DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

The single outstanding feature of the month was the prevailing low pressure over the Atlantic as touched upon by Supervising Forecaster Bowie and others in the pages which follow.

Coupled with this deficit in pressure over the North Atlantic, there appears to have been a small excess in pressure over the North Pacific between Hawaii and the North American Continent. The consequence of this change in pressure distribution is reflected in the abnormalities of temperature and precipitation as shown in Chart III and on the inset map of Chart IV. The usual details follow.

CYCLONES AND ANTICYCLONES

By W. P. DAY

The general path of the cyclones moving across the United States during the month of March was considerably depressed toward the south, and there were several developments into important storms, especially along the Atlantic coast. At the same time, air pressure was almost continuously high over the interior of Canada, apparently with a peak of high pressure near or over the Hudson Bay region. In fact the southern edge of this area coming within the limits of observation persisted without break from the 6th to the 24th, during which time no low-pressure area was charted within the region. It is also interesting to note in this connection that the pressure was continuously below normal over the Azores from the 1st to the 27th with an average depression of about half an inch. Bermuda also showed a large deficiency of pressure from the 6th to the 27th.

FREE-AIR SUMMARY

By V. E. JAKL, Meteorologist

The wind resultants for the month show for the four northern aerological stations a decidedly more northerly component than normal at all levels. The influence of this northerly tendency of the winds is also noticeable in the observations at the southern stations, where the wind resultants show a less southerly tendency than normal at most levels.

The thermal significance of the wind resultants is immediately apparent in the monthly mean temperatures. (See Table 1.) It was colder than normal to the upper limit of observations at all stations, the departures being especially pronounced in the higher levels at the northern stations and at Due West. At Groesbeck, where the departure from the normal wind direction was least, the temperature departure was also least. The departure of temperature with altitude showed the greatest range over Ellendale, where the temperature averaged nearly normal at the surface, but became progressively more below normal with increasing altitude. In this connection attention is called to Chart III, this REVIEW, which shows a positive departure at the surface along the northern boundary of the country. It is evident from the aerological data that this positive departure, at least east of the Rocky Mountains, prevailed at the surface only. The abnormally-low temperatures were associated on the whole with relative humidities higher than normal, except that about normal humidities obtained at Groesbeck, and in the lower levels at Due West.

The observed variance of wind from the normal and consequent depression of temperature occurred at more or less scattered intervals during the month, although a rather general and pronounced period of cold weather prevailed toward the close of the first decade. The dominant weather-map conditions, to which these departures from the normal can be attributed, appear to have been mainly a persistence of high pressure over middle sections of the country and low pressure over the North Atlantic; also a movement of LOWS across the country somewhat south of their usual path. (See Storms and Weather Warnings, Washington forecast district, p. 178, this REVIEW.) The resultant lowering of temperature, however, does not appear to have been due entirely to the northerly winds implied from this pressure distribution during the month, as numerous instances were recorded of temperatures below normal in winds having a strong southerly component. The most conspicuous examples were found on the 16th and 22d, on which dates, in the line of stations from Ellendale on the north to Groesbeck on the south, temperatures well below the average for the season were observed at practically all levels in winds draining northward from the rear of a ridge of high pressure extending southeastward across the country. An example is also found at Broken Arrow on the 22d, and on other dates (see p. 174) of an apparent exception to the known relation of temperature to wind direction, viz, a fairly well-defined fall in temperature in a southeast wind aloft. The explanation seems to be a reinforcement of the HIGH to the northeast, and the development of a LOW to the south.

A record of extremely low temperatures aloft for a southern station was obtained at Due West in the series of observations on March 10–11. The observations were made in the rear of the LOW that appeared over New Mexico on the 8th, a discussion of this LOW in its earlier stages appearing on page 161 of this REVIEW. The lowest temperature recorded, −20.8° C. at 2,500 meters altitude late at night of the 10th, was 22° lower than normal for that level, and practically the same as the lowest temperature recorded at the same level at the most northerly stations (Ellendale and Drexel), 36 hours previously. It is obvious from this observation that under certain conditions of pressure distribution and temperature conditions in its path, a cold mass of air can be transported great distances south or southeast without material gain in temperature. The temperature and wind direction record of this series of observations appears in the following table:

Wind directions and temperatures over Due West, S. C., on March 10–11, 1924 (see also Table 1, p. 174)

[Altitude, M. S. L., meters]

Date	Time	Surface	500	1,000	1,500	2,000	2,500
10	2 p. m.	W.	W.	W.	WNW.	W.	----------
		4.5	1.6	−3.1	−7.1	−10.7	----------
10	7 p. m.	WNW.	WNW.	W.	W.	WNW.	WNW.
		1.0	−2.1	−7.1	−11.6	−15.0	−18.1
10	11 p. m.	WNW.	WNW.	WNW.	WNW.	WNW.	WNW.
		−2.6	−5.0	−9.0	−12.8	−16.6	−20.8
11	3 a. m.	W.	W.	WNW.	WNW.	WNW.	NW.
		−3.9	−6.2	−9.9	−12.6	−13.7	−14.0
11	8 a. m.	W.	WNW.	WNW.	NW.	NW.	NW.
		−3.5	−5.3	−8.1	−9.8	−6.0	−8.5
11	Noon	WNW.	W.	WNW.	NW.	NNW.	NNW.
		3.0	−0.5	−3.6	−4.6	−5.2	−6.3