MONTHLY WEATHER REVIEW.

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VOL. XXIII. ANNUAL SUMMARY. No. 13

INTRODUCTION.

The Summary for the year 1895 is based upon data received from about 3,000 stations occupied by regular and voluntary observers of the Weather Bureau, Canadian data received by the cooperation of Prof. R. F. Stupart, and Mexican data received from the Directors of observatories in that country. The statistical tables have been generally prepared by the Division of Records and Meteorological Data, A. J. Henry, Chief of Division. The text and editorial work is by Prof. Cleveland Abbe unless otherwise specifically noted.

GENERAL CLIMATIC CONDITIONS.

ATMOSPHERIC PRESSURE.

The mean pressure for 1895 is shown numerically in Tables I and II. The data there given refer to the mercurial barometer corrected for instrumental temperature and error but not reduced to standard gravity, and, therefore, in accordance with the strict usage of physicists should be called "mercurial barometric means;" the readings by aneroid barometers would differ therefrom by amounts depending upon the local variations of gravity at different latitudes and altitudes. In accordance with the decision of the International Meteorological Congress the term atmospheric pressure should be used only in connection with true pressure or absolute measurements of pressure, that is to say, measurements that are strictly comparable among themselves and are not distorted by any variations of temperature or gravity. The corrections to barometric readings for the effects of temperature, instrumental error, and local gravity should all be applied at the same time in order to obtain the true local pressure instead of the apparent pressure as indicated by the crude readings of mercurials and aneroids. The gravity correction is a constant for each station, its value is so large as to be appreciable in studies based on the daily maps, and is still more important in studies based on the maps of monthly and annual means. The reduction of local pressure to sea-level pressure is a separate step, the method proper for this reduction varies in different countries and under different circumstances, but there is no essential difference of opinion as to the corrections for instrumental temperature and local gravity. The method of reduction to sea level and the omission of the correction for gravity as explained by Professor Hazen in the MONTHLY WEATHER REVIEW for 1894, Vol. XXII, p. 538, have continued in use in the Weather Bureau during 1895, and the figures given in Tables I and II, as also those in Chart I accord therewith.

In order to present the distribution of the true atmospheric pressure as reduced to sea level by the tables and methods of the International Meteorological Congress, the Editor has requested Mr. Park Morrill to prepare Chart IV. The data used by him, namely, the latitude, temperature, dew-point and local pressure corrected for gravity and the methods adopted are given in full in the special contribution by him to this annual summary. The simplified methods of reduction to sea level that it is convenient to adopt in daily telegraphic work are not necessarily those that should be adopted in studying monthly and annual means, therefore the data given in Mr. Morrill's table (A) and in Chart IV of sea level pressures is especially commended to the student.

As the general motions of the lower atmosphere depend intimately upon those of that portion of the air that is within 20,000 feet of sea level the Editor has requested Mr. Morrill to prepare from the same data and by the same methods a system of isobars showing pressures and temperatures at an elevation of 10,000 feet. The resulting isotherms are found by diminishing those of Chart IV by exactly 20° F., but the high level isobars are drawn on Chart V and differ entirely from those for sea level.

These charts cover the stations of the United States and Canada. The Editor has been able to add data for only a few Mexican stations, and forbears from extending the isotherms and isobars over Mexico, but hopes to cover this region more fully at a future time.

The data on Chart I show that the reduced barometric means, not corrected for gravity, were highest in the east Gulf and South Atlantic States, and lowest in Arizona. They were also quite low in Alberta, Assiniboia, and Manitoba, and eastward to Newfoundland. The data on Chart IV show that the mean annual atmospheric pressure was also lowest and highest in these same regions, respectively, but the gradients and many other details differ appreciably from those of 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, and even if there be a considerable systematic alteration in the adopted temperatures of the columns of air between the upper and lower levels, yet no reasonable hypothesis will alter this conclusion. Consequently the air that descends from above to the earth's surface must have a decided influence upon our winds, as it is known to have upon our weather. It is quite as proper to compare the resultant surface winds on Chart I with these high level isobars of Chart V, as it is to compare the cloud movements with the latter. In the day time the winds at the surface of the earth generally consist of a rapid alternation of descending currents moving under the influence of upper isobars and ascending currents moving under the influence of sea-level isobars. At night time this vertical interchange is less important, and may even cease altogether. The result is a diurnal and reciprocal periodicity in the strength of the sea-level wind and of the currents at the lower cloud level, the latter being stronger in proportion as the former is weaker, as has been explained by Espy and Koeppen. There must also be a diurnal periodicity in the relation of the upper and lower isobars to the direction of the upper and lower currents, respectively. The currents at the level of cumulus clouds should be inclined to the upper isobars at a greater angle at the time of most active vertical interchange, say 2 p. m., and at a less angle at the time of minimum sea-level temperatures, say 6 a. m., but the Editor is not aware that observations are at hand to test the truth of this deduction.

MOVEMENTS OF CENTERS OF HIGH AND LOW BAROMETER DURING 1895.

The location of an area of high or low pressure is, to a limited extent, affected by the method adopted in the reduction of the barometer to sea level. The following summary, therefore, holds good, especially in connection with the method adopted by the Weather Bureau for the past few years. The average daily and hourly movements of the centers of the areas are given by paths and by days in the individual tables of the successive MONTHLY WEATHER REVIEW, and the monthly sums are collected together in the following table for the purpose of taking the annual means by paths and by days.

Movements of areas of high and low barometer for 1895.

Month.	High areas.				Low areas.			
	By paths.		By days.		By paths.		By days.	
	No.	Movement.	No.	Movement.	No.	Movement.	No.	Movement.
		Miles.		*Miles.*		*Miles.*		*Miles.*
January	11	10,409	28.5	25,000	15	10,326	46.0	29,400
February	12	7,341	37.0	21,050	17	10,457	43.5	26,400
March	11	7,041	41.5	24,150	18	12,756	46.5	32,200
April	10	5,314	65.0	33,390	14	8,971	66.5	40,500
May	6	3,142	19.0	10,200	8	4,185	29.5	15,450
June	4	2,393	24.5	14,558	4	1,862	17.5	7,880
July	11	5,168	38.0	16,670	11	5,711	42.5	21,880
August	14	6,323	42.0	20,480	17	9,077	62.0	28,920
September	9	4,683	43.0	21,520	9	5,276	36.0	20,920
October	11	6,765	46.0	29,510	15	9,364	50.5	30,850
November	4	2,037	37.5	18,950	10	8,199	21.5	17,470
December	3	1,457	12.0	5,915	14	10,525	46.5	32,930
Sums	106	62,073	434.0	241,393	152	96,709	509.5	304,800
Mean daily velocity	585		556		636		598	
Mean hourly velocity	24.4		23.2		26.5		24.9	

TEMPERATURE.

The mean annual temperature is shown by the isotherms on Chart I. These temperatures relate to the surface of the ground. The individual figures are given in Table I of data for Weather Bureau stations. The lowest annual averages within the United States were: St. Vincent, 35.3; Moorhead, 38.5; Sault Ste. Marie, 38.6; Williston, 38.9; Duluth, 39.1; Havre and Bismarck, 39.8. The highest averages were: Key West, 75.9; Jupiter, 72.8; Yuma, 72.4; Tampa, 70.9.

The mean annual temperature was above the normal in New England and in the Missouri Valley, elsewhere it was below the normal; the regions of large deficits were the east and west Gulf States.

The maximum temperatures are shown both by the upper figures and full lines on Chart II; the minimum temperatures of the year are shown by the lower figures and the dotted lines on the same chart. The absolute range of temperature during the year is easily obtained by comparing the full and dotted lines on this chart. In general, maximum temperatures exceeding 100°, occurred as follows: 102, Columbia, S. C., Omaha, and Independence; 103, San Antonio, Tex., Sioux City, and Huron; 104, Walla Walla; 106, Pierre; 108, Red Bluff; 110, Fresno; the absolute maximum for the whole country was 114 at Yuma.

Minimum temperatures of 35° or less occurred at Bismarck, —39; Williston, —40; St. Vincent, —41; the absolute minimum for the whole country was —41° at St. Vincent.

The region of large annual ranges of temperature were: Upper Lake, Upper Mississippi and Missouri Valleys, the Dakotas, northern and middle Slopes.

The small annual ranges were: Key West, 42; Point Reys Light, 49.

The accumulated departures of average monthly temperatures are given in Table III, and show that there was a steady increasing deficit throughout the year over the lower Lakes, Atlantic and Gulf States, as also over the northern, middle, and southern Rocky Mountain Slopes, and the northern, middle and southern Pacific Slopes. A diminishing deficit amounting to an excess in some places prevailed in the upper Lake Region, North Dakota, the Mississippi and Missouri Valleys.

PRECIPITATION.

The total annual fall of rain and melted snow for 1895 is shown on Chart III. The greatest precipitation was Tatoosh Island, 92.95; East Clallam, 90.35; Jupiter, 70.47; Astoria, 70.75; the least was 1.33 at Yuma, 4.17 at Independence, and 6.84 at Winnemucca.

An annual rainfall above 60 inches occurred at Hatteras, Jupiter, East Clallum, Fort Canby, Pysht, Tatoosh Island, and Astoria.

An annual rainfall of less than 20 inches prevailed in North Dakota, the northern part of the Missouri Valley, and generally over the northern and middle Slope, the Southern, middle, and northern Plateau, and the south Pacific Coast regions.

The accumulated departures of total monthly precipitation from the normal values are shown in Table IV, from which it appears that a steadily increasing deffcit has prevailed in all regions except Florida, the southern Slope, and southern Plateau. The larger accumulated deficits were: Ohio Valley and Tennessee, 11.00; middle Atlantic, 9.10; upper Mississippi, 7.80; east Gulf, 8.60.

WIND.

The prevailing direction of the wind, namely, that which occurred most frequently at the two hours of regular observations for telegraphic report, 8 a. m. and 8 p. m., eastern time, is given in Table I. The annual resultant wind deduced from these same observations without taking account of the force of the wind (which is equivalent to attributing a uniform force to all winds) is given in table V. These resultants are also presented graphically on Chart I in connection with the barometric means. They should also be compared with the pressures on Charts IV and V to which they are intimately related.

Owing to the great labor of computation the resultant winds, as deduced from hourly readings of the self-registering anemometers, have not been computed during the year 1895, but the relation between the resultants from two observations per day and those from twenty-four hourly observations can be estimated by a comparison between Tables V and VI, pp. 544 and 545 of the Summary for 1894.

MOISTURE.

The mean temperature of the dew-point and the mean relative humidity are given in Table I.