

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The present Summary, for the year 1897, is based essentially upon data received from about 150 regular Weather Bureau stations and 30 regular Canadian stations, all reporting daily by telegraph. A revised chart of total annual precipitation will be published in the Annual Report of the Chief of the

Weather Bureau when the data from all voluntary stations have been received. The tables for thunderstorms and auroras are, as usual, based on reports from both voluntary and regular observers. The statistical tables have generally been prepared by the Division of Records and Meteorological Data, A. J. Henry, Chief.

GENERAL CLIMATIC CONDITIONS.

ATMOSPHERIC PRESSURE.

The mean annual pressure for 1897 is shown numerically in Tables I and II, both for the respective stations and as reduced to sea level by the method explained in the MONTHLY WEATHER REVIEW for 1894, Vol. XXII, p. 538. The corresponding isobars for sea level are shown on Chart I. As the international conferences of meteorologists have uniformly urged the application of the reduction to standard gravity and the further reduction to sea level by the tables and methods of the International Meteorological Committee, the Editor has requested Mr. Park Morrill, forecast official, to make the corresponding corrections and reductions, not only for sea level, but also for an upper level of 10,000 feet above the sea; these are given on Charts IV and V. The tables for passing from sea level upward to 10,000 feet are given on page 494 of the MONTHLY WEATHER REVIEW for 1895 or page 491 of the REVIEW for 1896. A general average decrement of temperature is assumed at the rate of 2° F. per 1,000 feet, or 0.37° C. per 100 meters, or about one-third of the adiabatic rate. Corresponding isobars for the level of 5,000 meters, or 16,404 feet, may be drawn by means of the table computed by Koeppen and published on page 419 of the MONTHLY WEATHER REVIEW for November, 1896.

The data on Chart I show that the highest pressures at sea level, not corrected for gravity, were 30.13 inches at Charleston, 30.12 at Knoxville, 30.11 at Chattanooga and Atlanta, respectively. The highest pressure for 1896 was 30.14 at Charleston. The lowest pressure for 1897 was 29.88, at Phoenix, as against 29.89, at the same station, in 1896.

The data on Chart IV show that the true pressure gradients at sea level differ appreciably from the apparent gradients shown on Chart I. The data on Chart V show that the high-level gradients are steeper, and that, therefore, the currents of air must be swifter than at sea level. As the atmosphere is a mixture of ascending and descending currents, which necessarily interact on each other, therefore, both the upper and lower gradients and winds and temperatures represent the result of the vertical interchange of air that is perpetually going on. The resultant surface winds, as also the upper currents, indicated by the clouds, are each related to both the upper and lower isobars.

AREAS OF HIGH AND LOW PRESSURE.

The average daily and hourly movements of the centers of these areas are given both by paths and by days in the individual tables of the successive MONTHLY WEATHER REVIEWS, and the monthly sums are collected together in the following table (A), which also gives the annual means by paths and by days.

These averages show the same peculiarities as those for previous years, namely, that the means taken by days are in all cases smaller than those taken by paths by about one-half of 1 per cent. This is apparently due to the fact that the numerous paths of rapid movements and short durations outweigh those of slow movement and long duration. If the movements of the centers depend upon the general movement of the upper portion of the atmosphere, as may be the case, then the general average movement of the atmosphere over the United States during 1897 was about the same as in 1896, as shown by the corresponding numbers, 550 and 549, or 606 and 612, respectively.

TABLE A.—Movements of areas of high and low pressure for 1897.

Month.	High areas.				Low areas.			
	By paths.		By days.		By paths.		By days.	
	No.	Movement.	No.	Movement.	No.	Movement.	No.	Movement.
January.....	6	3,930	17.0	11,170	9	6,291	35.5	24,180
February.....	8	5,019	29.5	17,120	11	8,397	43.0	31,240
March.....	6	3,699	26.5	15,510	12	7,973	39.5	24,430
April.....	11	6,243	47.5	27,210	8	4,484	42.5	23,240
May.....	7	3,256	51.5	23,960	11	5,431	45.0	22,290
June.....	7	3,980	36.5	19,790	9	5,266	31.0	17,410
July.....	4	1,997	22.0	10,870	8	3,742	40.5	19,290
August.....	8	4,828	35.0	19,144	9	4,764	44.5	22,004
September.....	9	4,689	41.0	21,990	10	6,131	42.5	26,100
October.....	10	5,916	47.0	26,410	12	7,680	38.0	23,580
November.....	7	4,325	48.0	25,120	8	5,324	38.5	25,940
December.....	7	3,355	35.0	18,820	12	9,327	44.0	33,960
Sums.....	90	51,847	431.5	237,114	119	74,669	434.5	293,514
Mean daily velocity...	576		550		628		606	
Mean hourly velocity.	24.0		23.9		26.2		25.2	