

Missouri, 6. Montana, 14. Nebraska, 6, 7. Nevada, 26 to 29. Oregon, 16. Rhode Island, 2, 3. South Carolina, 2. South New Hampshire, 1. New Jersey, 2. New Mexico, 21. New York, 1, 15. North Dakota, 10. Ohio, 2, 15. Oklahoma, 5. Dakota, 1, 6. Tennessee, 14. Utah, 29. West Virginia, 14. Wisconsin, 1, 10, 11.

SUNSHINE AND CLOUDINESS.

The sunshine is now recorded automatically at 18 regular stations of the Weather Bureau by its photographic, and at 26 by its thermal effects. The results are given in Table XI for each hour of local, not seventy-fifth meridian, time. The cloudiness is determined by numerous personal observations at all stations during the daytime, and is given in the column of "average cloudiness" in Table I; its complement or clear sky is given in the last column of Table XI.

COMPARISON OF SUNSHINE AND CLEAR SKY.

The sunshine registers give the *duration* of direct sunshine whence the percentage of possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. It should not be assumed that these numbers should agree, and for comparative purposes they have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental record of percentages of duration of sunshine is almost always larger than the observer's personal estimates of percentages of area of clear sky; the average excess for April, 1895, is 9 per cent for photographic records, and 12 per cent for thermometric records.

Difference between instrumental and personal observations of sunshine.

Photographic stations.	Difference.			Thermometric stations.	Difference.		
	Instrumental.	Personal.	Difference.		Instrumental.	Personal.	Difference.
Tucson, Ariz.....	82	77	15	Key West, Fla.....	89	69	14
Galveston, Tex.....	81	81	0	Vicksburg, Miss.....	81	78	3
Santa Fe, N. Mex.....	80	66	14	San Francisco, Cal.....	78	60	18
Salt Lake City, Utah*.....	75	61	14	Salt Lake City, Utah*.....	75	61	14
Denver, Colo.....	69	55	14	Columbus, Ohio.....	72	45	27
Dodge City, Kans.....	67	61	6	St. Louis, Mo.....	71	56	15
Helena, Mont.....	67	60	7	Atlanta, Ga.....	70	48	22
Cincinnati, Ohio.....	63	51	12	Norfolk, Va.....	69	67	2
Memphis, Tenn.....	62	56	6	Baltimore, Md.....	68	48	20
Spokane, Wash.....	62	51	11	Chicago, Ill.....	68	56	12
Kansas City, Mo.....	60	51	9	Marquette, Mich.....	67	56	11
Savannah, Ga.....	60	54	6	New Orleans, La.....	65	64	1
Cleveland, Ohio.....	58	51	7	Des Moines, Iowa.....	62	50	12
Portland, Oreg.*.....	57	45	12	Louisville, Ky.....	61	48	13
San Diego, Cal.....	57	48	9	Portland, Me.....	61	38	23
Eastport, Me.....	54	38	16	Rochester, N. Y.....	61	55	6
Washington, D. C.....	52	44	8	Little Rock, Ark.....	60	51	9
Bismarck, N. Dak.....	48	51	-3	Philadelphia, Pa.....	58	41	17
				Portland, Oreg.*.....	57	45	12
				Buffalo, N. Y.....	52	42	10
				Boston, Mass.....	50	36	14
				New Haven, Conn.....	50	46	4
				New York, N. Y.....	49	41	8
				Seattle, Wash.....	45	31	14
				Wilmington, N. C.....	43	48	-5

* Records kept by both registers.

WIND.

The *prevailing winds* for April, 1895, viz, those that were recorded most frequently at Weather Bureau stations, are shown in Table I.

Maximum wind velocities of 50 miles or more per hour were reported 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.
Abilene, Tex.....	5	56	nw.	Fort Canby, Wash.....	18	60	s.
Amarillo, Tex.....	5	84	nw.	Do.....	14	71	se.
Do.....	6	68	nw.	Do.....	15	66	se.
Do.....	7	60	n.	Do.....	17	60	se.
Do.....	15	68	nw.	Hatteras, N. C.....	8	51	n.
Cheyenne, Wyo.....	6	60	nw.	Huron, S. Dak.....	5	51	nw.
Dodge City, Kans.....	5	54	n.	Do.....	14	56	se.
Do.....	6	50	nw.	Idaho Falls, Idaho.....	14	52	s.
Do.....	15	64	nw.	Kittyhawk, N. C.....	8	52	se.
Duluth, Minn.....	21	54	nw.	Moorhead, Minn.....	14	55	se.
Eastport, Me.....	14	56	ne.	Nantucket, Mass.....	9	50	sw.
Do.....	15	60	e.	New York, N. Y.....	9	50	se.
El Paso, Tex.....	5	78	w.	North Platte, Nebr.....	6	53	nw.
Do.....	14	51	sw.	Pierre, S. Dak.....	26	50	ne.
Fort Canby, Wash.....	1	54	se.	Rapid City, S. Dak.....	6	52	nw.
Do.....	2	72	s.	Sioux City, Iowa.....	28	60	nw.
Do.....	3	60	s.	Walla Walla, Wash.....	1	50	sw.
Do.....	9	71	se.	Williston, N. Dak.....	5	50	nw.
Do.....	10	60	se.				

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart II, in connection with the isobars based on the same system

of simultaneous observation; 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 wind of average velocity; these figures (or the ratio between them and the total number of observations in this month) indicate the extent to which winds from different directions counterbalanced each other.

LOCAL STORMS.

Destructive or severe local storms were reported as follows: **1st.**—Louisville, Ky., thunderstorm; stock killed by lightning. Boone County, Ky., Stamford, Nebr., Pendleton, Oreg., and over eastern portions of Washington, windstorms.

2d.—Tampa, Fla., thunderstorm. Melbourne, Fla., wind-storm.

5th.—Abilene, El Paso, Sulphur Springs, Bluff Dale, Fort Bliss, and Waco, Tex., and Gila, N. Mex., windstorms. Winnsboro, Tex., windstorm; 1 person killed and several injured. Amarillo, Tex., snowstorm. Chilton, Tex., hailstorm. Meade and Garden City, Kans., snowstorms. Over the southern portion of Stanton County, Kans., windstorm; cattle killed. Buffalo, Okla., snowstorm; cattle killed. Manhattan, Kans., and Madrid, Iowa, thunderstorms.

6th.—Dodge City, Kans., snowstorm; cattle killed. Deer Trail, Colo., snowstorm.

8th.—Washington, N. J., thunderstorm.

9th.—New Brunswick, Newton, and Junction, N. J., thunderstorms. Philadelphia, Pa., thunderstorm; 2 children killed by lightning. Seattle and Stillaguamish, Wash., thunderstorms. Pullman, Wash., windstorm.

10th.—Portland, Me., thunderstorm.

11th.—St. Paul, Minn., thunderstorm.
12th.—Near Nashville, Tenn., near Kirksville, Ohio, and Springfield, Mo., thunderstorms.
14th.—Concord and West Milan, N. H., rainstorms. Steele, N. Dak., windstorm.
15th.—Sarcxie, Mo., and Colby, Kans., thunderstorms. East Lynne, Mo., and Meade, Kans., windstorms. Cherokee, Kans., windstorm; 1 person killed and 1 injured. Near Harlan, Iowa, thunderstorm; 1 person and stock killed by lightning.
16th.—Americus, Ga., and Fairford, Ala., thunderstorms. Augusta, Ga., Longshore, S. C., and Silver Creek, Wash., windstorms. Waynesboro, Palo Alto, and Agricultural College, Miss., hailstorms.
17th.—Tampa, Fla., thunderstorm.
21st.—Duluth, Minn., windstorm.
22d.—Westfield, Mass., thunderstorm; a man killed by lightning.

23d.—Anson, Tex., windstorm.
24th.—Orange Park, Fla., thunderstorm. Benton, Tex., windstorm; 15 persons injured. Pinopolis, S. C., and Lytle, Tex., hailstorms.
25th.—Camden, Ark., hailstorm; 2 persons injured. Kirby, Ark., hailstorm. In Meeker County, Minn., thunderstorm; a man and horse killed by lightning. Near Luverne, Minn., thunderstorm; a man killed by lightning. Valley Springs, Minn., thunderstorm; a man killed by lightning.
27th.—Houma, La., thunderstorm. Paradise, Nev., windstorm.
28th.—Algona and Sioux City, Iowa, thunderstorms. Near Butlerville, Utah, thunderstorm; 1 person and 2 horses killed and 1 person injured by lightning.
29th.—Carroll, Iowa, thunderstorm; 5 persons killed by lightning. Ovid, Iowa, and Omaha, Nebr., thunderstorms.
30th.—Whitehall, Wis., thunderstorm; 1 person killed by lightning.

ATMOSPHERIC ELECTRICITY.

The statistics relative to auroras and thunderstorms are given in Table X, 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.

The dates on which reports of thunderstorms for the whole country were most numerous were: 1st, 84; 9th, 94; 12th, 104; 13th, 91; 25th, 127; 26th, 137; 27th, 162.

Thunderstorms were most numerous in Florida, Iowa, Massachusetts, Minnesota, Missouri, Nebraska, and Ohio.

Thunderstorms were most frequent in Florida, where they were recorded on nineteen days; Iowa and Missouri, eighteen days; Nebraska, seventeen days; Georgia, Kansas, North Carolina, and Tennessee, sixteen days.

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 128 reports were received, or an average of about 6 per day. The dates on which the reported number especially exceeded this average were: 10th, 23; 11th, 47; 16th, 25; 19th, 19.

Auroras were reported by a large percentage of observers as follows: New Hampshire, 100; North Dakota, 80; Maine,

100; Minnesota, 35; Wisconsin, 33; Montana, 33; and Washington, 20.

Auroras were most frequent in: Wisconsin, on fourteen days; Minnesota, twelve days; North Dakota, eleven days; and Maine, ten days.

CANADIAN DATA—THUNDERSTORMS AND AURORAS.

Auroras were reported as follows: 1st, 2d, Winnipeg. 5th, Medicine Hat and Battleford. 9th, Winnipeg. 10th, Grand Manan, Quebec, Montreal, and Kingston. 11th, Grand Manan, Father Point, Quebec, Montreal, Kingston, Winnipeg, Minnedosa, Medicine Hat, Edmonton, and Battleford. 12th, Sydney, Charlottetown, Father Point, Minnedosa, and Prince Albert. 13th, Winnipeg, Medicine Hat, Prince Albert, and Edmonton. 16th, Sydney, Grand Manan, Yarmouth, Charlottetown, Father Point, and Port Arthur. 17th, Father Point and Medicine Hat. 18th, Father Point, Port Arthur, and Qu'Appelle. 19th, Grindstone, Yarmouth, Father Point, Winnipeg, Qu'Appelle, and Prince Albert. 20th, Father Point, Montreal, Port Arthur, Winnipeg, Minnedosa, Qu'Appelle, Medicine Hat, and Swift Current. 21st, Grindstone. 22d, Kingston. 24th, Father Point and Minnedosa. 25th, Winnipeg and Minnedosa. 26th, Quebec, Port Arthur, and Minnedosa. 27th, Quebec. 29th, Winnipeg.

Thunderstorms were reported on the 25th at Halifax and on the 26th at Yarmouth.

METEOROLOGY AND MAGNETISM.

By Prof. FRANK H. BIGELOW.

For general remarks relative to this subject see page 7 of the REVIEW for January, 1895.

The comparison of the air temperature with magnetic horizontal force is shown in detail on Chart V, and the special features of the April curves are as follows:

SPECIAL FEATURES OF THE APRIL CURVES.

It is evidently desirable to make the record of comparison between the variations of the magnetic and meteorological systems as complete as possible. The space formerly devoted to the San Antonio observatory is therefore filled by inserting the mean barometer reading of 10 northwest stations, namely,

Huron, Pierre, Moorhead, Bismarck, Williston, Havre, Helena, Miles City, Rapid City, Idaho Falls, and Salt Lake City. The variations are inverted in plotting, the pressure being inverse while the temperature is direct relatively to the magnetic force. The pressures of this region are set back one day for synchronism in April and the succeeding summer months. Thus, April 2 is written and plotted against April 1 to allow for the eastward drift of the highs and lows.

For slope the correction to Williston is -1 , for Toronto -1 , and for Washington -1 . For reduction to the zero base-line the correction for temperature means is -5 , and for magnetic force $+19$.