The principal object in publishing the resultant winds is to afford students and others an opportunity to compare the mean isobars with the mean direction of the wind at 8 a. m. and 8 p. m., seventy-fifth meridian time. As stated in a previous letter on the subject, the Bureau does not attempt to combine the elements of force or velocity with that of time. It is conceded that for a special locality where the general atmospheric circulation is modified by local causes, the mean direction of the wind is best obtained by taking into account the element of velocity as you have done. It has been shown, however, that generally the difference in the velocity of the winds from different points of the compass affects the resultant but slightly, either in direction or amount. (See MONTHLY WEATHER REVIEW, December, 1893, page 365, and Coffin's Winds of the Globe.

In deciding to adopt the present method of computing the mean direction of the wind, we were largely influenced by two considerations, first, a great saving of clerical labor would be effected, and second, the results that would be obtained by the use of the two daily observations, as distinguished from the records by self-registers, would be uniform at all stations of the service. You may be interested in knowing that a comparison of resultant winds, computed by both methods, was carried on throughout 1894. (See Tables VIII and IX, MONTHLY WEATHER REVIEW of that year.)

PROBABLE CLOUDINESS DURING TOTAL SOLAR ECLIPSE OF MAY 28, 1900.

In the MONTHLY WEATHER REVIEW for 1897, p. 394, and 1898, p. 404, Prof. F. H. Bigelow has published his first and second reports, showing the results of special observations made at the request of Prof. D. P. Todd, for the purpose of determining as far as practicable the probability of the occurrence of cloudy weather at different points along the path of totality. The exact location of this path is shown by the narrow band on Chart XI, taken from Professor Bigelow's Bulletin. As many expeditions from astronomical centers throughout the world will be sent to observe the solar and atmospheric phenomena visible in this region during totality, it is important for the astronomer to avail himself of all the information that the meteorologist can furnish so that he may as far as possible diminish the chances of the disappointment that cloudy weather must inevitably bring.

The third and final report by Professor Bigelow, being rather larger than the first and second, will be printed as a bulletin of the Weather Bureau and distributed to astronomers and scientific journals, but some of the results given therein are here quoted for the information of all voluntary observers.

The total eclipse begins on the Pacific Ocean just west of Mexico at sunrise and will be visible at stations located within a narrow band that stretches from that point due eastward over Mexico and the Gulf of Mexico and enters the United States near New Orleans whence it passes northeastward toward Norfolk and Cape Henry and, finally, after crossing the Atlantic Ocean, Portugal, and Algiers, terminates near the northern end of the Red Sea at sunset. In the United States totality begins near New Orleans at 7:20, local mean time, and ends at Norfolk about 9 a. m., local mean time, or between 1:30 and 1:55 p. m., Greenwich mean time. The respective observers can convert these times into the standards, eastern or central time, by applying the proper differences of longitude. The totality of this eclipse will last only about one and a half minutes for those who are located precisely on the line that marks the center of the path of the shadow of the moon, but will be nothing for those on the boundary lines of the path.

The short lines on Chart XI, numbered (1) to (6), drawn across the path of totality, represent the position of the center of the shadow at intervals of five minutes, as it advances along its path; No. (1) corresponds to 1h. 30m. p. m. and No. (6) to 1h. 55m. p. m., Greenwich mean time.

The observations made by voluntary observers during the past three years give uniformly harmonious results as to the probable state of the sky over this region between 8 and 9 a. m., May 28, 1900. If we classify the observers by States, and consider their observations year by year, and also divide the records into two classes according as they give the general cloudiness of the sky and the special cloudiness in the neighborhood of the sun, we obtain the figures given in the following table:

Summary of results for three years.

[The figures are percentages of cloudiness.]

State.	1897.		1898.		1899.		Means.	
	General sky.	Near sun.	General sky.	Near sun.	General sky.	Near sun.	General sky.	Near sun.
Virginia	.....	.....	44.9	41.7	35.7	34.3	40.3	38.0
N. Carolina	35.8	33.3	28.2	25.7	33.3	30.6	32.4	29.9
S. Carolina	33.7	32.1	17.5	16.0	28.1	26.7	26.4	24.9
Georgia	18.4	16.0	12.2	10.8	18.5	17.4	16.4	14.7
Alabama	15.2	14.9	17.1	15.7	22.4	22.6	18.2	17.7
Mississippi	.....	.....	23.0	26.4	38.6	31.9	30.8	29.2
Louisiana	26.5	21.5	36.4	30.9	35.9	30.6	32.9	27.7

In addition to this table, showing the probabilities in favor of good weather, Professor Bigelow's Bulletin gives a mass of information for the benefit of visiting astronomers, showing the railroads, the hotels, the astronomical conveniences, and the resources for enabling heavy baggage to be transported to the path of totality. Undoubtedly the Weather Bureau observers, both regular and voluntary, will receive many calls for assistance in connection with this eclipse of the sun.

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

PRESSURE.

The month of September, 1899, was one of high pressure, great dryness, and a high percentage of sunshine.

As compared with the preceding month pressure was markedly higher in all of the interior districts. The geographic center of the country happens to mark the region of greatest increase in pressure, viz, about two-tenths of an inch, which extended from Nebraska southward to Oklahoma and northern Texas. The increase over the whole country, excepting the Florida Peninsula and the St. Lawrence Valley, was greater than a tenth of an inch.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature is shown on Chart VI which also shows by appropriate lines the monthly maximum and minimum temperatures. During August temperature was below normal in the western part of the country and above in the eastern. These conditions were reversed during the current month. West of the Mississippi River temperature was from 1° to 4° above normal, while over the remaining areas there was a deficiency ranging from a fraction of a degree in the South Atlantic States to 4° in the region about Lake Superior.

Maximum temperatures of 100° and over occurred over a large area in the Mississippi and Missouri River valleys and

also in central and lower California, Arizona, and New Mexico.

Minimum temperatures as low as 15° to 18° occurred in the Dakotas and northern Wisconsin. The low temperatures in northern Wisconsin afford an illustration of the fact that the temperature over an area, say, 50 miles square, may fall 10° to 15° below that of the surrounding country on all sides.

In Canada.—Prof. R. F. Stupart says:

The temperature was above average from Vancouver Island to Manitoba, nearly average in eastern Quebec and the greater portion of the Maritime Provinces, and below average over Ontario and western Quebec, and especially so in the more northern portions. White River was as much as 7° below, Bissett, 6° below, and Montreal, 5° below. Alberta and the North Saskatchewan Valley show the greatest amount above average, amounting to 3°.

FROST.

Frost occurred at one or more stations in the States and on the dates named below: Alabama, 27–30; Arkansas, 27–30; California, 4; Colorado, 23, 28, 29, 30; Connecticut, 7, 15, 16, 27, 30; Idaho, 3, 4, 6, 7, 21; Illinois, 27, 29, 30; Indiana, 19, 27, 29, 30. Indian Territory, 26, 29, 30; Iowa, 13, 17, 18, 20, 25–30; Kansas, 11, 17, 20, 26, 29; Kentucky, 21, 27, 28, 30; Maine, 15–18, 23, 24, 26; Maryland, 14, 15, 28, 29, 30; Massachusetts, 15, 16, 30; Michigan, 12–30; Minnesota, 13, 16–20, 22, 24–30; Missouri, 26, 27, 29, 30; Montana, 3, 4, 6, 7, 8, 15, 16, 18, 28, 29; Nebraska, 16, 17, 20, 24–30; Nevada, 8–12; New Hampshire, 5, 7, 10, 13–17, 22, 23, 24, 28, 29; New Jersey, 15, 28; New Mexico, 17; New York, 3, 7, 10, 13–16, 23, 25, 28, 29, 30; North Carolina, 27, 28, 30; North Dakota, 5, 14, 17, 18, 19, 22, 25–30; Ohio, 30; Oklahoma, 29; Oregon, 7, 8, 29; Pennsylvania, 7, 13–16, 22, 23, 27–30; Rhode Island, 30; South Dakota, 15–20, 24, 25, 26, 28, 29, 30; Tennessee, 26, 27, 28, 30; Utah, 16; Vermont, 14, 15, 16, 20, 22, 23, 28, 29; Virginia, 27–30; Washington, 6, 27, 28; West Virginia, 25, 27, 28, 30; Wisconsin, 12, 13, 14, 18, 19, 20, 23, 26–30; Wyoming, 4, 6–10, 12, 16, 17, 18, 20, 22, 28.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	60.6	− 0.8	+ 0.3	0.0
Middle Atlantic	12	66.1	− 0.9	− 1.8	− 0.2
South Atlantic	10	74.0	0.0	+ 0.1	0.0
Florida Peninsula	7	78.9	0.0	+ 2.1	+ 0.2
East Gulf	7	75.2	− 0.7	− 4.3	− 0.5
West Gulf	7	76.3	+ 0.3	− 2.2	− 0.2
Ohio Valley and Tennessee	12	68.5	− 0.1	− 0.6	− 0.1
Lower Lake	8	60.9	− 2.3	+ 1.5	+ 0.2
Upper Lake	9	56.2	− 2.8	− 6.0	− 0.7
North Dakota	7	55.2	− 0.2	−19.4	− 2.2
Upper Mississippi	11	64.2	− 0.8	− 7.1	− 0.8
Missouri Valley	10	65.3	− 0.2	− 9.2	− 1.0
Northern Slope	7	60.9	+ 2.9	−23.2	− 2.6
Middle Slope	6	68.6	+ 1.2	− 6.8	− 0.8
Southern Slope	6	72.9	+ 1.3	− 8.8	− 1.0
Southern Plateau	13	74.7	+ 3.3	− 4.9	− 0.5
Middle Plateau	9	64.7	+ 2.7	−11.1	− 1.2
Northern Plateau	10	61.6	+ 3.5	−13.7	− 1.5
North Pacific	9	60.0	+ 2.4	−11.6	− 1.3
Middle Pacific	5	66.0	+ 1.2	− 3.6	− 0.4
South Pacific	4	69.7	+ 1.3	− 3.6	− 0.4

PRECIPITATION.

The distribution of precipitation is exhibited on Chart III. The precipitation was above normal in but two districts, New England and the Middle Atlantic States. There were nevertheless areas of considerable extent over which fairly heavy rains fell. One in particular may be found in the panhandle of Texas with branches extending northeastward into Kansas and westward into New Mexico.

Fairly heavy rains also fell in the upper Lake region and the St. Lawrence Valley, but generally there was a deficit of rain.

In Canada.—Professor Stupart says:

The rainfall was largely above average over the middle and eastern portions of Ontario and in western Quebec, below average in western and southwestern Ontario, and also generally below over British Columbia. In the other portions of the Dominion it did not differ much from the average amount except locally; it was, however, for the most part, a little below average in eastern Quebec, the Maritime Provinces, Southern Manitoba and the Qu'Appelle Valley, and above average in the North Saskatchewan Valley. At Toronto the average amount was exceeded by 2.5 inches, at Ottawa by 3.0 inches, at Welland by 3.4 inches, and at Haliburton by 3.7 inches. Montreal was 2.0 inches above average, and Quebec 0.6 below average.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	3.89	122	+0.7	−1.8
Middle Atlantic	12	4.24	112	+0.4	−1.5
South Atlantic	10	2.37	42	−3.1	−5.4
Florida Peninsula	7	6.10	82	−1.3	−3.0
East Gulf	7	1.20	29	−3.0	−9.6
West Gulf	7	1.27	32	−2.7	−8.5
Ohio Valley and Tennessee	12	2.03	67	−1.0	−4.1
Lower Lake	8	2.72	93	−0.2	−5.1
Upper Lake	9	3.24	94	−0.2	−2.3
North Dakota	7	0.64	42	−0.9	−1.9
Upper Mississippi Valley	11	1.88	59	−1.3	+0.4
Missouri Valley	10	1.08	44	−1.4	−5.1
Northern Slope	7	0.37	38	−0.6	−0.7
Middle Slope	6	1.69	100	0.0	+1.4
Southern Slope	6	1.97	87	−0.3	+2.2
Southern Plateau	9	0.56	58	−0.4	−2.1
Middle Plateau	13	0.12	17	−0.6	+0.7
Northern Plateau	10	0.65	32	−0.3	−0.9
North Pacific	9	1.69	50	−1.7	+3.5
Middle Pacific	5	0.22	35	−0.4	−2.1
South Pacific	4	T.	0	−0.1	−1.8

SNOW.

A measurable amount of snow fell in western New York, northern Michigan, northern Wisconsin, and northern Minnesota. Snow also fell in other portions of the States named but the amounts were generally too small to measure, A fall of snow so early in the season is a rather remarkable phenomenon; we therefore present a chart, No. VIII of this REVIEW, showing the amount and distribution of snowfall as reported by regular and voluntary observers.

HAIL.

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

Arizona, 30. Colorado, 7, 8, 14, 15. Connecticut, 3. Georgia, 13, 14, 25. Idaho, 5, 12. Illinois, 7, 24, 25, 26. Indiana, 6, 7, 8, 24, 29. Iowa, 20, 22, 24. Kansas, 7, 9. Kentucky, 25. Louisiana, 7, 8. Massachusetts, 3. Michigan, 17, 24, 29. Minnesota, 2, 5, 6, 10. Missouri, 7, 17, 22, 24, 25. Montana, 1, 13. Nebraska, 15. Nevada, 14. New Hampshire, 3, 12, 30. New Jersey, 4, 29. New Mexico, 3, 13, 15, 16, 19. New York, 3, 14, 21, 25, 27, 29, 30. North Carolina, 6, 7, 25. North Dakota, 3. Ohio, 5, 7, 8. Oregon, 3, 30. Pennsylvania, 3, 8, 19, 29, 30. South Carolina, 7. South Dakota, 1. Tennessee, 8, 25, 26. Virginia, 5, 7, 25. Washington, 1, 5, 6, 30. West Virginia, 6, 7, 25. Wyoming, 5, 7, 13, 14, 17.

SLEET.

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

Indiana, 29; Michigan, 28, 29. Minnesota, 27, 28. New York, 30. North Dakota, 26, 27. Ohio, 27, 29, 30. Pennsylvania, 30. Wisconsin, 28.

LOCAL STORMS AND TORNADOES.

The month was unusually free from destructive local storms and tornadoes. The number of thunderstorms reported was

also much smaller than for the corresponding month a year ago. Forty-five lives were lost by lightning, as against 130 during the preceding month, and 41 during September, 1898.

Two short periods of thunderstorm activity in the Lake region and Ohio Valley prevailed, viz: On the 5–6th and again on the 7–8th. The storms were quite severe in portions of Ohio on the night of the 5th, and again on the night of the 7th.

Severe local storms occurred in Connecticut on the 26th, and in New Jersey on the 23d and again on the 29th.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	7	60	w.	Mount Tamalpais, Cal.	27	66	nw.
Basseterre, St. Kitts	8	62	sw.	Do.	28	63	nw.
Bismarck, N. Dak	27	51	nw.	Do.	29	62	nw.
Block Island, R. I.	11	54	e.	Do.	30	58	nw.
Fort Canby, Wash.	29	56	se.	New York, N. Y.	3	50	nw.
Hannibal, Mo	7	57	w.	Do.	11	64	e.
Huron, S. Dak	27	56	nw.	Pierre, S. Dak.	27	52	nw.
Mount Tamalpais, Cal.	2	50	n.	Williston, N. Dak.	1	60	nw.

HUMIDITY.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	78	— 4	Missouri Valley	59	— 8
Middle Atlantic	76	— 1	Northern Slope	54	+ 1
South Atlantic	78	— 3	Middle Slope	54	— 4
Florida Peninsula	81	— 1	Southern Slope	57	— 5
East Gulf	71	— 6	Southern Plateau	34	—13
West Gulf	65	— 9	Middle Plateau	28	— 9
Ohio Valley and Tennessee	67	— 6	Northern Plateau	49	— 3
Lower Lake	70	— 4	North Pacific Coast	78	— 3
Upper Lake	78	+ 2	Middle Pacific Coast	56	—12
North Dakota	64	— 1	South Pacific Coast	67	+ 2
Upper Mississippi	68	— 4			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	4.9	—0.1	Missouri Valley	3.5	—0.5
Middle Atlantic	4.0	—0.8	Northern Slope	3.4	—0.6
South Atlantic	3.5	—1.3	Middle Slope	2.8	—0.4
Florida Peninsula	5.7	+0.2	Southern Slope	2.0	—1.6
East Gulf	2.7	—1.7	Southern Plateau	1.6	—0.7
West Gulf	2.9	—1.4	Middle Plateau	1.8	—0.7
Ohio Valley and Tennessee	3.8	—0.6	Northern Plateau	2.8	—1.3
Lower Lake	6.0	+1.2	North Pacific Coast	4.0	—0.9
Upper Lake	6.0	+0.9	Middle Pacific Coast	2.7	—0.1
North Dakota	3.5	—0.8	South Pacific Coast	2.0	—0.5
Upper Mississippi	3.9	—0.3			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table VII, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 2,203 thunderstorms were received during the current month as against 2,698 in 1898 and 4,943 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 7th, 258; 8th, 241; 3d, 178; 6th, 151.

Reports were most numerous from: Pennsylvania, 129; Florida, 111; Ohio, 107; Michigan, 104; New Mexico, 102.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, 14th to 22d.

The greatest number of reports were received for the following dates: 26th, 32; 25th, 27; 2d, 6; 27th, 5.

Reports were most numerous from: Minnesota, 13; Wisconsin, 12; Michigan, 10; Montana and North Dakota, 9.

In Canada.—Auroras were reported as follows: Sydney, 10th; Grand Manan, 25th; Yarmouth, 25th; Father Point, 30th; Quebec, 9th; White River, 26th, 27th; Minnedosa, 25th, 26th, 29th; Qu'Appelle, 8th; Medicine Hat, 1st, 25th, 26th; Prince Albert, 3d, 10th, 11th, 28th, 29th; Battleford, 29th, 30th.

Thunderstorms were reported as follows: St. Johns, 4th; Grand Manan, 3d, 4th; Yarmouth, 4th; Father Point, 3d; Quebec, 3d, 17th; Montreal, 4th, 12th; Toronto, 7th, 11th, 17th, 24th; White River, 2d, 4th, 12th; Ottawa, 18th; Port Stanley, 1st, 5th, 7th, 8th, 24th, 25th; Parry Sound, 5th; Port Arthur, 2d; Winnipeg, 4th; Barkersville, 21st; Minnedosa, 3d; Qu'Appelle, 3d; Medicine Hat, 1st; Swift Current, 1st, 17th; Banff, 12th, 29th; Edmonton, 13th; Kamloops, 12th; Victoria, 29th; Bermuda, 1st, 3d, 4th, 14th; Sable Island, 13th.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum