

THE WEATHER ELEMENTS.

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PRESSURE AND WINDS.

The most important phase of the pressure distribution during the month was the persistence of anticyclonic conditions over nearly all northern districts, including the Canadian Provinces, and a corresponding reduction in the number of cyclones entering the United States from the far Northwest.

The month opened with an area of high pressure dominating the north-central districts, which persisted with more or less strength until after the end of the first decade, drifting slowly southeastward toward the end of the period. As this anticyclone approached the Atlantic coast another entered the far Northwest and pursued its easterly course, though with diminishing strength, and finally merged with that preceding, which still maintained its identity over the Atlantic coast districts.

After an interval of a few days, during which moderately low pressure dominated the Canadian Northwest and adjacent portions of the United States, another anticyclone entered the Pacific States and during the last few days of the second decade overspread the Plateau and Rocky Mountain districts, and moving thence eastward brought fair and cool weather over all interior and most eastern districts during the early part of the third decade. As this passed eastward over the St. Lawrence Valley, another entered the far Northwest, and with some variations in strength and location of center, finally developed into an anticyclone of marked importance central over the middle Rocky Mountain region by the end of the month, attended by unusually low temperatures over the districts immediately to the eastward.

The important cyclones of the month entered the country mainly from southern points, and were notably absent from the far Northwest, where high pressure greatly hindered their entrance from the adjacent ocean.

No storm of importance covered any material area during the first half of the month, although rains were of frequent occurrence in the Southern Plains and adjacent areas, with local heavy falls, particularly in Oklahoma and parts of Texas, New Mexico, and adjacent areas.

By the middle of the month low pressure had overspread the Texas coast, and during the night of the 15th-16th a tropical storm of moderate intensity, more fully described elsewhere in this REVIEW, moved inland over Louisiana, attended by heavy rains in the lower Mississippi Valley and more or less precipitation in portions of the Great Plains. This storm moved northward, with rapidly decreasing energy, and was quickly followed by another from the Gulf moving rapidly northward over nearly the same territory, which likewise brought heavy rains over the immediate Mississippi Valley and northward into the Great Lakes region during the 17th and 18th, and to most districts to the eastward during the following 36 hours. In fact this was the most widespread storm of the month and largely ended the droughty conditions that had persisted more or less generally for several months over the Eastern States.

During the early part of the last decade of the month a tropical storm moved northward from the vicinity of the Bahama Islands, and by the morning of the 23d rain had set in over the Atlantic coast sections from the Carolinas to southern New England, which gradually extended westward into the Ohio Valley and lower Lake region and thence over the northeastern districts on the 24th and 25th, some unusually heavy falls being

reported from New England and near-by areas. At the same time an area of rain, turning to snow, overspread the southern and central Rocky Mountain districts, and some unusually heavy snows occurred over portions of Colorado and Wyoming. The last half of the third decade was mainly without important cyclonic activity, although during the last two days precipitation, mostly light, however, occurred over much of the country from the Great Plains eastward.

For the month as a whole the pressure was above normal in all districts of the United States and Canada as far as observations extend, save along the immediate Pacific coast of the United States and over a small area in the far Southwest. In the middle Plains and adjacent areas the monthly means of pressure were unusually high for October.

The changes in pressure from the preceding month, which are usually of small proportions, were everywhere positive to a large degree, save for small areas in the extreme northeastern, southeastern, and northwestern portions of the country, where they were of a small negative character.

Aside from the high winds associated with the tropical storms entering the Middle Gulf States and along the Atlantic coast few severe storms occurred during the month.

On account of the persistence of high pressure over the northern districts the winds were mainly from northerly points in the districts from the eastern Great Plains to the Atlantic coast. Along the immediate Pacific coast they were from the northwest, except over portions of Washington, where they were easterly and southerly, while in the Mountain and Plateau regions they were diversified, as usual.

TEMPERATURE.

In the absence of important barometric changes and due to generally high pressure over northern districts, there was little variation in temperature during the first decade of the month, though this period was mainly cooler than normal from the eastern Great Plains to the Atlantic coast, and over the middle and southern Plateau and the adjacent portions of the Pacific Coast States, the period being quite cold over the Great Lakes and nearby areas. Killing frosts occurred over portions of the Ohio Valley and to the northeastward, embracing areas not previously visited, and some damage resulted to late crops.

For the week ending the 16th there was a gradual rise in temperature over most eastern districts as the week advanced, and as a whole temperatures were above normal over the eastern half of the country, save in portions of the Southeastern States, and it was likewise warm over the northern districts from the Great Plains westward. Over the middle and southern portions of the Plateau and Rocky Mountain regions and extending eastward into the southern Great Plains this week was mainly colder than normal, with freezing weather to the northern portions of Arizona and New Mexico.

The seven-day period ending on the 23d was moderately warm during the early portion, but cooler weather developed as the week advanced, and the average temperature for the week was below normal over most central and southern districts, and severe frosts, the first of the season, were reported from Kansas and Missouri as well as in the northern portions of the Gulf States, and freezing weather occurred as far south as Nebraska and Iowa.

From the 24th to the end of the month temperatures remained below normal in nearly all districts, and at the end the coldest weather of the season so far had advanced into the Northwest, and temperatures were near zero at points in Wyoming and surrounding States. The week as a whole was colder than normal over nearly all parts of the country, but particularly so in the Rocky Mountains and Great Plains, where the averages ranged from 10° to 15° below the normal. Freezing temperatures were reported over wide areas in the West, and frosts occurred at points near the Gulf Coast and in northern Florida.

The monthly means of temperature were below normal in practically all central and southern districts, except along the Pacific coast. Over the middle Mountain and Great Plains States and thence southward the temperature averages ranged from 4° to 7° below normal, and in numerous instances the month was the coldest October in 50 years or more.

Over the more northern districts of the United States, and throughout Canada as far northward as reports disclose, the average temperature was above the normal, due to the prevailing northward drift of the atmosphere from the high pressure area to the southward of the boundary.

The most important warm periods of the month were on the 1st, over the South Atlantic and Gulf States, and the middle and southern Great Plains; on the 2d and 3d in the far Northwest; and from the 10th to 14th over the Dakotas and Iowa and thence eastward to the Atlantic coast.

The most important cold periods were mainly during the last decade, notably from the 29th to 31st over the Mountain and Plateau districts and thence easterly to the Mississippi Valley, where minimum temperatures ranged generally below 20°, with extremes of 18° to 20° below zero at exposed points in the middle Rocky Mountain region, and at many points to the eastward the temperatures were the lowest ever observed in October.

PRECIPITATION.

In general the precipitation for the month was less than normal over the districts from the Mississippi River eastward, except in portions of the North and Middle Atlantic States. Over much of this region there was little precipitation prior to the middle of the month, and in some of the Atlantic coast and East Gulf States the drought had become very severe, and the water supply for hydroelectric operations and even for stock and household use was in many instances insufficient. This condition was partially relieved by the general rains about the 16th to 20th, but in some instances permanent relief was not afforded until the heavy rains of the 23d to 25th over the northeastern districts.

Precipitation was markedly less than normal in Iowa and to a less extent over Minnesota and portions of adjacent States, and there was less than the usual precipitation along the Pacific coast, particularly in the far Northwest.

Over the Southern Plains and generally in the Rocky Mountain and Plateau States the precipitation was nearly everywhere greater than normal, and the falls were frequent and particularly heavy in Oklahoma, northern Texas, eastern New Mexico, Colorado, portions of Kansas and Missouri, and locally in Wyoming, southern Idaho and eastern Oregon. At individual points in

northern Texas, Oklahoma, and adjacent areas the monthly precipitation was the greatest of record for October and even whole States had averages the greatest of record for that month. Monthly amounts in excess of 15 inches were measured at points in Oklahoma and Florida, and at Pensacola in the last-named State a total of nearly 10 inches fell in less than 40 hours on the 16th and 17th.

At the end of the month drought conditions had been relieved in practically all districts where the need of rain had been felt, and a plentiful supply of soil moisture was available in the principal winter grain areas.

SNOWFALL.

The first important snowfall of the season set in over the central Rocky Mountain districts on the 23d, and extended eastward into the Dakotas, Nebraska, and western Kansas during the following day. Unusually heavy falls for the season of the year occurred in the mountain districts of Colorado, Wyoming, and adjacent States, and considerable depths were reported from the near-by Great Plains. About the same time some unusually heavy snows for so early in the season occurred in the southern Appalachian Mountain regions, depths up to 8 inches being reported from some of the higher elevations of western North Carolina and adjacent portions of Kentucky and Tennessee.

Near the end of the month snow was again reported over wide areas from the northern Great Plains eastward. The falls were mainly light, however, except locally in northern New York, where as much as 10 inches was reported.

In the mountain districts of the far West the total snowfall for the month ranged up to a foot or more in the high Sierra of California, but farther north in the mountains of Oregon and Washington the falls were mainly light. In the Rocky Mountains snowfall was generally much heavier, and depths ranging up to 2 feet or more occurred in the high mountains of New Mexico, while in Colorado and Wyoming depths up to 3 feet or more were reported. Considerable snow fell during the last decade of the month over South Dakota and Nebraska, and thence eastward to Iowa, and there was light snow generally during this period over all northern districts from the Dakotas eastward to New York and northern New England, extending southward over the Appalachian Mountain regions to western North Carolina and eastern Tennessee.

RELATIVE HUMIDITY.

Owing to the marked deficiency in temperature and the unseasonably heavy rainfall, and persistent cloudiness, the relative humidity over the Plains and Rocky Mountain States was much higher than normal in October, some stations reporting from 15 to 30 per cent higher. Also there was a considerable excess in parts of the Plateau States, in the middle Mississippi Valley, and most of New England and eastern New York. Deficient humidity prevailed in the greater part of the Lake region, the Middle Atlantic States, the southern Appalachian region, and East Gulf States, likewise along the Pacific coast, particularly in western Washington and northwestern Oregon.