

THE WEATHER OF THE MONTH.

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

In the majority of districts moderate winter weather prevailed during the greater part of the month. From about the 20th to the end of the month the weather was uniformly cold but without severe storms or other marked disturbances. The precipitation was above normal in the Gulf States and the great interior valleys. It was markedly deficient only in New England and the Middle and South Atlantic States. Three lows moved from Texas northeastward to the Gulf of St. Lawrence during the month, all of which were attended by copious rains.

On the Pacific coast there was an abundance of rain from central California northward to British Columbia. Clear, dry weather prevailed quite generally from the 19th until the end of the month. There were no destructive storms.

The snowfall was rather light and disappeared rapidly. At the end of the month there was not much snow on the ground.

PRESSURE.

The monthly mean isobars, as drawn on Chart IV, differ but slightly in their configuration from those of a normal month. The winter high of the western Plateau extended somewhat further southeast than is the case in a normal month, and the increase in pressure as compared with the preceding month was relatively greater over the Rocky Mountain and Plateau region than over the South Atlantic States. There was an increase from November to December of more than 0.20 inch in monthly mean pressure throughout the northern and middle plateaus, and also in Assiniboia and Alberta.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

Temperature was from 2° to 3° above normal from New England westward through the Lake region, and along the northern boundary to the Pacific coast and also over southern California, Arizona, and New Mexico. It was below normal by amounts ranging from less than a degree, on the average, on the south Atlantic coast to about 5° in Missouri and eastern Kansas. On the whole the month was not so severe as the corresponding month a year ago. In New England and the Middle States the weather was mild and pleasant up to Christmas. There was not as much snow in southern New England as in the interior of the Gulf States. The snow in the Gulf States, however, did not last long, although several moderate cold waves passed over the Gulf and South Atlantic States, during the month, a minimum temperature of 30° being recorded at Jacksonville.

There were comparatively few days with zero temperature in the extreme northwest, and no very severe and widespread cold waves in any part of the country.

In Canada.—Prof. R. F. Stupart says:

Temperature was above average throughout the Dominion, except in a few small sections, where it was just about the average, or slightly

below. These sections were a portion of Alberta, the extreme southern part of Assiniboia, the extreme southwestern part of Ontario, and in the neighborhood of White River, in the Lake Superior district. From the Georgian Bay region to our Atlantic coast the average was considerably exceeded. Parry Sound was 3° above; Kingston, 4° above; Ottawa and Montreal, 5° above; Quebec, 7° above; Charlottetown, 6° above, and Halifax 4° above.

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	34.2	+ 2.6	+ 4.8	+ 0.4
Middle Atlantic	12	37.0	+ 0.8	+ 3.1	+ 0.3
South Atlantic	10	47.2	- 1.5	+ 2.7	+ 0.2
Florida Peninsula	7	61.2	- 0.5	+ 4.0	+ 0.3
East Gulf	7	50.4	- 1.8	- 0.5	0.0
West Gulf	7	49.3	- 2.1	+ 2.7	+ 0.2
Ohio Valley and Tennessee	12	35.4	- 2.9	+ 5.9	+ 0.5
Lower Lake	8	30.3	- 0.2	+ 9.7	+ 0.8
Upper Lake	9	24.4	- 0.1	+ 6.9	+ 0.6
North Dakota	7	13.9	+ 1.0	- 4.9	- 0.4
Upper Mississippi	11	26.7	- 1.7	+ 6.4	+ 0.5
Missouri Valley	10	25.7	- 3.1	+ 2.3	+ 0.2
Northern Slope	7	24.0	- 0.9	- 17.4	- 1.4
Middle Slope	6	32.3	- 2.6	+ 1.0	+ 0.1
Southern Slope	6	38.8	- 2.8	- 2.8	- 0.3
Southern Plateau	13	41.9	+ 1.2	- 2.8	- 0.2
Middle Plateau	9	26.4	- 2.4	- 12.3	- 1.0
Northern Plateau	10	29.4	- 0.2	- 10.5	- 0.9
North Pacific	9	43.4	+ 1.5	- 5.1	- 0.4
Middle Pacific	5	47.6	- 0.9	- 3.9	- 0.3
South Pacific	4	53.6	+ 0.9	- 3.5	- 0.3

PRECIPITATION.

A little more than half the normal amount of rain and snow fell in the New England, Middle, and South Atlantic States, and there was also a deficit in the Plateau region and the middle and south Pacific coast regions. The amount and distribution of precipitation east of the Rocky Mountains were largely influenced by the fact that three areas of low pressure moved from Texas northeastward in somewhat different paths, each, however, contributing a generous share of the total precipitation of the month. The rather unusual phenomenon of precipitation occurring from the Atlantic to the Pacific within a period of twelve consecutive hours was noted on the morning weather map of December 12. An area of low pressure had advanced from the north Pacific to the Dakotas where it was central on the morning of the 12th. Rain or snow was falling, or had fallen, along the northern boundary from the Pacific to the Dakotas and Minnesota. A second low of considerable depth, whose influence extended to the Atlantic Ocean, occupied the Lake region. Precipitation was occurring on the morning of the above named date, or had occurred within the previous twelve hours at 86 of the 117 stations, whose observations were telegraphed to the Central Office in Washington, D. C.

In Canada.—Professor Stupart says:

The precipitation was below average over British Columbia, Manitoba, and the southern portions of the Northwest Territories, below average over the Peninsula of Ontario, and in parts of Nova Scotia and Prince Edward Island, and elsewhere above the average. At Parry Sound the average was exceeded by 3.8 inches, at Kingston by 2.5 inches, at Montreal by 1.3 inches, and at Sydney by 3.0 inches. During the first three weeks of the month the precipitation was very largely rain, but during the last week it was in Ontario, Quebec, and the Maritime Provinces nearly altogether snow. In British Columbia there was no snow on the ground at the end of the month; the Northwest Territories and Manitoba had only a light covering, or in some localities none. In Ontario it varied from a trace at southwestern stations to from 10 to 20 inches in northern localities. In Quebec it varied from 2 to 10 inches, and in the Maritime Provinces from 2 to 13 inches.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
New England	10	1.87	51	-1.8	-7.3
Middle Atlantic	12	1.55	48	-1.7	-5.6
South Atlantic	10	2.14	60	-1.4	-7.2
Florida Peninsula	7	2.28	105	+0.1	+1.9
East Gulf	7	5.02	116	-0.7	-11.0
West Gulf	7	3.78	115	+0.5	-8.7
Ohio Valley and Tennessee	12	3.45	97	-0.1	-6.2
Lower Lake	8	3.55	125	+0.7	-6.9
Upper Lake	9	2.28	105	+0.1	-4.3
North Dakota	7	0.43	81	-0.1	-2.4
Upper Mississippi Valley	11	1.97	95	-0.1	-0.8
Missouri Valley	10	1.20	100	0.0	-5.6
Northern Slope	7	0.65	144	+0.2	-0.2
Middle Slope	6	1.21	138	+0.3	+4.2
Southern Slope	6	1.95	134	+0.5	+7.3
Southern Plateau	13	0.44	38	-0.9	-3.4
Middle Plateau	9	1.06	73	-0.4	+1.4
Northern Plateau	10	1.40	70	-0.6	0.0
North Pacific	9	7.25	100	0.0	+11.1
Middle Pacific	5	4.02	72	-1.6	+2.0
South Pacific	4	1.79	60	-1.2	-1.7

SNOWFALL.

The depth of snowfall during the month is graphically shown on Chart VIII, and the numerical values are given in Table II.

The total snowfall for the month was somewhat less than during the corresponding month a year ago. It was rather widely distributed, however, and disappeared rapidly on account of the prevailing mild weather east of the Rocky Mountains during the first half of the month. At the close of the month a moderate cold wave accompanied by a snow-storm passed over the interior of the Gulf States. The snow covering was not more than two or three inches on the average, yet it exceeded in amount the total fall in the South Atlantic States, the eastern portion of the Middle States, and southern New England. The fall in the Lake region was moderately heavy, and this was particularly so of the Parry Sound region, as was the case a year ago. No very great depths were reported from mountain stations in Colorado, Wyoming, Montana, and Idaho.

The depth of snow on the ground at the close of the month is graphically shown on Chart IX.

The officials in charge of the Climate and Crop sections in Colorado and Wyoming, concerning the snowfall in their respective States, report as follows:

Snowfall in the mountains of Colorado.—The weather conditions during October, November, and December were not favorable to the accumulation of a large stock of snow. It is true that a heavy fall was general during the second decade of October, and another about the middle of December, but the remainder of the period was characterized by an absence of local storms of consequence, and for the mountain districts as a whole the amount is below the average. Windy weather has been the exception, and, in consequence, the snow is loosely packed, and stupendous drifts, which form the basis of the flow during the summer season, are notably few. The ground was well supplied with moisture and frozen to a considerable depth before the October storm; hence it is expected that the run-off, when melting begins in the spring, will be relatively great as well as rapid.

The distribution has been very uneven over the watershed of the Arkansas. As compared with last year and the average, the fall has been very light over the northern drainage area, while over that of its southern tributaries it has been considerably above the average, and many correspondents report that the stock of snow now on the ranges is much in excess of the total during last winter.

The fall has been very close to the average over the upper drainage area of the South Platte and tributaries, but generally much less than last year.

No such scarcity of snow as characterized last winter over the Rio Grande watershed is reported this season. The average amount has fallen in the mountains of Mineral and Hinsdale counties, and on the watersheds of the tributaries rising in Conejos and Costillo counties.

Less than the normal snowfall has occurred in nearly all parts of the area drained by the Grand and Gunnison. Compared with the corresponding months of last year, the fall has been exceeding light.

Snowfall in Wyoming.—The snowfall throughout the State for December was usually below the average, but was fairly well distributed. At the close of the month many stations reported little or no snow on the ground. Over Laramie County only traces of snow remained, increasing northward to Sheridan County, 5 inches being reported on ground at Buffalo, and 6.5 inches at Sheridan. Over Big Horn County the amount on ground varied from little or no snow to 8 inches, the greatest depth being reported from the lower portion of the Basin. Little or no snow was on the ground over the western portion of the county. The greatest depths of snow on ground were reported from Uinta County, where from 2 to 8 inches remained over the plains and valleys.

Reports from the mountain districts show from 4 to 40 inches of snow at present, and reporters generally concede this to be less than the usual amount at this time of the year. However, snows of the later winter may augment the amount very much, and provide a bountiful supply for irrigation purposes the coming summer.

The following table gives the amount of snow reported from the eastern slope of the Big Horn Mountains and from the basins of the Platte and Laramie rivers:

Eastern slope of Big Horn Range.	Snow on ground in vicinity of place.	Average depth on adjacent hills or mountains.	Laramie and Platte basins.		
			Snow on ground in vicinity of place.	Average depth on adjacent hills or mountains.	
Parkman	6	15	Clarkson	0	3
Dayton	10	36	Springhill	0	6
Mayoworth	1	14	Toltec	1	12
Griggs	12	12	Elk Mountain	0	60
Kaycee	7	7	Bennett	5	13
Ono	4	French	8	15
			Mandel	2	8

Mr. Foster in his report from the Snowy Range reports 3 inches at 8,700 feet, 28 at 9,000, 36 at 10,000, and 39 at 11,000. This is more than was reported from the same locality one year ago. He says: "I find the snow drifted but little at the greater elevations as compared with other winters. Scarcely any frost in the ground. Above 10,000 feet many of the drifts of 1898-99 are still in evidence, and will add to the water supply of the coming summer. The water in the streams is nearly double the usual stage at this season. The snow of the second week in October is well packed, as well as that which has fallen in the later storms."

HAIL.

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

Arizona, 18. Arkansas, 18. California, 15, 16. Oregon, 4, 11, 12, 14, 20. Texas, 10. Washington, 7, 8, 9.

SLEET.

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

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

WEATHER IN THE WEST INDIES.

The distribution of pressure, temperature, and the direction of the resultant winds in the West Indies are shown on Chart X. The numerical values of pressure, temperature, etc., for West Indian stations will be found in Tables I, II, III, IV, V, VI, VIII, IX, and X.

The maximum wind velocity for West Indian stations was 38 miles per hour from the northeast at Havana on the 7th; generally, however, light winds prevailed. The rainfall was deficient at both Havana, Cuba, and San Juan, Puerto Rico, the only stations having normal values. It was also light at other places, particularly at Cienfuegos, Cuba.

HUMIDITY.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	75	0	Missouri Valley	75	0
Middle Atlantic	73	-2	Northern Slope	73	+3
South Atlantic	73	-2	Middle Slope	73	+3
Florida Peninsula	73	-2	Southern Slope	41	+3
East Gulf	73	-2	Southern Plateau	41	+3
West Gulf	73	-2	Middle Plateau	70	+3
Ohio Valley and Tennessee	73	-2	Northern Plateau	81	+3
Lower Lake	73	-2	North Pacific Coast	86	+3
Upper Lake	73	-2	Middle Pacific Coast	84	+3
North Dakota	73	-2	South Pacific Coast	71	+3
Upper Mississippi	71	+1			

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	5.5	-0.3	Missouri Valley	5.6	+0.5
Middle Atlantic	4.9	-0.5	Northern Slope	5.6	+1.2
South Atlantic	4.5	-0.3	Middle Slope	5.6	+0.9
Florida Peninsula	5.3	+0.7	Southern Slope	5.6	+0.3
East Gulf	5.7	+0.5	Southern Plateau	5.6	+0.4
West Gulf	5.2	-0.1	Middle Plateau	5.6	+0.4
Ohio Valley and Tennessee	5.8	-0.3	Northern Plateau	7.7	0.0
Lower Lake	7.6	0.0	North Pacific Coast	7.7	+0.6
Upper Lake	6.7	-0.4	Middle Pacific Coast	5.6	+0.2
North Dakota	4.8	-0.4	South Pacific Coast	4.6	+0.2
Upper Mississippi	5.2	-0.5			

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.
Block Island, R. I.	24	51	e.	Mount Tamalpais, Cal.	6	78	n.
Buffalo, N. Y.	13	50	sw.	Do.	15	58	sw.
Do.	13	50	sw.	Do.	20	50	n.
Do.	13	50	sw.	Do.	21	58	nw.
Do.	13	50	w.	Do.	22	70	n.
Do.	13	50	sw.	Do.	23	64	ne.
Carson City, Nev.	11	50	sw.	Do.	26	64	sw.
Chicago, Ill.	11	50	sw.	New York, N. Y.	4	50	n.
Do.	11	50	w.	Do.	6	70	nw.
Do.	12	50	sw.	Do.	12	55	s.
Cleveland, Ohio	12	50	s.	Do.	13	54	ne.
Do.	12	50	w.	Do.	24	68	e.
Detroit, Mich.	12	50	sw.	Do.	26	50	nw.
Fort Canby, Wash.	12	50	sw.	Northfield, Vt.	12	50	s.
Grand Haven, Mich.	12	50	sw.	Winnemucca, Nev.	15	50	se.
Mount Tamalpais, Cal.	5	68	nw.				

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 167 thunderstorms were received during the current month as against 148 in 1898 and 661 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 10th, 41; 11th, 30; 18th, 27.

Reports were most numerous from: Louisiana, 35; Arkansas, 29; Mississippi, 17.

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, 12th to 20th.

Reports were most numerous from Montana and North Dakota, 5; Minnesota, 3.

In Canada.—Auroras were reported as follows: Minnesota, 8th, 9th, 28th, 29th, 30th. Battleford, 28th, 29th, 31st.

DESCRIPTION OF TABLES AND CHARTS.

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For description of tables and charts see page 424 of REVIEW for September, 1899.