

that of 2 p. m. of the 15th with a barometric reading 743.8 mm. (29.28 ins.) and a strong gale from NNE. The communication with Yap was then interrupted, and up to the present no information has been received from our observer there, although news has reached us to the effect that our meteorological station was practically destroyed by the typhoon.

Observations from the U. S. A. T. *Chaumont*, on her way from Guam to the Philippines, show clearly that the typhoon recurved gradually to the N. and NE. after passing over Yap. The barometric minimum observed

on the *Chaumont* was 749.5 mm. (29.51 ins.) on the 18th, while a strong gale was blowing from the SE.

The approximate position of the center at 6 a. m. and 2 p. m. of the 17th to 20th was as follows:

December 17, 6 a. m.	132 35	longitude E.,	10 50	latitude N.
December 17, 2 p. m.	131 30	longitude E.,	11 30	latitude N.
December 18, 6 a. m.	130 35	longitude E.,	12 40	latitude N.
December 18, 2 p. m.	130 30	longitude E.,	13 00	latitude N.
December 19, 6 a. m.	130 20	longitude E.,	13 40	latitude N.
December 19, 2 p. m.	130 20	longitude E.,	13 50	latitude N.
December 20, 6 a. m.	130 40	longitude E.,	15 40	latitude N.

DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

The outstanding features of the pressure distribution were as follows: The continental extension of the North Pacific statistical anticyclone was centered over the Great Basin with pressure 30.30 inches or higher on 19 days; pressure in the oceanic part of this anticyclone was considerably diminished and was probably 0.20 inch below normal values. Coincidentally with decreased pressure over the ocean, continental over western United States were higher than usual. The continuity of the high pressure over the Great Basin was interrupted in the last half of the month, thus facilitating the development and movement of cyclonic storms in lower latitudes. Several such storms converged over the North Atlantic in the neighborhood of the Grand Bank where very low pressure was registered.

In the United States the single outstanding cold spell was inaugurated by the southward movement of high pressure as shown in Chart I.

The usual details follow.

CYCLONES AND ANTICYCLONES

By W. P. DAY

The number of both low-pressure and high-pressure areas was below the normal for December. There were 13 LOWS as compared with 18 for November and 23 for October, and the 8 HIGHS were the least number occurring in any month during the year. A persistent Plateau HIGH with extensions to the southeast, continuing from the 3d to the 11th, shielded the country from the rather active Pacific LOWS; and when the Plateau HIGH finally gave way, it was succeeded by two great HIGHS from the Canadian interior which successively occupied much of the country. The second and larger of the two covered practically the entire interior of the continent from the 26th until the 31st, and of course no LOWS of importance were charted during this interval.

FREE-AIR SUMMARY

By V. E. JAKL

The mean free-air temperatures were below normal at all aerological stations except Drexel and Ellendale, where they were approximate normal at the former station and slightly above at the latter. (See Table 1.) Observed departures aloft were, moreover, about the same as at the surface. Their geographical distribution is therefore quite well represented by the map of surface temperature departures, Chart III in this REVIEW.

The greatest negative departure was at Groesbeck, where the resultant winds (Table 2) were generally northwesterly, instead of about west-southwest, as is normal for the altitudes usually obtained there. At those

other stations where negative temperature departures were also recorded, the excess of northerly component (or lack of southerly component) as compared with the normal, was not so pronounced as at Groesbeck; in some cases, as at Royal Center, the deviation from the normal was barely perceptible.

The general wind resultants derived from both balloon and kite observations were northwesterly, varying, however, from more nearly westerly to decidedly northwesterly with increase in altitude and latitude. Westerly winds aloft were dominant in the lower latitudes as far south as Key West, where above 2,000 meters the prevailing winds were of moderate force from almost due west. At this station the winds had an easterly component up to about 1,000 meters, above which there was a transition zone of southerly winds extending to about 2,000 meters. San Francisco also showed winds with an easterly component in the lower levels, but to a slightly greater depth than at Key West. Easterly components are not apparent in the resultants from observations at any of the other stations. Resultant velocities were close to normal at all levels at practically all stations.

The northern stations showed, as usual for the time of year, decided temperature inversions at levels of moderate height (about 1,500 meters). They were most pronounced at Ellendale, where at 1,500 meters the average temperature was 3.2° higher than on the ground. The average inversion at Ellendale was accumulated for the most in the first decade of the month, when temperatures were usually considerably above normal, owing to cold periods being of but short duration. Typical inversions occurred, for instance, on the 10th, when it was 12° warmer at 1,200 meters than on the ground. On the 31st temperature increased with altitude from -16.8° on the ground to 7.1° at 2,000 meters, and decreased thence to -13.4° at 5,000 meters. These were well-defined examples of the reaction to warmer with free-air winds of south component, following a change to colder with northerly winds. This condition is always productive of large inversions due to the southwesterly to westerly winds aloft bringing higher temperatures more rapidly than the southerly wind near the ground which is mostly dependent on insolation for raising the temperature at the place of observation.

In the latter part of the month, when the cold was more intense and more persistent, the vertical temperature gradients showed a tendency to a more nearly isothermal state. Thus at Ellendale and Drexel, on the 26th and 27th, respectively, the effects of a pronounced HIGH on the vertical temperature gradient are shown by the following figures: Ellendale on the 26th: Ground, -22.3°; 900 meters, -26.1°; 2,000 meters, -20.9°; 2,600 meters, -22.4°. Drexel on the 27th: Ground, -22.8°; 1,200 meters, -26.1°; 2,000 meters, -17.5°;

3,600 meters, -22.2°. In both these cases the station lay in front of, and close to, the crest of the HIGH.

Relative humidities were about normal at all levels for all stations, and varied little from station to station. Consequently vapor pressures were greatest at those stations that had the highest mean temperatures. However, the total precipitation at the various stations showed but little relation to this factor of moisture content. Thus, at Drexel the total precipitation for the month was six times that at Ellendale and nearly three times that at Groesbeck.

A diurnal series of observations made at Due West on the 1st and 2d is of interest in view of the proximity of that station to the hurricane that was passing up the Atlantic coast on those dates. As the later flights of the series were curtailed owing to stormy conditions impending, the records of only the 1st and last flights are reproduced for comparison, and appear in the following table:

Table with columns for Altitude (m. s. l. meters), Temperature, Relative humidity, and Wind (Direction, Velocity) for Dec. 1 and Dec. 2. Includes sub-columns for °C and Per cent.

The record of the 1st, to which have been added wind data from the simultaneous pilot-balloon observation of that date for levels above 4,000 meters, shows that although Due West was just outside of the periphery of the Low northwest of its center, wind velocities up to 6,000 meters were not especially affected. This is in contrast to conditions to the rear of intense extra-tropical Lows, where it is frequently observed that a station apparently outside of its influence, so far as surface isobars indicate, shows high velocities aloft. The change to higher humidities and stronger winds attending the approach of the hurricane center is shown in the record of the 2d.

The most pronounced instance of high velocities aloft occurred on the 31st at Broken Arrow and Due West, where double and single theodolite observations respec-

tively showed 56 m.p.s. from the west at 11,000 meters at the former station, and 66 m.p.s. from the west-northwest at 7,000 meters at the latter. This wind was a natural consequence of the south-to-north pressure gradient as shown by the surface map, and its coincidence with the temperature gradient shown by free-air observations.

TABLE 1.—Free-air temperatures, relative humidities and vapor pressures during December, 1925

Large table with columns for Altitude (m. s. l. meters), Temperature (Mean, Departure from 8-yr. mean), Relative Humidity (Mean, Departure from 8-yr. mean), and Vapor Pressure (mb.). Includes sub-columns for °C.

TABLE 2.—Free-air resultant winds (m. p. s.) during December, 1925

Table with columns for Altitude (m. s. l. meters) and stations: Broken Arrow, Okla. (233 meters); Drexel, Nebr. (396 meters); Due West, S. C. (217 meters); Ellendale, N. Dak. (444 meters); Groesbeck, Tex. (141 meters); Royal Center, Ind. (225 meters). Columns include Mean and 8-year/11-year/5-year means for Direction and Velocity.