

lar stations are complete unless destroyed by fire or other accident. Incomplete records may sometimes be completed hypothetically and used to fill up the details of a special chart, but they can not give us the annual or seasonal periodicity that is so important for many studies. In some sections the rain gages of the voluntary observers have all been inspected by the respective section directors; in other States this work is not yet quite complete. Practically all stations use gages of the standard Weather Bureau pattern having eight inches as the diameter of the inside of the rim of the receiver. The exposures are generally satisfactory to the inspector, and this means that the gages are not unduly sheltered by buildings and trees; if not satisfactory, the trouble is remedied if possible.

Owing to the changes that frequently take place among voluntary observers and stations, it must necessarily happen that some records begin and others stop in the midst of any given year, but as far as possible these breaks ought to be prevented, since a fragmentary year contributes so little to our knowledge as compared with a complete record.

The fact that the total number of rain gages at regular Weather Bureau stations is over 180, and at voluntary stations

over 3000 may possibly lead one to think that we are providing fairly well for the collection of rainfall statistics, but when we consider that from these we received only 2000 complete station records, we must see that we are not doing nearly as well as is required by the urgent demand for information by those who are at work on the problems of river navigation, arid land irrigation, city water supply, and water power for manufacturing plants of all kinds. Every State and railroad in the country ought to follow the example of the California Railway Company, and maintain a large number of rain gages and records as a contribution to our knowledge of the climate of their localities.

Would it not be practicable to stimulate the keeping of complete rainfall records, and to diminish our large proportion of incomplete records, 25 per cent, by offering some special reward or honor? Mr. Symons adopted this plan in order to build up his great British rainfall system. The result was about 1000 complete rainfall station records for 40 continuous years, so that we know the laws of rainfall in Great Britain better than for any other country. If we had 30,000 stations, instead of 3000, it would not be too many for the great area of the United States.

### THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

#### PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

A ridge of mean barometric pressure, with readings of 30.15, or higher, extended from the Canadian border of northeastern Montana, North Dakota, Minnesota, Michigan, and the lower Lake region, southward and southeastward to the Gulf coast of Louisiana, Mississippi, and Alabama, to the central portion of the Peninsula of Florida, and to the coast of the south Atlantic and middle Atlantic districts. The crest of mean pressure, with a reading of 30.26 inches, overlay the Valley of the Red River of the North.

The mean pressure was low over Washington, Oregon, and the western portions of the middle and northern Plateau regions, with a minimum mean pressure of 29.69 inches reported from the region of the San Juan de Fuca Strait.

The mean pressure was below the normal over the Pacific and Plateau and practically all of the slope districts, and above the normal in all districts to the eastward of the slope region.

The mean pressure was .10 inch, or more, below the normal over the northern and middle Plateau regions, the deficiency increasing toward the westward and northward until it amounted to —.31 inch over the northwestern portion of Washington.

The greatest positive departures from the normal amounted to +.15 to +.18 inch, and occurred over the upper Lake region, North Dakota, and the northern portion of the upper Mississippi Valley.

The mean pressure decreased from that of the preceding month over the region to the westward of a line drawn from southeastern Louisiana northwestward to the Canadian border of central Montana, and over Maine; in all other districts the pressure increased.

The decrease in pressure was, as a rule, marked, and increased from —.10 inch over the central portion of the slope regions and southern portion of the Plateau regions westward and northwestward until it amounted to slightly more than —.40 inch on the coast of Washington.

The increase in pressure over the preceding month was not so marked, the maximum changes occurring over the Lake region, the greatest excess, +.15 inch, being reported from the central Lake Superior region.

#### TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart V.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from 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 .....	8	19.5	— 6.5	—12.5	— 6.2
Middle Atlantic .....	12	27.1	— 7.4	—13.5	— 6.8
South Atlantic .....	10	45.0	— 4.0	— 8.7	— 4.4
Florida Peninsula * .....	8	63.3	+ 0.3	— 1.2	— 0.6
East Gulf .....	9	52.9	— 0.3	— 3.3	— 1.6
West Gulf .....	7	54.0	+ 2.4	+ 2.9	+ 1.4
Ohio Valley and Tennessee .....	11	38.2	— 5.0	— 8.9	— 4.4
Lower Lake .....	8	17.4	— 9.1	—15.8	— 7.9
Upper Lake .....	10	8.7	—10.2	—15.5	— 7.8
North Dakota * .....	8	— 1.3	— 9.3	—10.3	— 5.2
Upper Mississippi Valley .....	11	18.9	— 7.2	—10.8	— 5.4
Missouri Valley .....	11	21.1	— 3.3	— 2.3	— 1.2
Northern Slope .....	7	21.0	— 0.1	+ 6.4	+ 3.2
Middle Slope .....	6	36.7	+ 4.2	+ 6.1	+ 3.0
Southern Slope * .....	6	47.2	+ 6.6	+ 5.9	+ 3.0
Southern Plateau * .....	13	46.9	+ 5.5	+ 5.4	+ 2.7
Middle Plateau * .....	8	34.4	+ 4.3	+ 2.9	+ 1.4
Northern Plateau * .....	12	32.6	+ 3.7	+ 9.3	+ 4.6
North Pacific .....	7	39.8	— 0.8	+ 1.6	+ 0.8
Middle Pacific .....	5	48.6	— 0.6	+ 0.4	+ 0.2
South Pacific .....	4	53.8	+ 0.4	+ 2.0	+ 1.0

\* Regular Weather Bureau and selected voluntary stations.

To the eastward and northward of a line drawn from the north-central portion of Florida northwestward to the Canadian Provinces, north of western Montana, the mean temperature for the month was below normal; and above the normal to the southward and westward of that line.

The maximum deficiencies occurred in the upper Lake region, and the maximum excesses in the southeastern portion of the northern Plateau region.

The mean temperature was decidedly below the normal in New England, the Middle Atlantic and South Atlantic States, Ohio Valley and Tennessee, Lake region, and the upper Mississippi and Missouri Valleys, and markedly above the normal in the Plateau and southern and middle slope regions, and west Gulf States. In the east Gulf States, and northern slope,

and north and middle Pacific districts the mean for the month was slightly below normal, and slightly above in the Florida Peninsula and south Pacific district.

East of the Rocky Mountain slope region the isotherms of mean temperature lay to the southward of their position in February, 1903; the isotherms of maximum temperature slightly to the northward, and the isotherms of minimum generally slightly to the northward.

The maximum temperature for the month exceeded the record by 1° at Little Rock, Ark.; Palestine, Tex.; Wichita, Kans.; Yuma, Ariz., and Meridian, Miss.; by 2° at Pueblo, Colo., and Valentine, Nebr.; by 4° at El Paso and Fort Worth, Tex.; by 5° at Dodge, Kans.; by 9° at Abilene and Amarillo, Tex., and by 10° at Oklahoma, Okla.

*In Canada.*—Prof. R. F. Stupart says:

The mean temperature of February was decidedly below average throughout the Dominion, and to the greatest extent in Alberta where the negative departure amounted to 17°. At Calgary the mean temperature was -2°, the lowest monthly mean on record, excepting February, 1887, and January, 1890. Edmonton reports a mean of -8°, and the only months with a lower mean temperature were January, 1886, with -14°, and February, 1887, with -10°. Farther east in the Territories, and in Manitoba, lower means have been recorded in several years. Dawson City reports a mean temperature of -26°, about 6° below average, and depth of snow on the ground 30 inches.

Eastward from Alberta the negative departures became less pronounced, and were but 5° or 6° in Manitoba. In Ontario, east of Lake Huron and the Georgian Bay, the departure from average ranged between 9° and 12°. There are indications, however, that northward from the Ottawa River and Lake Superior the departures from average diminished quickly, and the James Bay temperature was probably above average. In the Province of Quebec and the Maritime Provinces the negative departures ranged between 6° and 10°, except in the Gaspé Peninsula where it was somewhat less.

**PRECIPITATION.**

The distribution of total monthly precipitation is shown on Chart III.

The precipitation was above the normal in west-central Colorado, Utah, Idaho, except the southwestern portion, western Montana, Washington, Oregon, and northern and central California, and in small areas in the following States: Southeastern Alabama, southeastern South Carolina, east-central North Carolina, east-central Maine, northwestern New York, and southeastern lower Michigan; elsewhere it was below the normal. The maximum excess occurred in the western portions of California, Oregon, and Washington; and the maximum deficiency in the central and lower Mississippi, and lower Ohio valleys, and western Tennessee.

By geographic districts the precipitation was normal in the Florida Peninsula, and lower Lake region; above normal in North Dakota, and the Pacific, and northern and middle Plateau regions; and below normal in the remaining districts.

Precipitation ranging in amounts from 6 to somewhat more than 45 inches occurred in northern California, and the western portions of Oregon and Washington, and 6 to 9 inches in west-central Georgia, and southeastern Alabama.

The southern limit of snowfall extended to the southern border of South Carolina, below but near to the northern border of Georgia, Alabama, and Mississippi, and to southern Arkansas, and central Texas. No snowfall during the month was reported from southern California.

At the end of the month there was snow on the ground in New England, northern portion of the Middle Atlantic States, Lake region, North Dakota, the northern portions of the upper Mississippi and Missouri valleys, northern and middle slope and Plateau regions, and northern portion of the north Pacific district.

**HAIL.**

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

Alabama, 7, 29. Arizona, 5, 17. Arkansas, 6, 7, 19, 20. California, 4, 5, 6, 7, 8, 12, 15, 25, 26, 27, 28. Connecticut, 6, 13,

22. Florida, 1. Georgia, 7. Idaho, 12, 22, 23, 26, 28. Illinois, 7, 17, 20, 29. Indiana, 6, 7, 18, 29. Indian Territory, 6, 7. Kansas, 6, 7. Kentucky, 7, 18, 19. Maine, 22, 29. Michigan, 2, 26, 29. Mississippi, 29. Missouri, 6, 7, 17, 29. Montana, 26. New Hampshire, 6, 7, 28. New Mexico, 16. New York, 6, 7, 22, 24, 28, 29. North Carolina, 7, 10, 14, 16, 19, 25, 26, 27. Ohio, 7, 18, 22, 23, 29. Oregon, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 19, 21, 22, 26, 27, 28, 29. Pennsylvania, 14, 28, 29. Rhode Island, 6, 15, 28. South Carolina, 8. Tennessee, 7, 19, 26, 29. Texas, 6, 7, 17, 18. Utah, 16, 28. Vermont, 21, 28, 29. Virginia, 9, 10, 15, 18, 19, 21, 26, 27. Washington, 4, 5, 6, 8, 11, 16, 19, 22, 24, 25, 26, 27, 28, 29. West Virginia, 28.

**SLEET.**

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

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

*Average precipitation and departure from the normal.*

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
New England.....	8	<i>Inches.</i> 2.59	70	<i>Inches.</i> -1.1	-1.4
Middle Atlantic.....	12	2.01	57	-1.5	-2.2
South Atlantic.....	10	3.06	79	-0.8	-1.5
Florida Peninsula*.....	8	3.10	100	0.0	+2.6
East Gulf.....	9	2.99	61	-1.9	-3.5
West Gulf.....	7	1.78	50	-1.8	-3.9
Ohio Valley and Tennessee.....	11	2.39	54	-2.0	-3.6
Lower Lake.....	8	2.87	100	0.0	+1.5
Upper Lake.....	10	1.51	79	-0.4	-1.2
North Dakota*.....	8	0.77	135	+0.2	+0.1
Upper Mississippi Valley.....	11	0.87	44	-1.1	-1.1
Missouri Valley.....	11	0.48	38	-0.8	-0.9
Northern Slope.....	7	0.51	84	-0.1	-0.3
Middle Slope.....	6	0.10	12	-0.7	-0.9
Southern Slope*.....	6	0.10	11	-0.8	-0.8
Southern Plateau*.....	13	0.52	51	-0.5	-1.4
Middle Plateau*.....	8	2.22	168	+0.9	+0.6
Northern Plateau*.....	12	2.37	151	+0.8	-0.1
North Pacific.....	7	9.20	159	+3.4	+2.1
Middle Pacific.....	5	8.06	189	+3.8	+0.2
South Pacific.....	4	3.36	126	+0.7	-1.6

\*Regular Weather Bureau and selected voluntary stations.

*In Canada.*—Professor Stupart says:

The precipitation was very generally above the average, the only large district showing a deficiency being New Ontario, where there was no rain and the snowfall was light. British Columbia stations show an excess, with a much larger snowfall than usual, and in the Northwest Territories and Manitoba it was wholly in the form of snow, which was heavier and more frequent than usual in nearly all districts except south-

ern Alberta and eastern Manitoba. In Ontario the snowfall was not excessive, and there were several rainy days. The heaviest snowfall occurred on the last day of the month, when from 10 to 15 inches fell in most districts, but near Lake Erie there was heavy rain and sleet. In Quebec and the Maritime Provinces the precipitation was nearly average; in the former province and northern New Brunswick it fell as snow except on one day, and in the Maritime Provinces it was partly rain and partly snow, the latter predominating.

**CLEAR SKY AND CLOUDINESS.**

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The cloudiness was normal in the middle slope region; below normal in New England, the Middle Atlantic and west Gulf States, Florida Peninsula, Ohio Valley, and Tennessee, Lake region, North Dakota, and the southern slope region, and above normal in the remaining districts.

Over Florida, southeastern New York, New Jersey, the southwestern quarter of the country generally, and North Dakota, the percentage of clear sky ranged from 50 to 70 per cent of the possible, and over the remainder of the country generally from 20 to 50 per cent. The smallest percentage of clear sky was reported from the northern Pacific region.

The average cloudiness for the various districts, with departures from the normal, are shown in the following table:

*Average cloudiness and departures from the normal.*

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.4	- 0.1	Missouri Valley	5.8	+ 0.4
Middle Atlantic	5.5	- 0.1	Northern Slope	5.7	+ 0.3
South Atlantic	5.4	+ 0.1	Middle Slope	4.4	- 0.9
Florida Peninsula	3.8	- 0.8	Southern Slope	3.9	- 0.3
East Gulf	5.0	+ 0.5	Southern Plateau	3.6	+ 0.6
West Gulf	5.1	- 0.7	Middle Plateau	6.5	+ 1.4
Ohio Valley and Tennessee	5.1	- 0.1	Northern Plateau	7.3	+ 0.6
Lower Lake	6.6	- 0.2	North Pacific	7.7	+ 1.5
Upper Lake	5.7	- 0.6	North Pacific	7.7	+ 2.9
North Dakota	4.9	- 0.2	South Pacific	5.5	+ 1.4
Upper Mississippi Valley	6.0	+ 0.7			

**HUMIDITY.**

The relative humidity was normal in the middle Plateau region; above normal in the Florida Peninsula, Lake region, upper Mississippi, and Missouri valleys, and the northern slope and Pacific districts; in the remaining districts it was below the normal.

In the Middle Atlantic States and middle and southern slope regions the deficiency was quite marked, especially in the last-named district where it amounted to 16 per cent. In the middle and south Pacific districts the excess in humidity was quite decided.

The averages by districts appear in the subjoined table:

*Average relative humidity and departures from the normal.*

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	74	- 1	Missouri Valley	76	+ 1
Middle Atlantic	69	- 5	Northern Slope	75	+ 4
South Atlantic	74	- 2	Middle Slope	62	- 9
Florida Peninsula	81	+ 1	Southern Slope	58	- 3
East Gulf	76	+ 1	Southern Plateau	40	- 4
West Gulf	73	- 1	Middle Plateau	64	+ 0
Ohio Valley and Tennessee	73	- 2	Northern Plateau	73	+ 2
Lower Lake	82	+ 2	North Pacific	83	+ 1
Upper Lake	84	+ 3	Middle Pacific	82	+ 6
North Dakota	77	+ 3	South Pacific	78	+ 9
Upper Mississippi Valley	79	+ 2			

**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.
Bismarck, N. Dak.	1	50	nw.	North Head, Wash.	4	84	se.
Block Island, R. I.	1	78	nw.	Do.	10	70	s.
Do.	2	66	nw.	Do.	11	90	s.
Do.	3	51	w.	Do.	18	65	ve.
Do.	8	54	nw.	Do.	19	50	sw.
Do.	10	53	nw.	Do.	22	62	sw.
Do.	11	53	nw.	Do.	26	61	s.
Do.	16	57	w.	Do.	27	62	s.
Do.	25	60	nw.	Do.	28	72	s.
Buffalo, N. Y.	2	60	w.	Point Reyes Light, Cal.	4	73	s.
Do.	3	56	w.	Do.	11	64	se.
Do.	4	52	w.	Do.	12	62	se.
Do.	7	66	w.	Do.	15	60	ve.
Do.	22	54	w.	Do.	16	50	nw.
Cairo, Ill.	7	66	sw.	Do.	24	59	s.
Carson City, Nev.	15	52	sw.	Do.	26	60	s.
Charlotte, N. C.	7	52	sw.	Port Crescent, Wash.	12	51	sw.
Cheyenne, Wyo.	1	60	nw.	St. Louis, Mo.	7	62	sw.
Cleveland, Ohio	2	60	sw.	Sioux City, Iowa.	1	53	nw.
Do.	7	50	sw.	Do.	2	61	nw.
Columbus, Ohio.	2	59	w.	Southeast Farallon, Cal.	4	50	s.
Denver, Colo.	1	51	nw.	Do.	12	50	s.
El Paso, Tex.	6	56	w.	Syracuse, N. Y.	14	51	s.
Fort Smith, Ark.	6	54	w.	Do.	21	50	s.
Hatteras, N. C.	1	50	w.	Do.	28	56	s.
Do.	11	51	n.	Tatoosh Island, Wash.	9	60	e.
Helena, Mont.	1	51	sw.	Do.	10	56	e.
Independence, Cal.	22	60	w.	Do.	11	69	e.
Knoxville, Tenn.	7	50	w.	Do.	12	66	sw.
Lexington, Ky.	7	50	w.	Do.	14	69	e.
Modena, Utah	5	58	sw.	Do.	15	54	e.
Mount Tamalpais, Cal.	4	56	sw.	Do.	19	64	sw.
Do.	12	50	s.	Do.	21	63	sw.
Do.	15	58	s.	Do.	22	78	sw.
Do.	16	67	nw.	Do.	25	50	e.
Do.	17	50	nw.	Do.	27	60	s.
Do.	22	56	sw.	Do.	28	68	s.
New York, N. Y.	1	60	nw.	Do.	29	50	sw.
Do.	3	58	nw.	Valentine, Nebr.	1	52	nw.
Do.	8	54	nw.	Williston, N. Dak.	1	68	nw.
Do.	16	54	nw.	Winnemucca, Nev.	4	57	s.
Do.	25	62	nw.	Do.	12	52	s.
North Head, Wash.	3	71	se.				

**ATMOSPHERIC ELECTRICITY.**

Numerical statistics relative to auroras and thunderstorms are given in Table IV, 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 1125 thunderstorms were received during the current month as against 802 in 1903 and 427 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 7th, 446; 28th, 164; 29th, 133.

Reports were most numerous from: Ohio, 154; New York, 93; Missouri, 78.

*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: January 28 to February 5, inclusive.

*In Canada:* Thunderstorms were reported from Kingston, 28; Toronto, 28, 29; Port Stanley, 7, 28; Hamilton, Bermuda, 9.

Auroras were reported from Grand Manan, 5; Father Point, 5; Quebec, 5, 11; White River, 5, 6; Port Arthur, 15; Minnedosa, 16; Edmonton, 9, 15; Prince Albert, 16, 17, 21; Battleford, 15; Port Simpson, 14.