

## STORMS AND WEATHER WARNINGS.

By EDWARD H. BOWIE, Supervising Forecaster.

January, 1923, was notable for the large number of disturbances which traveled eastward over the United States and southern Canada and also for the rapidity of their movement. The rapid succession of Lows continued until near the end of the month, or to be specific, until the 26th, when a disturbance of the South Atlantic type moved up the coast, increased greatly in intensity and finally reached Newfoundland where its center remained until the close of the month. During this time, i. e., the 26th to 31st, a notable retardation was noticeable in the speed of the cyclones and anticyclones in the United States. The precise cause of this retardation is not apparent, but seemingly it was connected in some way with the pressure distribution in the vicinity of Greenland, as reports radioed from that region showed abnormally high pressure during this period. The anticyclones of the month traveled with speeds approximating those of the cyclones, and none of these were of the type that normally carries extremely cold weather far to the southward. In fact, nearly all of them moved in relatively high latitudes and the cold waves of the month were confined to the more northern sections of the United States. The prominent feature of the January, 1923, run of weather was the frequent and heavy snowfalls in the North Atlantic States.

## WASHINGTON FORECAST DISTRICT.

The month opened with a belt of low pressure on the Atlantic seaboard, with a center of minimum pressure over southern Virginia. As it advanced northeastward, it increased decidedly in intensity and caused general and heavy precipitation in the Middle Atlantic and New England States and gales on the coast north of Delaware Bay. The highest velocity reported was 64 miles from the southeast at Atlantic City, N. J. Following this disturbance, others of more or less marked intensity passed eastward over the Washington District and storm warnings were displayed for them as follows: On the 3d at and between Delaware Breakwater and Eastport, Me.; on the 7th on the Atlantic coast north of Cape Fear, N. C., and on the 8th warnings were continued on the New England coast at and north of New Haven, Conn.; on the 10th at and between Delaware Breakwater and Provincetown, Mass.; on the 11th at and north of the Virginia Capes and for the same coastal region on the 14th and 18th; on the 20th at and north of Sandy Hook, N. J.; on the 23d from Savannah, Ga., to the Virginia Capes and on the 24th for the same storm the warnings were extended northward to Eastport, Me., and continued for the same storm on the 25th for the coastal waters from Sandy Hook northward. This record of necessary storm advices indicates the frequency of storm winds during January on the Atlantic coast, for in practically every instance winds of gale force and, not infrequently, snows accompanied the disturbances for which warnings were issued.

Warnings of frost were issued on a number of days for the South Atlantic and Gulf States, but these regions did not receive the cold weather that normally is to be expected in January. Cold wave warnings were issued on a number of days for the Mississippi and Ohio Valleys, the lower Lake region and the North Atlantic States, but as a matter of fact, the only pronounced cold waves of the month in the Washington Forecast District occurred in the Atlantic States north of Maryland and in the lower Lake region and these were accurately forecast.

The usual amount of forecast and other information was issued for the aid of aviation activities. A notable part of this work was the issue of forecasts and information for a considerable number of seaplanes bound from Hampton Roads, Va., to southern waters. This work was done in cooperation with the United States Navy.

## CHICAGO FORECAST DISTRICT.

Except in the northern upper Lake region, January, 1923, was not so cold as usual in the Chicago Forecast District. In fact, over the southern half of the district the month was especially mild, temperatures averaging from 6° to 10° a day above the normal. Frequent precipitation occurred in the Lake region, where scarcely a day passed without some rain or snow being reported; while on the other hand, the weather was exceptionally dry in the Middle Plains States. In southwestern Kansas the lack of moisture was so pronounced that at the close of the month a great deal of ungerminated wheat was still lying in the dust where it has been sown.

*Cold-wave warnings.*—No general cold-wave warnings were issued during the month, nor were any warnings of this scope required. Except in one instance all warnings were for areas in the northern half of the district, and these were, as a rule, rather limited as to the extent of territory included. Most of the warnings issued were verified in whole or in part, but in a few cases cold waves occurred without warning. This was especially true in the Red River of the North Valley and adjacent territory, where the number of cold waves occurring appears to have been about as large as usual. The following is a summary of the cold-wave warnings issued:

2d: Northwestern Wisconsin and vicinity of Lake Superior in Minnesota.

3d: North Dakota and northwestern Minnesota.

4th: Northern Minnesota.

5th: Upper Michigan, northern lower Michigan, eastern and southern Wisconsin, Missouri, southern and western Illinois, and southern and eastern Iowa.

16th: Extreme northern lower Michigan.

17th: Northeastern Montana, North Dakota, and northern Minnesota.

18th: Minnesota, eastern South Dakota, upper Michigan, lower Michigan, and Wisconsin.

24th: Wisconsin and extreme eastern Minnesota.

28th: Montana, North Dakota, extreme western South Dakota, and Wyoming.

29th: Southern Wyoming, southern and central Minnesota, and eastern South Dakota.

30th: Minnesota, western upper Michigan, and northwestern Wisconsin.

*Stock warnings.*—The month was especially favorable for live stock in the grazing sections of the Plains States and no losses are known to have occurred as a result of adverse weather conditions. The only warning issued was that on the 29th for South Dakota, Nebraska, and Wyoming.

*Advisory warnings for Lake Michigan.*—No storms of severity affected Lake Michigan during the month, navigation having been carried on under more favorable conditions than ordinarily is the case in January. In fact, an unusual volume of business was reported as a result of the prevailing mild weather and absence of storms. Advisory warnings were issued on the 6th, 11th, 13th, 17th, 18th, and 23d, but only on the 18th were winds of gale force forecast.

As instances of the appreciation of the press in the efforts of this office toward cooperation the following

quoted letters have been received by Professor Cox. The first is from the superintendent of the central division of the Associated Press, and the other from the managing editor of the Chicago Herald and Examiner.

1. I wish to express my appreciation for the splendid cooperation that we receive from you and the men attached to your bureau. We appreciate not only the prompt service on the regular and the special weather reports, but also the telephone calls on earthquake records and warnings of important weather changes.

2. Thank you very much for your kind letter of January 26, relative to service on weather forecasts for the press. We always knew you were a true friend of the newspapers, as you have proved yourself innumerable times in the past.

—C. A. Donnel.

#### NEW ORLEANS FORECAST DISTRICT.

The weather over this district was exceptionally mild for the month of January. A cold-wave warning was issued for Oklahoma and northwestern Arkansas at 2 p. m. of the 5th and later extended over the remainder of Arkansas. The cold wave occurred as forecast over Oklahoma and northwestern Arkansas. Noon-special observations, January 22, showed a depression over southern Louisiana and a rapid rise in the barometer over the southern Plains States and Texas. Cold-wave warnings were ordered at 1 p. m. of the 22d for southern Texas and southern Louisiana. Verifying temperatures were not reached. Cold-wave warnings were ordered for Oklahoma and the Texas Panhandle on the 31st, and they were justified.

Live-stock warnings were issued for the northern portion of the district on the 5th, 14th, and 22d. Fire-weather warnings were issued on the 5th. "Norther" warnings were issued for Tampico, Mexico, on the 22d.—I. M. Cline.

#### DENVER FORECAST DISTRICT.

From the 1st to the 11th, generally high pressures prevailed west of the Continental Divide, with lows from the north Pacific passing to the northward of the district. A low which appeared on the Southern Plateau on the 12th advanced northeastward across Colorado, attended by occasional light snow in the northern portions of this State and Utah. High pressures prevailed west of the Divide from the 14th to the 19th. On the morning of the 14th, when the crest of the HIGH was over Utah and moving southeastward, warning of a moderate cold wave was issued for extreme southeastern New Mexico. On the following morning the minimum temperatures at Roswell and Abilene were 28° and 30°, the 24-hour falls at those stations, 14° and 22°, respectively.

A storm of decided intensity appeared on the coast of northern California on the morning of the 22d and advanced slowly to southeastern Colorado and northwestern Texas, where it recurved to the northeastward on the 26th. This disturbance was accompanied by precipitation in about all portions of the district except southern New Mexico, with heavy snow in northwestern and extreme southeastern Utah and in portions of northeastern Arizona and southwestern Colorado.

Another storm of marked energy advanced southward from Alaska during the 27th and 28th and was central over southwestern Utah on the evening of the latter

date. On the morning of the 29th the disturbance had increased in intensity and extended eastward to Kansas, but with its center remaining over southern Utah, while a HIGH of great intensity, attended by severely cold weather, was central on the northeastern Rocky Mountain slope. Warnings of a moderate cold wave and live-stock warnings were issued for eastern and extreme northwestern Colorado and southern Utah. Warnings of a moderate cold wave were repeated on the evening of the 29th for northern and eastern Colorado and southeastern Utah. The cold-wave warnings were justified in eastern Colorado, but as the storm center remained nearly stationary over southern Utah, there was little fall in temperature west of the Divide. Only light snow occurred in northeastern Colorado, Utah, and northern Arizona. Cold-wave warnings were repeated for southwestern Utah on the morning of the 31st. The storm center failed to move, however, and the warning was only partially verified, the fall in temperature at Modena amounting to 12°, with a minimum of 16°.

Frost warnings were issued for southern Arizona on the 1st and 2d and for extreme southwestern Arizona on the 3d, 27th, 28th, 30th, and 31st. Warnings of freezing temperature were issued for south-central and southeastern Arizona on the 2d and 27th and for southeastern Arizona on the 3d. With the exception of the 31st, the warnings were justified.—J. M. Sherrier.

#### SAN FRANCISCO FORECAST DISTRICT.

The outstanding factor of weather control in this district during January, 1923, was the shifting of the Pacific HIGH from California and the Plateau to British Columbia and the adjacent North Pacific. During the first part of the month an area of high pressure was central over California and the Plateau which caused storms from the North Pacific to move inland through British Columbia. On the 15th, a change in the pressure distribution began, the high area moving to British Columbia and the adjacent Pacific while the pressure diminished to normal or below over California and the Plateau. This caused storms moving southeastward from Alaska to pass to the west of the high area in the north and enter the continent through the North Pacific States.

Conformable to a pressure distribution as described the first part of the month was "wet" in the northern portion of this district and "dry" in the southern and the latter part of the month "wet" in the southern portion and comparatively "dry" in the northern.

A warm wave prevailed over southern California on the 8th and 9th, and January records of high temperature were broken at Los Angeles on the 8th, while on the 9th they were broken at San Diego and equaled at San Luis Obispo.

Frost warnings were issued in California on 14 days, and while severe frosts occurred at many places, no serious damage was reported.

Storm warnings were ordered as follows: At Washington and Oregon stations, 4 times; at the mouth of the Columbia River, Strait of Fuca, and Washington coast, 5 times; on the California coast, 4 times. The warnings were generally verified.

On the 15th, 16th, 17th, and 18th strong gales were reported from many ships in the Pacific.—G. H. Willson.