

generally about half way between the temperature of the air and of the dew-point. The quantity of water evaporated in a unit of time from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The *relative humidity*, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day or any other interval would properly be obtained from the data given by an evaporimeter, but may also be obtained, approximately, from frequent observations of the relative humidity.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month exceeded 10 inches in the neighborhood of Jupiter, and exceeded 6 inches in southeast Florida, central Texas, southern Maine, Connecticut, New York, northern New Jersey, and eastern Pennsylvania. Little or no rain fell in the central and southern Plateau Region and California.

The larger values for regular stations were: Jupiter, 10.73; Portland, Me., and Eastport, 7.88; Washington, 6.97; Baltimore, 6.88.

Details as to *excessive precipitation* are given in Tables XI and XII.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from the self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in New England, and especially in northwestern Texas and eastern New Mexico. It was deficient in the Valley of the Mississippi and tributaries.

The large excesses were: Jupiter, 4.9; Eastport, 4.2; Santa Fe, 3.3; Baltimore, 3.1; Washington, 3.0; Amarillo, 2.4. In Canada, Yarmouth, 2.5; Quebec, 2.0. The large deficits were: New Orleans and Little Rock, 4.6; Vicksburg, 4.0; Springfield, Mo., and Yankton, 3.6; Kansas City and Montgomery, 3.4; Meridian and Atlanta, 3.2; Topeka and St. Louis, 3.0.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: New England, 120; Middle Atlantic, 135; Florida Peninsula, 130; southern Slope, 165; southern Plateau, 300.

Below the normal: South Atlantic, 63; east Gulf, 31; west Gulf, 59; Ohio Valley and Tennessee, 87; lower Lake, 89; upper Lake, 76; North Dakota, 37; upper Mississippi, 43; Missouri Valley, 37; northern Slope, 49; middle Slope, 80; middle Plateau, 56; northern Plateau, 74; north Pacific, 61; middle Pacific, 21; south Pacific, 19.

In Canada.—Prof. R. F. Stupart reports:

The rainfall was considerably below the average in British Columbia, and less so in the Northwest Territories and Manitoba. It was somewhat in excess in Ontario and Quebec. It was slightly above average in Prince Edward Island and eastern Nova Scotia, but very excessive in southern New Brunswick and western Nova Scotia.

The *years of greatest and least precipitation* for May are given in the REVIEW for May, 1890. The precipitation for the current month was the greatest on record at:

Santa Fe, 4.35. It was the least on record at: Columbus, Mo., 3.19; Raleigh, 2.85; Springfield, Mo., 2.48; Kansas City, 1.24; Nashville, 1.22; Cairo, 1.12; Chicago, 0.84; Moorhead, 0.80; Eureka, 0.75; Montgomery, 0.68; Havre, 0.42; Miles City, 0.35; Atlanta, 0.34; Tampa, 0.33; Carson City, 0.23; North Platte, 0.11; Red Bluff, 0.06; Point Reyes Light, 0.02; Fresno, 0.00.

The *total accumulated monthly departures* from January 1 to the end of the current month are given in the second column of the following table: The third column gives the percentage of the current accumulated precipitation relative to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	<i>Inches.</i>	<i>Per cent.</i>		<i>Inches.</i>	<i>Per cent.</i>
Florida Peninsula	+ 5.60	138	New England	— 1.00	89
Ohio Valley and Tenn.....	+ 2.30	111	Middle Atlantic	— 1.50	93
Upper Mississippi Valley.	+ 1.80	114	South Atlantic	— 1.50	93
Missouri Valley.....	+ 0.70	106	East Gulf.....	— 1.80	93
Middle Slope	+ 1.20	114	West Gulf	— 2.70	86
Southern Slope.....	+ 2.30	181	Lower Lake	— 1.20	91
Southern Plateau	+ 2.30	197	Upper Lake.....	— 0.30	96
Middle Plateau	+ 0.40	107	North Dakota.....	— 0.70	89
South Pacific.....	+ 0.90	113	Northern Slope	— 0.80	87
			Northern Plateau.....	— 0.30	96
			North Pacific.....	— 1.90	93
			Middle Pacific.....	— 2.40	87

SNOWFALL.

The *total monthly snowfall* at each station is given in Tables I and II. The chart of geographical distribution is omitted for this month.

Snowfalls of from 4 to 23 inches were reported from mountain stations in Colorado; from 1 to 2½ inches in the mountains of western Montana; 4 inches or less in Ohio, Indiana, Kentucky, and West Virginia, and generally a trace in central Maine, the upper Lake Region, Wisconsin, and Minnesota.

The *depth of snow on the ground* was not appreciable at the end of the month.

In Canada.—The map for May, published by Prof. R. F. Stupart, makes no special mention of snowfall, but local reports show that light snows fell in Manitoba and the region north of Lake Superior; also in New Brunswick, Nova Scotia, and Newfoundland, but all disappeared very soon.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 12. Arizona, 19, 29. Arkansas, 28. California, 14, 15, 23. Colorado, 4, 5, 8, 9, 14, 16, 18, 20, 21, 24, 29, 30. Delaware, 18, 21. District of Columbia, 24. Florida, 15, 24. Idaho, 3, 6, 7, 8, 15, 19, 20, 24, 25, 30, 31. Illinois, 8, 9, 13, 14, 15. Indiana, 9, 11, 14, 15, 20 to 24. Indian Territory, 10. Iowa, 8, 10, 12, 13, 14, 19. Kansas, 2, 8, 9, 10, 21, 22, 25. Kentucky, 9, 23, 24. Louisiana, 1, 11, 13, 14. Maine, 7, 29. Maryland, 21, 24, 25. Massachusetts, 7. Michigan, 11, 13, 14, 19, 23, 30. Minnesota, 11 to 15. Mississippi, 8, 30. Missouri, 2, 8, 20, 22, 26, 28. Montana, 9, 16, 30. Nebraska, 10, 11, 17, 18, 20, 31. Nevada, 1, 2, 7, 8, 17, 18, 21, 23, 24. New Jersey, 21. New Mexico, 3, 4, 6, 15 to 21, 23, 25, 26, 27. New York, 4. North Carolina, 1, 5, 13, 14, 17, 24, 29, 30. North Dakota, 7, 10, 11, 25, 26. Ohio, 9, 12, 14, 15, 16, 20, 23, 24, 27. Oklahoma, 4, 6, 8, 9, 10, 12, 13, 22. Oregon, 4 to 7, 16, 24. Pennsylvania, 16, 21, 23, 24. South Dakota, 8, 11, 12, 13, 16, 18, 26. Tennessee, 8, 9, 21, 24. Texas, 4 to 7, 10 to 13, 16, 17, 23. Utah, 1, 15, 20, 24. Virginia, 1, 5, 11, 16, 17, 21, 23, 24. Washington, 5, 6, 7, 12, 29, 30. West Virginia, 24, 29, 30. Wisconsin, 12, 13, 14, 29, 31. Wyoming, 2, 19.

SLEET.

The following are the dates on which sleet fell in the respective States:

California, 17. Colorado, 3, 4, 10, 27, 31. Illinois, 2. Indiana, 1, 2. Iowa, 13. Michigan, 1, 2, 30, 31. Minnesota, 14, 23. Montana, 9. North Dakota, 11. Ohio, 1, 2. Virginia, 2, 3. West Virginia, 2. Wisconsin, 12, 30.

WIND.

The prevailing winds for May, 1897, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

The resultant winds, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table VIII. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

Maximum wind velocities are given in Table I, which also gives the altitudes of the Weather Bureau anemometers above the ground. Maxima of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Fort Canby, Wash.....	6	Miles 57	s.	Tatoosh Island, Wash.	23	Miles 55	e.
Idaho Falls, Idaho.....	25	51	s.				

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 22 regular stations of the Weather Bureau by its photographic, and at 39 by its thermal effects; at one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X for the 60 stations at which instrumental self-registers are maintained.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the durations of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of area of clear sky. These numbers have no necessary relation to

each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for May, 1897, is 10 per cent for photographic and 11 per cent for thermometric records.

The details are shown in the accompanying table, in which the stations are arranged according to the total possible duration of sunshine, and not according to the observed duration.

Difference between instrumental and personal observations of sunshine.

Stations.	Latitude.	Apparatus.	For whole month.		Instrumental record of sunshine.		
			Total possible.	Personal.	Photographic.	Difference.	Thermometric.	Difference.
Key West.....	24 34	T.	414.6	64	.....	64	+20
Tampa, Fla.....	27 57	T.	419.8	77	.....	77	+9
Galveston, Tex.....	29 18	P.	431.8	66	74	+6	.....
New Orleans, La.....	29 58	T.	423.7	63	.....	63	-1
Savannah, Ga.....	32 06	P.	428.4	66	77	+9	.....
Vicksburg, Miss.....	32 23	T.	428.4	74	.....	74	+13
San Diego, Cal.....	32 43	P.	420.7	49	49	0	.....
Charleston, S. C.....	32 47	T.	420.7	70	.....	70	+10
Phoenix, Ariz.....	32 28	P.	420.7	83	88	+11	.....
Atlanta, Ga.....	32 45	T.	422.6	63	.....	63	+11
Los Angeles, Cal.....	34 08	P.	432.6	45	50	+5	.....
Wilmington, N. C.....	34 14	T.	432.6	61	.....	61	+10
Little Rock, Ark.....	34 45	T.	434.2	56	.....	56	+24
Chattanooga, Tenn.....	35 04	T.	434.2	53	.....	53	+4
Santa Fe, N. Mex.....	35 41	P.	436.7	52	60	+8	.....
Raleigh, N. C.....	35 45	T.	436.7	51	.....	51	+17
Nashville, Tenn.....	36 10	T.	436.7	64	.....	64	+5
Fresno, Cal.....	36 43	T.	439.0	53	.....	53	+5
Dodge City, Kans.....	37 45	P.	441.7	56	63	+5	.....
San Francisco, Cal.....	37 48	T.	441.7	59	.....	59	+13
Louisville, Ky.....	38 15	T.	441.7	46	.....	46	+22
St. Louis, Mo.....	38 28	T.	443.8	60	.....	60	+15
Washington, D. C.....	38 54	P.	443.8	55	60	+5	.....
Kansas City, Mo.....	39 05	P.	443.8	57	59	+2	.....
Cincinnati, Ohio.....	39 06	T.	443.8	55	.....	55	+8
Baltimore, Md.....	39 18	T.	442.8	48	.....	48	+10
Atlantic City, N. J.....	39 23	P.	443.8	50	63	+13	.....
Denver, Colo.....	39 45	P.	446.7	48	72	+24	.....
Indianapolis, Ind.....	39 46	T.	446.7	56	.....	56	+9
Philadelphia, Pa.....	39 57	T.	446.7	49	.....	49	+27
Columbus, Ohio.....	39 58	T.	446.7	49	.....	49	+10
Harrisburg, Pa.....	40 16	T.	446.7	38	.....	38	+30
Pittsburg, Pa.....	40 22	T.	449.1	45	.....	45	+2
New York, N. Y.....	40 48	T.	449.1	46	.....	46	+20
Salt Lake City, Utah.....	40 46	P.	449.1	36	37	+1	.....
Eureka, Cal.....	40 48	P.	449.1	47	53	+6	.....
Cheyenne, Wyo.....	41 06	P.	449.1	43	65	+22	.....
Omaha, Neb.....	41 16	P.	449.1	60	70	+10	.....
Cleveland, Ohio.....	41 30	T.	451.9	39	.....	39	+1
Des Moines, Iowa.....	41 35	T.	451.9	67	.....	67	+5
Chicago, Ill.....	41 53	T.	451.9	87	.....	87	+5
Erie, Pa.....	42 07	T.	451.9	47	.....	47	+7
Binghamton, N. Y.....	42 08	T.	451.9	36	.....	36	+8
Detroit, Mich.....	42 30	T.	451.9	49	.....	49	+12
Boston, Mass.....	42 31	T.	451.9	35	.....	35	+8
Dubuque, Iowa.....	42 30	T.	451.9	75	.....	75	+3
Albany, N. Y.....	42 39	T.	454.0	42	.....	42	+11
Buffalo, N. Y.....	42 58	T.	454.0	38	.....	38	+17
Rochester, N. Y.....	43 03	T.	454.0	41	.....	41	+2
Idaho Falls, Idaho.....	43 29	T.	454.0	67	.....	67	+3
Portland, Me.....	43 29	T.	457.9	28	.....	28	+20
Northfield, Vt.....	44 10	P.	457.9	33	43	+10	.....
Eastport, Me.....	44 54	P.	460.7	30	38	+8	.....
St. Paul, Minn.....	44 58	P.	460.7	46	.....	46	+12
Minneapolis, Minn.....	44 59	T.	460.7	.....	.....	.....	.....
Portland, Oreg.....	45 33	T.	464.1	58	.....	58	+3
Helena, Mont.....	46 34	P.	467.4	58	61	+3	.....
Bismarck, N. Dak.....	46 47	P.	467.4	68	69	+1	.....
Seattle, Wash.....	47 35	T.	471.3	51	.....	51	+6
Spokane, Wash.....	47 40	P.	471.3	59	70	+11	.....

* Buffalo, N. Y.—Instrumental record is for 28 days, for which the total possible is 412.4; the instrumental, 344.1; instrumental percentage, 83; personal estimate, 43, and difference, -17.
 † St. Paul, Minn.—The instrumental record is for 31 days, for which the total possible is 516.1; instrumental record, 149.4; instrumental percentage, 47; personal percentage, 35; difference, +12.