DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

By A. J. HENRY.

As a whole, the month was characterized by cyclones that lacked in intensity, by anticyclonic movement with a larger than usual southerly component of motion, and by dry weather in the great majority of districts.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

No really important storms were charted within the area of the United States proper, although one or two good blows occurred on the North Pacific coast, the Lake region, and the North Atlantic coast, and disturbed conditions prevailed over the Gulf of Mexico during a large part of the month. The influence of the hurricane which traversed the northern portion of the Province of Yucatan in Mexico was not felt north of the Tropics.

High-pressure areas were about normal in number, movement, and with respect to place of origin.

Tables showing the number of cyclones and anticyclones by types are given below. Two storms of tropical origin are not included, though shown in part on Chart II.

Cyclones.	Alberta.	North Pacific.	South Pacific.	Northern Rocky Mountain.	Colorado.	Texas.	East Gulf	South Atlantic.	Central.	Total.
October, 1922....	4.0	2.0	.....	2.0	1.0	1.0	2.0	1.0	1.0	14.0
Average number, 1892-1912, inclusive.....	4.2	1.3	0.7	0.5	1.7	0.7	0.4	0.5	0.3	10.3

Anticyclones.	North Pacific.	South Pacific.	Alberta.	Plateau and Rocky Mountain. region.	Hudson Bay.	Total.
October, 1922.....	4.0	.....	4.0	.....	1.0	9.0
Average number, 1892-1912, inclusive	2.8	0.9	3.0	1.2	0.6	8.5

FREE-AIR CONDITIONS.

By L. T. SAMUELS.

Free-air temperatures during the month were mostly above their normal values (Table 1). At Broken Arrow, Due West, and Ellendale these positive departures increased generally with altitude, while at Drexel they were only slightly smaller in the upper levels. At Groesbeck no appreciable change in the amount of the departures was found, while at Royal Center they were negative throughout, although considerably smaller in the higher levels. Comparison of surface departures with those given in Climatological Chart III shows good agreement with the exception of Royal Center. This apparent discrepancy is due partly to the short period available for which normals are computed and which, in this case, is obviously influenced to a greater degree than it should be by the unusually high mean for 1920, and in part to the smaller southerly component in the resultant winds as compared with the average for the month. (Table 2). It is of interest to note the direct connection between the wind direction and temperatures in the fact that on days when either record maximum or minimum temperatures for various levels were recorded the wind direction at the time had a southerly or northerly component, respectively.

Relative humidity departures were in general negative for all stations and levels, while those for vapor pressure conformed as a whole with the temperature departures.

In Table 2 are shown the resultant wind directions and velocities for the month and their averages. At the four stations having the largest positive temperature departtures it will be noted that the resultant winds in most cases have either a greater southerly or a smaller northerly component than the average. The resultant winds at Groesbeck show a decidedly greater easterly component than normal.

At this time of the year winds begin to manifest characteristics of the winter season, particularly as regards increased velocities and less frequent easterly components at high altitudes. Pilot-balloon observations at numerous stations in the eastern and central sections of the country from the 18th to the 21st showed winds of hurricane velocity in the upper levels. Of particular interest during this period is the single-theodolite pilot-balloon observation made at Fort Bragg, N. C., on the morning of the 20th, when a velocity of 77 m. p. s. (172 m. p. h.) from the WNW. was observed at an altitude of 9,100 meters. The question of the reliability of the assumed ascensional rate upon which single-theodolite observations are necessarily based becomes at once of great consequence, and comparison with surrounding stations is of vital importance before accepting as correct such tremendous velocities. Simultaneous observations at the following stations showed velocities as follows:

Station.	Velocity.	Direction.	Altitude.
	m. p. s.		*m.*
Due West, S. C.	42	W.	8,400
Fort Benning, Ga.	35	W.	10,000
Mitchel Field, N. Y.	42	WNW.	4,000

Observations made just prior to, and shortly after, those given above, when extremely high upper velocities were general over this region, strongly substantiate the great velocity found at Fort Bragg on the 20th. This region was at the time under the influence of a widespread anticyclone, central to the northward, causing easterly winds in the lower levels. These winds became westerly above 3,000 meters and then increased greatly in velocity. The cause of these extreme velocities is plainly revealed on the weather maps for this period and is to be found in the sharp surface-temperature gradient extending from south to north. On the morning of the 19th it will be noted that this ranged from 28.9° C. in southern Florida to 1.1° C. in northern Mississippi. Such a temperature gradient obviously causes a steep south-to-north pressure gradient in the upper air on account of the difference in the resulting air densities and, when sufficiently steep, causes tremendous velocities such as were recorded. Reference is made to the pilot-balloon observation made at Lansing, Mich., on December 17, 1919, when a wind of 83 m. p. s. from the NW. was recorded at 7,200 meters elevation.[1]

[1] W. R. Gregg, MO. WEATHER REV., December, 1919, 47: 853-854.