

the highest on record at: Williston, 69; La Crosse,\* 72; Des Moines, 76; Columbia, Mo., 80; Kansas City, 79; Miles City, 76; Denver,\* 77; Dodge City, 84; Wichita, 83; Amarillo, 82; El Paso, 83; Carson City, 72; Baker City, 65; Idaho Falls, 64. The minimum temperatures were equal to or below the lowest on record at: Miles City, —26; Wichita, 7; Point Reyes Light, 41; Fresno, 28.

The greatest daily range of temperature and the data for computing the extreme and mean monthly ranges are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Rapid City, 54; Pueblo, 53; Bismarck and Winnemucca, 52; Havre, 50. The smallest values were: Key West, 10; Fort Canby, 13; Astoria and Jupiter, 18; Port Angeles, San Francisco, Marquette, and Woods Hole, 19; Hatteras, 20.

Among the extreme monthly ranges the largest were: Miles City, 102; Havre, 92; Huron, 91; Williston and Pierre, 88; Bismarck, 87; Yankton, 86. The smallest values were: Key West, 16; Fort Canby, 20; San Francisco, 24; Jupiter, 27; Astoria, 28; Point Reyes Light, 29.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: southern and middle Plateaus, 2.2 and 2.1, respectively. The greatest negative departures were: North Dakota, 5.6; Northern Slope, 2.7.

In Canada.—Prof. R. F. Stupart says:

The distribution of mean average temperature for November is not unlike, in many respects, that of its predecessor of 1896, but the amounts above and below average are not so great as they then were. In 1896 the temperature from the Rockies to Lake Superior, starting from the former, ranged from 27° to 9° below the average, whilst this year it is, over the same stretch of country, from 13° to 3° below the average. In British Columbia it then varied from 9° to 24° below the average; from Vancouver Island to the Selkirks now it is from 1° to 12° below. In 1896 southern Ontario was from 3° to 5° above the average; this year it is from 1° to 3° above. There was, however, a noticeable difference in the Maritime Provinces. Last November it was from 1° to 3° above average, and this month it is from average to 2° below.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	o	o		o	o
New England.....	+ 4.7	+ 0.4	Florida Peninsula.....	- 1.4	- 0.1
Middle Atlantic.....	+ 3.1	+ 0.3	Southern Plateau.....	- 4.3	- 0.4
South Atlantic.....	+ 4.5	+ 0.4	Middle Plateau.....	- 4.6	- 0.4
East Gulf.....	+ 7.8	+ 0.7	North Pacific.....	- 1.0	- 0.1
West Gulf.....	+ 14.2	+ 1.3	Middle Pacific.....	- 4.7	- 0.4
Ohio Valley and Tenn....	+ 9.0	+ 0.8	South Pacific.....	- 7.9	- 0.7
Lower Lake.....	+ 8.5	+ 0.8			
Upper Lake.....	+ 18.7	+ 1.7			
North Dakota.....	+ 2.5	+ 0.2			
Upper Mississippi Valley..	+ 14.7	+ 1.3			
Missouri Valley.....	+ 13.7	+ 1.2			
Northern Slope.....	+ 2.4	+ 0.2			
Middle Slope.....	+ 12.8	+ 1.2			
Southern Slope.....	+ 3.6	+ 0.3			
Northern Plateau.....	+ 9.5	+ 0.9			

FROST.

Following is a summary of reports by directors of the respective climate and crop sections south of latitude 37°:

Alabama.—Light frost was quite general in northern section on the 5th to the 14th, inclusive, 19th, 20th, and 21st; in southern section on the 3d, 4th, 7th, 10th, 17th, 18th, and 19th. Killing frost was general in northern section on the 2d and 3d, 12th and 13th, 15th to 20th, 24th,

26th, 28th, and 30th; in southern section, 17th to 20th, inclusive, the first killing of season occurring at Montgomery and as far south as Washington County on the 18th, and as far south as Conecuh and Monroe counties on the 30th. No killing frost was reported at Mobile up to the close of November, though light frost occurred at that station on the 3d, 4th, and 19th.

Arizona.—The first killing frost or the first freezing temperature of the month was reported at different points in the southern half of the State on the following dates: 4th, 7th, 8th, 9th, 25th, and 28th.

Arkansas.—Killing frost was general over the State on the 2d and 3d, 10th, 16th, and 17th, and was reported from a few places the 6th, 11th, 12th, and 18th.

Florida.—Light frosts reported from Washington, Gadsden, Baker, and Duval counties on the 4th, 12th, and 13th. The tenderest plants, however, were uninjured.

Georgia.—Light frost occurred at a number of places in various parts of the State on the 9th, 10th, 11th, 14th, 28th, 29th, and 30th, and was general on the 2d, 4th, 12th, 13th, 18th, 19th, and 20th. Killing frost was reported from the northern section of the State on the 3d, 4th, 5th, 10th, 12th, 13th, and 14th, and was general over the northern and middle sections from the 16th to the 20th, inclusive. Between the 23d and 30th killing frost occurred at a number of places in the northern section and at a few places in the southern section on the 30th.

Louisiana.—There were general frosts throughout the State on the morning of the 17th and near the coast on the 18th.

Mississippi.—Light frost occurred generally over the State, except the Gulf Coast, on the 2d and 3d, and was reported from various localities on the 4th, 6th, 9-13th, 15th, 17-20th, 24th, 28th, and 29th. Killing frost formed over the entire State on the 30th, and was reported from localities in the central and northern portions as early as the 3d.

North Carolina.—Light frosts occurred generally on the 2d, 4th, 5th, 7th, 11th, 12th, 13th; killing frosts occurred generally on the 13th, 18th, 19th, 20th, 24th, 29th, and 30th.

Oklahoma.—The first killing frost, at South McAlester, occurred on the night of the 16th. The first general killing frost of the season was reported on the morning of the 2d, destroying all tender vegetation.

South Carolina.—Killing frost occurred at a few places on the 12-13th, but the first general killing frost of the season occurred on the 18-19th, and 24th, except along the immediate coast, where no killing frosts were noted.

Texas.—The dates of light frosts were as follows: 1st-6th, 8th, 10th, 11th, 17-20th, 22d, 24th, 26-30th. Heavy frosts on the 1st, 16th, and 19th. Killing frosts on the 2d, 15-20th, 25th, and 27-30th.

PRECIPITATION.

[In inches and hundredths.]

Precipitation was unusually heavy on the north Pacific Coast, in eastern Washington and Idaho, and in the Ohio Valley, the lower Lake Region, the Middle States, and New England. Generally less than an inch was recorded at the majority of stations in Florida, Georgia, Alabama, and throughout central Mississippi. Light rains for the season fell in eastern Tennessee, southern West Virginia, and throughout the coast regions of the Carolinas.

Considered by districts the rainfall of the current month was below normal in 12 and above in the remaining 9; the largest excess was 4.70 on the north Pacific Coast; the greatest deficiency was 2.60 on the west Gulf. The values for all districts are shown in Table I.

In Canada.—Professor Stupart says:

At Esquimault, on Vancouver Island, the rainfall was 7.2 inches, being 1.0 inch below the average. Over a large portion of Manitoba the average precipitation for November was not reached, neither was it over the greater portion of the Muskoka District and the Ottawa Valley. Parry Sound and Sprucedale recorded 1.6 and 1.1 inch, respectively, less than the usual amount in the former, and Rockliffe 0.4 less in the latter region. In all other portions of Canada (not, however, considering the mainland of British Columbia, the reports received from this Province being from stations more recently established) the precipitation was generally in excess of the average, and in many localities to a considerable amount. In the Northwest Territories, where precipitation is usually so light, it was exceeded by over an inch in many places and even to an extent of over 2.0 inches. In Ontario, the Niagara Peninsula gave the greatest amount above average; Stony Creek recorded a total fall of 6.6 inches, being 3.6 inches above average. The heaviest general rainfall of the month occurred in the district embracing the Bay of Fundy; St. John recording 6.9 inches, Grand Manan, 8.3; Yarmouth, 7.4, being 2.2, 2.9, and 3.2 inches above the average, respectively.

The years of greatest and least precipitation for November are given in the REVIEW for November, 1890. The precipi-

\* Observations cover a period of twenty-five years, or more.

tation for the current month was the greatest on record at: Block Island, 9.42; Narragansett Pier, 8.25; Jupiter, 6.49; Cincinnati,\* 6.80; Columbus, Ohio, 7.45; Pittsburg,\* 5.11; Oswego,\* 6.56; Sandusky,\* 6.21; Toledo,\* 5.41; Rapid City,\* 1.16; Spokane, 5.85; Walla Walla, 5.15. It was the least on record at: Tampa, 0.63; Vicksburg,\* 1.37; Des Moines, 0.34; Phoenix and Yuma, 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 current accumulated precipitation expressed as a percentage of its normal value.

Districts.	Accumulated departures.		Districts.	Accumulated precipitation.	
	Inches.	Perct.		Inches.	Perct.
New England .....	+ 0.20	100	Middle Atlantic .....	- 4.10	90
Florida Peninsula .....	+ 11.30	123	South Atlantic .....	- 4.80	91
Middle Slope .....	+ 0.60	103	East Gulf .....	- 5.90	88
Southern Slope .....	0.00	100	West Gulf .....	- 11.30	72
Southern Plateau .....	+ 3.70	148	Ohio Valley and Tenn .....	- 1.90	95
Middle Plateau .....	+ 0.30	103	Lower Lake .....	- 3.50	89
Northern Plateau .....	+ 2.30	116	Upper Lake .....	- 2.90	91
South Pacific .....	+ 0.60	106	North Dakota .....	- 1.50	92
			Upper Mississippi Valley .....	- 2.00	94
			Missouri Valley .....	- 3.80	87
			Northern Slope .....	- 0.50	96
			North Pacific .....	- 0.70	96
			Middle Pacific .....	- 2.80	88

SNOWFALL.

The total monthly snowfall at each station, if any occurs, is given in Tables I and II. The geographical distribution of snowfall is shown on Chart VI. It will be seen that snow was general throughout Pennsylvania, New York, and the New England States, also throughout Michigan and the States westward to the Pacific. Practically no snow fell in Kansas except in the extreme northwestern portion. The snowfall of Montana, Idaho, and eastern Washington was quite heavy.

In Canada, Prof. R. F. Stupart reports snow as follows:

British Columbia: Snow on the ground from 6 to 16 inches. Northwest Territories: The precipitation was above the average and was mostly in the form of snow. The observer at Regina says: We have had a good deal of snow, but farther north, in the timber skirting the Qu'Appelle Valley, it is reported that there is at least 2 feet of snow and badly drifted; here there can not be more than 9 inches. From Swift Current a heavy snowfall is reported. Manitoba: Minnedosa, sleighing on the 15th, but roads bare in some places; at Emerson, snowfall only 3 inches. Ontario: The amount of snow on the ground at the end of the month was only from 1 inch in the southern portions to 12 inches in the northern portions. Quebec: Not more than 2 inches of snow reported in this Province. Maritime Provinces: Very little snow, not more than 2.20 inches.

HAIL.

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

Arizona, 13. Arkansas, 15. California, 6, 22. Connecticut, 11. Delaware, 15. Idaho, 20. Illinois, 8. Indiana, 11, 26. Maryland, 2, 11, 17. Massachusetts, 9. Missouri, 8, 15. Nevada, 12, 24. New Jersey, 4, 11, 14, 16, 22, 29. New York, 9, 25. North Carolina, 23. North Dakota, 9. Oregon, 5, 6, 7, 13, 14, 16, 21. Pennsylvania, 2, 3, 11, 16. Virginia, 2, 11. West Virginia, 11.

SLEET.

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

Arkansas, 28. California, 6. Connecticut, 8, 15, 29. Idaho, 6, 13, 22, 23, 29. Illinois, 15, 24, 25, 26. Indiana, 1, 9, 11, 24. Iowa, 12, 15, 25, 26. Kansas, 15. Kentucky, 23. Maine, 25, 29. Maryland, 14, 23, 29. Massachusetts, 8, 29. Michigan, 5, 10, 11, 14, 15, 24, 26. Minnesota, 4, 5, 10, 13, 14, 24, 25, 29. Missouri, 15. Montana, 3, 5, 12, 19. Nebraska, 4,

\* Observations cover a period of over twenty-five years.

9, 10, 22, 23, 24, 25, 26. Nevada, 3, 6. New Hampshire, 8, 9, 10, 11, 21. New Jersey, 13, 16, 22. New York, 6, 8, 9, 11, 12, 14, 16, 25, 27, 29. North Dakota, 13, 14. Ohio, 7, 9, 11, 12, 14, 16, 19, 22, 24, 25, 29. Oregon, 5, 6, 13, 19, 22, 28, 29, 30. Pennsylvania, 2, 10, 11, 14, 16, 22, 29. Rhode Island, 9. South Dakota, 4, 11, 13. Utah, 6, 24, 25. Vermont, 11, 12, 26. Virginia, 11, 14, 28, 29. Washington, 3, 7, 13, 14, 20, 23, 29, 30. West Virginia, 14, 28, 29. Wisconsin, 5, 10, 11, 14, 15, 25, 26.

WIND.

The prevailing winds for November, 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 Weather Bureau anemometers above the ground. Maxima of 50 miles or more per hour were reported during this month 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.
Block Island, R. I. ....	9	54	nw.	Chicago, Ill. ....	1	52	ne.
Buffalo, N. Y. ....	6	56	w.	Do. ....	10	55	sw.
Do. ....	12	54	w.	Do. ....	14	50	se.
Fort Canby, Wash. ....	8	50	se.	Cleveland, Ohio. ....	11	68	w.
Do. ....	9	58	s.	Denver, Colo. ....	10	51	w.
Do. ....	16	66	se.	Eastport, Me. ....	12	60	ne.
Do. ....	17	87	se.	Lexington, Ky. ....	9	50	w.
Do. ....	18	88	se.	New York, N. Y. ....	9	54	w.
Do. ....	20	56	se.	Do. ....	13	52	nw.
Carson City, Nev. ....	10	59	sw.	Portland, Ore. ....	18	52	s.
Do. ....	19	52	sw.	Woods Hole, Mass. ....	9	57	sw.
Do. ....	21	51	sw.	Do. ....	10	52	w.
Cheyenne Wyo. ....	10	54	w.	Do. ....	12	60	sw.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, 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.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 8th, 64; 9th, 59; 14th, 62; 26th, 58.

Reports were most numerous from: Illinois, 83; Indiana, 49; Missouri, 59; Ohio, 56.

Thunderstorm days were most numerous in: Illinois, 14; Indiana, 10; Missouri and Ohio, 12.

In Canada.—Thunderstorms were reported at Grand Manan on the 6th and 9th.

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, from the 4th to the 12th, inclusive. On the remaining twenty-one days of this month 54 reports were received, or an average of about 2 per day. The dates on which the number of reports of auroras for the whole country especially exceeded this average were: 2d, 4; 17th and 24th, 8.