of one or more typhoons in the region of the Philippines. It will be necessary, however, to have additional reports to determine the actual conditions within these areas.

GALE IN SOUTH ATLANTIC OCEAN.

The British S. S. *Vestris*, Capt. O. Penrice, experienced a heavy gale upon leaving Buenos Aires for New York in the early part of July, this year, of which First Officer A. G. T. Brown has furnished the following report:

July 9. Left Buenos Aires at noon. Strong SE. gale with heavy rain; heavily overcast and hazy.

July 10. Breeze falling light, leaving heavy swell (2 a. m.); 3 a. m. to 6 a. m., thick fog patches; 6.30 a. m., wind came from N'ly, increasing steadily and backing slowly; 6 p. m., strong WNW. wind and confused sea; overcast, St. Cu.; bar. 29.41, steady. By midnight, July 10–11, vessel not steering; whole gale from W.–WNW.; huge seas doing considerable damage; constant stream of spray and small seas deluging vessel fore and aft; bar. 29.57, rising slowly.

July 11. 8 a. m. vessel hove to, heading WNW.; wind about W. by S. Noon, similar weather; no apparent moderation; very hazy; bar. 29.81, still rising. 3 p. m. vessel resumed course and speed. 8 p. m. wind and sea moderating rapidly; heavy showers.

July 12. Wind and sea moderating all day; bar. rising steadily; weather fine and clear.

The lowest barometer recorded was 29.29 inches at Buenos Aires. Highest wind, force 10, W. by N. Shifts of wind, SE.–NW.–WNW.–W.–WSW.–SW. by W.

(F. G. T.)

DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

By A. J. HENRY.

From a physiological view point the most significant feature of the weather of northeastern United States was the absence of prolonged high temperature or, what amounts to the same thing, the rather frequent occurrence of cool spells due to the movement of anticyclonic areas over from the Hudson Bay region. West of the Appalachians mean temperatures were somewhat higher.

The rainfall was rather irregularly distributed.

The usual details follow.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

Low-pressure areas were numerous, but rather ill-defined and often difficult to trace from day to day. A majority of these depressions were first noted in western Canada. These moved southeastward, and there were frequent secondary formations in middle latitudes; but in no case did they develop storm intensity.

High-pressure areas were fairly numerous, nine of which seemed worthy of tracking; but, on the whole, they were unimportant, except that they gave pleasant alternations to cooler and drier weather, particularly over northern and central districts east of the Mississippi River. Four of these anticyclones were of the Hudson Bay type.

FREE-AIR SUMMARY.

By L. T. SAMUELS, Meteorologist.

Free-air temperature departures for July showed practically no change from the surface to 3,000 meters. (See Table 1.) In agreement with Climatological Chart III, the largest positive departures occurred at Ellendale, becoming smaller southward and eastward, and finally negative at Due West. This resulted in the interesting relationship found between the mean temperatures for the 3,000-meter level for the various stations. For example, Ellendale, the northernmost station, has a higher mean temperature for this level than Drexel, which in turn is higher than Broken Arrow, Due West, and Royal Center.

Relative humidity departures were mostly small except in the highest levels where the apparently large departures were the result of fewer observations, and therefore less reliable means.

Vapor-pressure departures were mostly positive. At Ellendale from the surface to 3,000 meters were found the highest mean monthly values for July since the establishment of the station in 1918. The resultant winds at this station (see Table 2) differed considerably from the normal both in velocity and direction. The normal at the surface and lower levels, it will be observed, is extremely light and therefore the corresponding direction carries little significance.

This month, however, the velocities were moderately high and likewise the resultant directions, which had a strong south component were closely related with the positive temperature departures previously referred to. In general the resultant winds at the other stations did not differ greatly from the normals both in direction and velocity. Pilot-balloon observations over the country showed a predominant easterly wind above 5,000 meters south of latitude 35° and a westerly north of this latitude. These upper easterly winds were observed at Groesbeck, extending to the highest level reached, which was 13,000 meters. At Ellendale not a single observation showed easterly winds above 5,000 meters, westerly being found to at least 12,000 meters.

There were apparent on the free-air wind charts during the month occasions when the winds at 4,000 and 5,000 meters showed a decidedly anticyclonic circulation, i. e., northerly over the eastern coast, easterly over the Gulf region, southerly over the Plains States, and westerly over the northern region. From an examination of the maps for these periods there seemed to be a connection between this condition and a warm period at the surface, i. e., there was usually a HIGH over the southeastern part of the country merged with the permanent Atlantic HIGH, a condition favorable for warm weather over the eastern part of the country. Such conditions occurred on the 6th, 9th, 20th, and 22d.

A number of cases occurred where southerly winds were overrun by northerly winds. On these occasions the southerly winds resulted from high pressure to the eastward, and usually between 2,000 and 3,000 meters above a reversal to northerly was found. This condition was characteristic only over that portion of the country east of the Rocky Mountains. The opposite condition, i. e., southerly winds overriding northerly ones

was not to be found over this section but on the other hand was of frequent occurrence at western stations such as Denver, San Francisco, Camp Lewis, Wash., and Rockwell Field, Calif. A predominating south-southwesterly wind was found above these levels over the Pacific coast stations indicating a reversal of the pressure gradient over the Pacific HIGH.

Some extremely deep winds were observed, as follows:

Station.	Date.	Direction.	Altitudes (meters).
Broken Arrow	26	N	1,500 to 18,000.
Drexel	23	NW	Surface to 8,500.
Ellendale	12	WNW	4,500 to 12,500.
Groesbeck	25	ENE	2,000 to 11,000.
Broken Arrow	31	N	3,000 to 13,000.

The exceedingly high velocity for this season of the year of 32 m. p. s. was observed at the level of the stratosphere at Drexel on the 19th and at Broken Arrow on the 31st. The direction on both occasions was north.

A description of the free-air conditions prevailing during the National Elimination Balloon Race held from Indianapolis on the 4th will be found under a separate heading in this REVIEW. (See pp. 356–358.)

The kite flight made at Drexel on the morning of the 20th showed an unusually steep temperature inversion directly above a layer of St. Cu. clouds. The base of these was 2,000 meters above the surface, they being less than 100 meters thick. The temperature rose 6° C. through a 250-meter layer just above these clouds accompanied by a drop in the relative humidity from saturation to 28 per cent. Pressure was high over the eastern half of the country and the lower winds at Drexel were south-southwest, veering to west-southwest at the height of the inversion. The winds above 4,000 meters shifted to north-northeasterly. The velocity decreased to nearly a calm at the altitude of the wind shift, then increased to 17 m. p. s. at 10,000 meters.

An interesting phenomonon was observed at Broken Arrow on the 29th when the kite was being reeled in from above a very thin A. St. veil. In being drawn through this cloud there was visible a dark streak giving the appearance of a rift in the clouds being made by the kite.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during July, 1923.*

TEMPERATURE (°C.).

Altitude. m. s. l. (m.)	Broken Arrow, Okla. (233m.) Mean.	Departure from 5-yr. mean.	Drexel, Nebr. (396m.) Mean.	Departure from 8-yr. mean.	Due West, S. C. (217m.) Mean.	Departure from 3-yr. mean.	Ellendale, N. Dak. (444m.) Mean.	Departure from 6-yr. mean.	Groesbeck, Tex. (141m.) Mean.	Departure from 5-yr. mean.	Royal Center, Ind. (225m.) Mean.	Departure from 6-yr. mean
Surface	26.2	−0.7	25.5	+0.5	26.6	−0.4	23.6	+2.1	26.9	+0.1	25.6	−0.1
250	26.1	−0.7			26.2	−0.5			26.0	+0.1	25.4	−0.1
500	25.2	0.0	25.1	+0.7	23.7	−0.6	23.3	+2.1	24.4	+0.3	23.2	+0.1
750	24.1	+0.4	23.7	+0.7	21.9	−0.6	21.9	+2.0	23.5	+0.5	21.2	+0.1
1,000	22.5	+0.3	22.1	+0.5	20.0	−0.7	20.8	+2.1	22.6	+0.8	19.4	+0.1
1,250	20.7	+0.1	20.5	+0.4	18.0	−0.9	20.0	+2.4	21.3	+0.8	17.9	+0.3
1,500	18.9	0.0	18.7	+0.1	16.4	−0.9	18.8	+2.3	19.7	+0.6	16.3	+0.3
2,000	15.3	−0.3	15.6	+0.1	13.5	−0.7	16.2	+2.3	16.4	+0.1	13.5	+0.3
2,500	12.0	−0.4	12.4	+0.2	11.0	−0.2	13.1	+2.1	13.4	0.0	10.3	−0.2
3,000	8.3	−0.9	9.5	+0.7	8.2	0.0	9.9	+1.9			7.3	−0.3
3,500	4.6	−1.5	6.7	+1.4	5.5	+0.5	7.2	+2.3			5.6	+0.9
4,000			3.7	+1.6			4.1	+1.8				
4,500			0.5	+1.6			0.4	+0.6				
5,000			−2.9	+0.7			−3.0	+0.2				

RELATIVE HUMIDITY (%).

Altitude. m. s. l. (m.)	Broken Arrow Mean.	Departure	Drexel Mean.	Departure	Due West Mean.	Departure	Ellendale Mean.	Departure	Groesbeck Mean.	Departure	Royal Center Mean.	Departure
Surface	71	+2	65	0	64	−3	75	+4	69	−6	64	+3
250	71	+2			64	−3			71	−5	64	+3
500	67	+1	63	0	65	−3	74	+4	72	−4	64	+1
750	65	0	59	−1	66	−3	71	+6	68	−3	66	+1
1,000	66	+1	58	−1	67	−4	68	+5	64	−3	68	+2
1,250	68	+3	59	+1	69	−3	64	+3	63	−2	67	+1
1,500	70	+5	62	+4	67	−3	61	+3	65	+1	67	+1
2,000	72	+10	62	+6	63	−5	55	0	67	+5	63	+1
2,500	72	+13	60	+6	62	−6	55	+2	69	+8	62	+7
3,000	76	+19	57	+5	61	−6	54	+2			62	+11
3,500	84	+28	50	−2	59	−3	50	−3			33	−13
4,000			54	+4			51	−3				
4,500			56	+4			62	+2				
5,000			55	+8			62	+4				

VAPOR PRESSURE (*mb.*).

Altitude. m. s. l. (m.)	Broken Arrow Mean.	Departure	Drexel Mean.	Departure	Due West Mean.	Departure	Ellendale Mean.	Departure	Groesbeck Mean.	Departure	Royal Center Mean.	Departure
Surface	24.00	−0.39	20.99	+0.80	21.91	−1.69	21.79	+3.71	23.99	−1.95	20.76	+0.98
250	23.85	−0.32			21.56	−1.64			23.38	−1.54	20.54	+1.00
500	21.35	+0.21	19.71	+0.55	19.10	−1.46	21.14	+3.65	21.60	−0.85	18.08	+0.66
750	19.35	+0.46	17.06	+0.16	17.42	−1.46	18.58	+3.55	19.27	−0.28	16.56	+0.84
1,000	17.79	+0.60	15.31	−0.01	15.95	−1.46	16.56	+3.13	17.05	−0.14	15.38	+1.02
1,250	16.47	+0.85	14.21	+0.30	14.58	−1.38	14.75	+2.76	15.47	+0.07	13.87	+0.94
1,500	15.11	+1.08	13.40	+0.85	12.86	−1.26	13.02	+2.45	14.59	+0.61	12.57	+0.97
2,000	11.88	+0.86	11.18	+1.17	9.99	−1.40	9.88	+1.43	12.51	+0.94	9.97	+1.14
2,500	9.65	+1.00	8.88	+0.97	8.26	−1.02	8.19	+1.25	10.93	+1.47	7.81	+1.43
3,000	8.33	+1.61	6.94	+0.81	6.83	−0.71	6.61	+0.97			6.35	+1.47
3,500	7.79	+2.36	5.21	+0.39	5.09	−0.33	5.01	+0.27			2.90	−0.75
4,000			5.13	+1.35			4.23	+0.29				
4,500			4.65	+1.51			4.07	+0.27				
5,000			3.83	+1.45			3.93	+0.49				

TABLE 2.—*Free-air resultant winds (m. p. s.) during July, 1923.*

Altitude, m. s. l. (m).	Broken Arrow, Okla. (233 m.) Mean. Dir.	Vel.	5-year mean. Dir.	Vel.	Drexel, Nebr. (396 m.) Mean. Dir.	Vel.	8-year mean. Dir.	Vel.	Due West, S. C. (217 m.) Mean. Dir.	Vel.	3-year mean. Dir.	Vel.
Surface	S. 19° E.	2.3	S. 1° E.	3.0	S. 3°W.	2.8	S. 1°W.	2.3	S. 20°W.	0.4	S. 58°W.	1.5
250	S. 19° E.	2.4	S. 1° E.	3.1					S. 34°W.	0.5	S. 59°W.	1.6
500	S. 2° E.	3.5	S. 10°W.	4.2	S. 4°W.	3.8	S. 4°W.	3.1	S. 84°W.	1.1	S. 69°W.	2.2
750	S. 13°W.	3.7	S. 20°W.	4.6	S. 16°W.	5.4	S. 18°W.	4.3	S. 87°W.	1.8	S. 81°W.	2.7
1,000	S. 19°W.	3.3	S. 27°W.	4.3	S. 19°W.	5.8	S. 25°W.	4.6	N. 86°W.	1.6	S. 84°W.	2.8
1,250	S. 27°W.	3.1	S. 32°W.	4.2	S. 22°W.	5.4	S. 35°W.	4.6	S. 46°W.	1.2	S. 75°W.	2.6
1,500	S. 19°W.	2.6	S. 34°W.	4.2	S. 34°W.	4.7	S. 42°W.	4.6	S. 64°W.	3.3	S. 80°W.	3.8
2,000	S. 17°W.	2.5	S. 32°W.	3.7	S. 41°W.	4.1	S. 56°W.	4.8	S. 69°W.	3.1	S. 81°W.	4.2
2,500	S. 73°W.	2.1	S. 42°W.	3.8	S. 44°W.	3.1	S. 70°W.	5.4	S. 83°W.	3.8	S. 84°W.	5.0
3,000	N. 79°W.	3.3	S. 54°W.	4.7	S. 43°W.	3.3	S. 70°W.	6.3	S. 87°W.	6.4	S. 83°W.	7.4
3,500	S. 80°W.	4.9	S. 62°W.	4.9	S. 41°W.	4.9	S. 71°W.	7.3	N. 69°W.	6.4	W.	7.1
4,000	N. 79°W.	8.2	S. 56°W.	6.6	S. 74°W.	3.5	S. 73°W.	7.0	N. 45°W.	10.8	N. 77°W.	7.4
4,500					S. 23° E.	6.7	S. 60°W.	7.7				
5,000					S.	6.5	S. 58°W.	8.6				

Altitude, m. s. l. (m).	Ellendale, N. Dak. (444 m.) Mean. Dir.	Vel.	6-year mean. Dir.	Vel.	Groesbeck, Tex. (141 m.) Mean. Dir.	Vel.	5-year mean. Dir.	Vel.	Royal Center, Ind. (225 m.) Mean. Dir.	Vel.	6-year mean. Dir.	Vel.
Surface	S. 66° E.	2.1	S. 39° E.	0.1	S. 20°W.	3.3	S. 19°W.	3.4	N. 88°W.	1.4	S. 78°W.	1.6
250					S. 19°W.	4.1	S. 22°W.	4.2	W.	1.4	S. 79°W.	1.7
500	S. 59° E.	2.4	S. 23° E.	0.4	S. 25°W.	5.6	S. 31°W.	6.0	S. 71°W.	2.9	S. 73°W.	3.0
750	S. 38° E.	3.3	S. 5°W.	1.3	S. 24°W.	5.4	S. 33°W.	6.0	S. 78°W.	3.4	S. 72°W.	4.0
1,000	S. 21° E.	3.1	S. 32°W.	1.7	S. 28°W.	4.5	S. 35°W.	5.6	S. 71°W.	3.5	S. 77°W.	4.4
1,250	S. 17° E.	2.7	S. 50°W.	2.0	S. 29°W.	3.8	S. 36°W.	5.2	S. 80°W.	4.4	S. 81°W.	5.2
1,500	S.	2.9	S. 61°W.	2.7	S. 29°W.	2.5	S. 34°W.	4.7	S. 77°W.	4.9	S. 84°W.	5.5
2,000	S. 32°W.	2.7	S. 80°W.	4.2	S. 53°W.	2.0	S. 36°W.	4.1	S. 79°W.	3.7	S. 86°W.	6.7
2,500	S. 57°W.	3.3	N. 89°W.	5.9	S. 30°W.	2.0	S. 33°W.	3.6	S. 86°W.	3.9	S. 88°W.	9.1
3,000	S. 71°W.	4.6	W.	7.6					S. 88°W.	5.7	S. 84°W.	11.6
3,500	N. 57°W.	5.1	N. 77°W.	9.7					N. 72°W.	5.6	S. 82°W.	11.3
4,000	N. 54°W.	12.0	N. 71°W.	10.9								
4,500	N. 52°W.	17.4	N. 65°W.	13.1								
5,000	N. 68°W.	19.6	N. 73°W.	16.0								