods for the different sections were widely scattered through the month. The principal warmest periods were about the 2d and 3d over the southeastern districts, the 19th and 20th over California and the far Southwest, and the 24th and 25th in the Ohio Valley and adjacent territory. The lowest temperatures were observed about the 8th to 12th in the central valleys, near the middle of the month in the East Gulf and South Atlantic States, and near the middle of the last decade in the western mountain districts.

For the month as a whole the average temperature was above normal over nearly the entire country, only a small area of the southern Appalachian Mountain region and portions of the East Gulf and South Atlantic States having averages below normal.

In portions of the Rocky Mountain and Plateau regions the month was the warmest October during 50 years of observation, and over the north-central districts it added another to the already abnormally long list of months with average temperatures above the normal.

PRECIPITATION.

The most prominent feature of the weather of the month was the almost universal deficiency in the precipitation.

Some heavy rains occurred near the beginning of the month at points in southern California and southwestern Arizona, and rains were fairly general during the first three or four days over the more eastern districts. Thereafter rainfall was scattered and greatly deficient until near the middle of the third decade, when heavy rains occurred over the greater part of Florida and lighter rains along the south Atlantic coast in connection with the severe West Indian hurricane that crossed the Florida Peninsula on the 25th and 26th. At the same time, general precipitation, rain or snow, set in over the western mountain districts and during the following few days overspread much of the central and northern Great Plains and extended into portions of the Mississippi and Ohio Valleys and Lake region. During the same period general rains set in over the far Northwest and extended eastward and southward over the greater part of the Plateau and Pacific coast States. The last few days of the month brought beneficial and greatly needed rains over many portions of the Gulf and Atlantic coast States and precipitation was more or less general as far west as the Mississippi River.

Over the Florida Peninsula the precipitation for the month was far in excess of the normal, due principally to the heavy falls in connection with the hurricane referred to previously, the monthly total exceeding 30 inches at the point of heaviest recorded rainfall. Some

heavy rains were reported along the coasts of Oregon and Washington, the maximum monthly amount exceeding 15 inches in extreme northwest Washington. In portions of the Great Lake region, Ohio Valley, New England, and some adjacent territory the monthly falls ranged from 2 to 4 inches, and over small areas in these districts the amounts for the month were slightly in excess of the normal. Elsewhere precipitation was usually far less than normal, and generally insufficient for local needs.

SNOWFALL.

In the mountain regions of the West snow occurred at most of the higher elevations, the total fall in portions of the Sierra amounting to a foot or more, and larger amounts were reported in the high mountains of Washington. In the Rocky Mountain system snow was general,

the greatest depths, amounting to nearly 2 feet, being reported from southwestern Colorado. East of the Rocky Mountains snow occurred over most of the northern border States and in some cases as far south as the Ohio River, but the amounts were usually no more than traces.

RELATIVE HUMIDITY.

The generally dry condition of the atmosphere, apparent from the long periods without material precipitation, is clearly indicated by the negative departures from the normal of the average relative humidity for the month. In practically all portions of the country the relative humidity was less than the normal for the month, and in portions of the Great Plains and Rocky Mountain districts the averages were frequently from 10 to nearly 30 per cent deficient.

SEVERE LOCAL STORMS.

The table herewith contains such data as have been received concerning severe local storms that have occurred during the month. A more complete statement will appear in the Annual Report of the Chief of the Weather Bureau.

Place.	Date.	Time.	Width of path.	Loss of life.	Value of property destroyed.	Character of storm.	Remarks.	Authority.
Florida.....	23-25		Yards.			Hurricane and tidal wave.	Severe West Indian hurricane passed over portion of State, causing large property damage and some loss of life. Full details elsewhere in this REVIEW.	Official, U. S. Weather Bureau.
Sacramento, Calif.....	26	2:45 to 2:55 p. m.			\$17,000	Small tornado.....	Considerable damage to roofs and buildings under construction.	Do.
Angloese, N. J.....	31	p. m.		11		Wind.....	Two fishing boats capsized, drowning 11 men...	New York Tribune (New York, N. Y.).

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STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

Storm warnings.—There was marked activity in the movement of areas of low pressure across the country during the greater part of the month, which was in striking contrast to the stagnant conditions that prevailed during October, 1920, and storm warnings were displayed on approximately half the days of the month on some portion of the Atlantic or East Gulf coasts or the Great Lakes.

The first disturbance of marked intensity that crossed the Washington district was central over western New York at 8 p. m. of the 7th, moving rapidly northeastward, and southwest storm warnings were issued at 9:30 p. m. for the Atlantic coast from Delaware Breakwater northward. The next warnings were issued for Lake Ontario and eastern Erie at 9:30 a. m. of the 9th in connection with a disturbance that was central over Lake Huron and moving rapidly eastward.

At noon of the 10th a disturbance of considerable intensity was central over western New York moving quite rapidly northeastward and southwest warnings were immediately ordered for the Atlantic coast from Delaware Breakwater northward.

The next storm of importance was central over lower Michigan on the morning of the 18th and moving northeastward, and southwest storm warnings were ordered for Lakes Huron, Erie, and Ontario. On the following day another disturbance was central over northern Lake Michigan, moving rapidly east-southeastward, and warnings were issued at 2 p. m. for Lakes Superior, Michigan,

and northern Huron. Two days later still another disturbance of marked intensity moved rapidly eastward over northern Minnesota and the northern Lake region, and southwest storm warnings were issued at 9:30 p. m. of the 21st for Lake Superior and the northern portions of Lakes Michigan and Huron. The following morning the warnings were extended over Lakes Erie, Ontario, and southern Huron, and at 1:30 p. m. southwest warnings were issued for the Atlantic coast from Sandy Hook northward. The highest velocity reported in connection with this storm was 72 miles an hour from the southwest at Buffalo, N. Y.

On the 25th there was a strong area of high pressure over Ontario and a disturbance of marked intensity central over Kansas, moving slowly northeastward. At 5 p. m. northeast storm warnings were ordered for the Great Lakes, except Ontario and eastern Erie. This storm decreased greatly in intensity as it moved northeastward from Kansas to Minnesota and verifying velocities were reached at only a few stations.

Storm warnings were issued for the East Gulf coast and the Atlantic coast as far north as the Virginia Capes well in advance of the tropical storm that passed over the Florida Peninsula on the 25th. The complete history of this storm and the warnings issued in connection therewith are given on pages 567-570 of this REVIEW.

Frost warnings.—Warnings of frost were issued on numerous dates for various portions of the Washington forecast district. These warnings were for a limited area, as a rule, except on the 8th, 11th, 12th, and 13th, when they were for a considerable portion of the district.—*Charles L. Mitchell.*