

28th; Montreal, 15th; Toronto, 22d; White River, 16th; Win-
nipeg, 1st, 19th; Minnedosa, 3d.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 23 regular stations of the Weather Bureau by its photographic, and at 38 by its thermal effects; at one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X for the 60 stations at which instrumental self-registers are maintained.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the durations of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of area of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for May, 1897, is 12 per cent for photographic and 12 per cent for thermometric records.

The details are shown in the accompanying table, in which

the stations are arranged according to the total possible duration of sunshine, and not according to the observed duration.

Difference between instrumental and personal observations of sunshine.

Stations.	Latitude.	Apparatus.	For whole month.		Instrumental record of sunshine.			
			Total possible.	Personal.	Photographic.	Difference.	Thermometric.	Difference.
Key West	24 34	T.	410.2	47	47	87	+20	
Tampa, Fla.	27 57	T.	416.2	64	64	71	+7	
Galveston, Tex.	29 18	T.	419.0	79	90	+11		
New Orleans, La.	29 58	T.	420.9	45	45	44	-1	
Savannah, Ga.	32 06	T.	425.8	48	73	+25		
Vicksburg, Miss.	32 22	T.	425.8	66	66	87	+21	
San Diego, Cal.	32 42	T.	428.7	61	58	-3		
Charleston, S. C.	32 47	T.	428.7	50	50	67	+17	
Phoenix, Ariz.	32 28	T.	428.7	88	98	+10		
Atlanta, Ga.	33 45	T.	431.5	53	53	56	+3	
Los Angeles, Cal.	34 06	T.	431.5	61	76	+15		
Wilmington, N. C.	34 14	T.	431.5	62	74	+12		
Little Rock, Ark.	34 45	T.	434.3	54	54	66	+12	
Chattanooga, Tenn.	35 04	T.	434.3	56	56	63	+7	
Santa Fe, N. Mex.	35 41	T.	437.2	64	75	+11		
Raleigh, N. C.	35 45	T.	437.2	46	46	73	+27	
Nashville, Tenn.	36 10	T.	437.2	66	66	71	+5	
Fresno, Cal.	36 42	T.	440.2	88	88	84	-4	
Dodge City, Kans.	37 45	T.	443.1	61	73	+12		
San Francisco, Cal.	37 48	T.	443.1	66	66	82	+16	
Louisville, Ky.	38 15	T.	443.1	46	46	71	+25	
St. Louis, Mo.	38 38	T.	445.9	43	43	69	+26	
Washington, D. C.	38 54	T.	445.9	46	58	+12		
Kansas City, Mo.	39 05	T.	445.9	37	46	+9		
Cincinnati, Ohio	39 06	T.	445.9	58	58	78	+20	
Baltimore, Md.	39 18	T.	445.9	45	45	49	+4	
Atlantic City, N. J.	39 22	T.	445.9	46	56	+10		
Denver, Colo.	39 45	T.	449.0	44	70	+26		
Indianapolis, Ind.	39 46	T.	449.0	66	66	75	+9	
Philadelphia, Pa.	39 57	T.	449.0	39	39	54	+15	
Columbus, Ohio	39 58	T.	449.0	50	50	74	+24	
Harrisburg, Pa.	40 16	T.	449.0	39	39	67	+28	
Pittsburg, Pa.	40 32	T.	451.9	50	50	54	+4	
New York, N. Y.	40 43	T.	451.9	45	45	64	+19	
Salt Lake City, Utah	40 46	P.	451.9	40	71	+31		
Eureka, Cal.	40 48	P.	451.9	45	48	+3		
Cheyenne, Wyo.	41 08	P.	451.9	51	58	+7		
Omaha, Nebr.	41 16	P.	451.9	41	60	+19		
Cleveland, Ohio.	41 30	T.	455.3	43	43	52	+9	
Des Moines, Iowa.	41 35	T.	455.3	50	50	56	+6	
Chicago, Ill.	41 58	T.	455.3	47	47	52	+5	
Erie, Pa.	42 07	T.	455.3	43	43	57	+14	
Binghamton, N. Y.	42 08	T.	455.3	49	49	58	+9	
Detroit, Mich.	42 20	T.	455.3	56	56	66	+10	
Boston, Mass.	42 31	T.	455.3	43	43	59	+16	
Dubuque, Iowa.	42 30	T.	455.3	55	55	66	+11	
Albany, N. Y.	42 39	T.	459.9	45	45	66	+21	
Buffalo, N. Y.	42 53	T.	459.9	44	44	65	+21	
Rochester, N. Y.	43 08	T.	459.9	49	49	54	+5	
Idaho Falls, Idaho.	43 29	T.	459.9	56	56	65	+9	
Portland, Me.	43 39	T.	463.5	53	53	69	+16	
Northfield, Vt.	44 10	P.	463.5	31	49	+18		
Eastport, Me.	44 54	P.	466.7	32	47	+15		
St. Paul, Minn.	44 58	T.	466.7	33	44	+11		
Minneapolis, Minn.	44 59	T.	466.7	43	43	45	+2	
Portland, Oreg.	45 32	T.	471.7	42	42	45	+3	
Helena, Mont.	46 34	P.	475.6	45	51	+6		
Bismarck, N. Dak.	46 47	P.	475.6	49	61	+12		
Seattle, Wash.	47 38	T.	479.8	32	32	46	+14	
Spokane, Wash.*	47 40	P.	479.8	36	36	36	0	

* Instrument out of order.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 80.9°, or 3.1° above normal; the highest was 105°, at Hamilton on the 27th and at Pineapple on the 29th, and the lowest, 44°, at Maple Grove on the 1st. The average precipitation was 1.85, or 2.95 below normal; the greatest monthly amount, 4.42, occurred at Newburg, and the least, 0.25, at Brewton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 78.3°, or 1.3° above normal; the highest was 113°, at Fort Mojave on the 4th, and the lowest, 31°, at Williams on the 16th. The average precipitation was 0.09, or 0.27 below normal; the greatest amount, 0.75, occurred at Cedar Springs, while none fell at nineteen stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 78.2°, or 1.3° above normal; the highest was 106°, at Jonesboro on the 12th and at Warren on the 22d, and the lowest, 41°, at Jonesboro on the 1st and 5th and at Silver Springs on the 4th. The average precipitation was 3.46, or 0.59 below normal; the greatest monthly amount, 6.90, occurred at Dallas, and the least, 0.60, at Arkansas City.—*F. H. Clarke.*

California.—The mean temperature was 69.8°, or 1.0° below normal; the highest was 118°, at Volcano Springs, and the lowest, 26°, at Snedden's Ranch. The average precipitation was 0.46, or 0.15 above nor-

mal; the greatest monthly amount, 5.76, occurred at Fordyce Dam; at most stations no rain fell.—*Alexander McAdie.*

Colorado.—The mean temperature was 60.8°, or 0.4° below normal; the highest was 103°, at Lamar on the 23d, and the lowest, 19°, at Alma on the 6th and at Breckenridge on the 17th. The average precipitation was 1.80, or 0.53 above normal; the greatest monthly amount, 5.53, occurred at Gold Hill, and the least, 0.24, at Garnett.—*F. H. Brandenburg.*

Florida.—The mean temperature was 82.0°, or 2.0° above normal; the highest was 102°, at De Funiak Springs on the 19th, and the lowest, 58°, at Emerson on the 4th and at Lake Butler on the 3d. The average precipitation was 4.96, or 1.10 below normal; the greatest monthly amount, 9.35, occurred at Sebastian, and the least, 2.03, at Pensacola.—*A. J. Mitchell.*

Georgia.—The mean temperature was 80.8°, or 2.9° above normal; the highest was 104°, at Leverett on the 14th and 27th, at Allentown on the 28th, at Poulan on the 18th, and at Quitman on the 29th; the lowest was 47°, at Dahlonega and Ramsey on the 1st. The average precipitation was 3.51, or 1.36 below normal; the greatest monthly amount, 8.16, occurred at Jesup, and the least, 0.91, at Adairsville.—*J. B. Marbury.*

Idaho.—The mean temperature was 59.2°; the highest was 101°, at Boise on the 12th, and the lowest, 24°, at Martin on the 1st. The average precipitation was 1.33; the greatest monthly amount, 3.96, occurred at Murray, and the least, 0.10, at Minidoka.—*D. P. McCallum.*

Illinois.—The mean temperature was 71.0°, or 0.2 below normal; the highest was 102°, at Clear Creek and Minonk on the 14th, and the lowest, 34°, at Chemung and Scales Mound on the 1st. The average precipitation was 4.57, or 0.03 below normal; the greatest monthly amount, 9.10, occurred at Chester, and the least, 0.92, at Galva.—*O. E. Linney.*

Indiana.—The mean temperature was 70.6°, or 1.5° below normal; the highest was 99°, at La Porte on the 15th, and the lowest, 36°, at La Porte on the 1st and 8th. The average precipitation was 4.31, or 0.26 above normal; the greatest monthly amount, 6.76, occurred at Kokomo, and the least, 1.65, at South Bend.—*C. F. E. Wuppenhans.*

Iowa.—The mean temperature was 69.1°, or 0.5° below normal; the highest was 103°, at Sigourney on the 17th, and the lowest, 29°, at Decorah and Lansing on the 1st. The average precipitation was 3.81, or 0.78 below normal; the greatest monthly amount, 9.38, occurred at Keosauqua, and the least, 1.03, at Rockwell City.—*G. M. Ohappel.*

Kansas.—The mean temperature was 76.6°, or 2.7° above normal; the highest was 113°, at Lakin on the 19th, and the lowest, 38°, at Norton and Salina on the 4th. The average precipitation was 3.46, or 0.42 below normal; the greatest monthly amount, 11.01, occurred at Ottawa, and the least, 0.25, at Ulysses.—*T. B. Jennings.*

Kentucky.—The mean temperature was 73.4°, or 1.1° below normal; the highest was 101°, at Shelbyville on the 15th and at Greensburg on the 30th, and the lowest, 41°, at Middlesboro on the 1st. The average precipitation was 3.61, or 0.47 below normal; the greatest monthly amount, 7.36, occurred at Blandville, and the least, 0.80, at Bowling Green.—*Frank Burke.*

Louisiana.—The mean temperature was 80.9°, or 1.5° above normal; the highest was 105°, at Amite on the 23d, and the lowest, 52°, at Mansfield on the 5th. The average precipitation was 3.80, or 2.15 below normal; the greatest monthly amount, 9.55, occurred at Oberlin, while no rain fell at Port Eads.—*R. E. Kerkam.*

Maryland and Delaware.—The mean temperature was 68.5°, or 3.5° below normal; the highest was 97°, at Taneytown on the 30th, and the lowest, 29°, at Sunnyside on the 2d. The average precipitation was 2.80, or 0.66 below normal; the greatest monthly amount, 6.46, occurred at Sunnyside, and the least, 0.82, at Port Deposit.—*F. J. Wals.*

Michigan.—The mean temperature was 61.5°, or 5.2° below normal; the highest was 96°, at Baldwin on the 15th, and the lowest, 12°, at Humboldt on the 18th. The average precipitation was 2.41, or 0.77 below normal; the greatest monthly amount, 5.39, occurred at Olivet, and the least, 0.64, at Bay City.—*O. F. Schneider.*

Minnesota.—The mean temperature was 62.5°, or 4.0° below normal; the highest was 102°, at Mazeppa on the 14th, and the lowest, 18°, at Tower on the 1st. The average precipitation was 5.40, or 1.78 above normal; the greatest monthly amount, 9.75, occurred at Lake City.—*T. S. Outram.*

Mississippi.—The mean temperature was 81.2°, or 2.1° above normal; the highest was 111°, at Columbus on the 24th, and the lowest, 60°, at Batesville on the 5th and 6th, and at Corinth on the 1st. The average precipitation was 1.10, or 3.15 below normal; the greatest monthly amount, 4.94, occurred at Austin, and the least, 0.13, at Water Valley.—*R. J. Hyatt.*

Missouri.—The mean temperature was 73.6°, or nearly normal; the highest was 102°, at Sublett on the 17th, Princeton on the 23d, and New Madrid on the 30th; the lowest was 38°, at Liberty on the 4th and Potosi on the 6th. The average precipitation was 6.18, or 1.42 above normal; the greatest monthly amount, 11.67, occurred at Conception, and the least, 2.30, at Oto.—*A. E. Hackett.*

Montana.—The mean temperature was 60.0°, or 2.0° below normal; the highest was 105°, at Glendive on the 13th, and the lowest, 20°, at St. Paul's Mission on the 2d and 17th. The average precipitation was 3.64, or 1.00 above normal; the greatest monthly amount, 7.48, occurred at Kipp, and the least, 0.68, at St. Paul's Mission.—*R. M. Crawford.*

Nebraska.—The mean temperature was 69.5°, or 0.3° above normal; the highest was 106°, at Gothenburg on the 22d, and the lowest, 35°, at Albion on the 8th and at Lodgepole on the 16th. The average precipitation was 3.60, or 0.32 below normal; the greatest monthly amount, 12.25, occurred at Red Cloud, and the least, 0.67, at Gering.—*G. A. Loveland.*

Nevada.—The mean temperature was 62.8°, or 2.7° below normal; the highest was 1.12°, at St. Thomas on the 8th, and the lowest, 20°, at Hamilton on the 2d. The average precipitation was 0.37, or the normal amount; the greatest monthly amount, 1.22, occurred at Battle Mountain, while none fell at Tecoma.—*R. F. Young.*

New England.—The mean temperature was 60.7°, or 4.1° below normal; the highest was 92°, at Plymouth, N. H., on the 24th, and the lowest, 30°, at West Milan, N. H., on the 21st. The average precipitation was 4.62; the greatest monthly amount, 8.63, occurred at Cornish, Me., and the least, 1.64, at Nantucket, Mass. Rain occurred in portions of this district every day except two, and was almost continuous from the 3d to the 15th. The most remarkable falls occurred on the 9th and 10th, particularly in the interior. This storm became a matter of serious concern in some localities, as it produced overflowing rivers, undermined railroad tracks and highways, and threatened damage far in excess of that caused by spring floods. Bridges were carried away in Vermont and New Hampshire and large tracts of land were flooded in the Connecticut River Valley. Western Connecticut and Massachusetts and southern Vermont and New Hampshire received the greatest falls during this storm.—*J. W. Smith.*

New Jersey.—The mean temperature was 66.1°, or 2.6° below normal; the highest was 95°, at Vineland on the 30th, and the lowest, 35°, at Charlotteburg on the 27th. The average precipitation was 3.38, or 0.27 below normal; the greatest monthly amount, 5.50, occurred at Sergeantsville, and the least, 2.12, at Clayton.—*E. W. McGann.*

New Mexico.—The mean temperature was a little below normal; the highest was 106°, at Eddy on the 23d and Puerto de Luna on the 24th, and the lowest, 22°, at Winson's on the 18th. The precipitation was very unevenly distributed; the greatest monthly amount, 5.51, occurred at Ocate, while none fell at Olio.—*H. B. Horsay.*

New York.—The mean temperature was 61.8°, or 4.2° below normal; the highest was 93°, at Avon on the 24th and Brentwood on the 30th, and the lowest, 29°, at New Lisbon on the 2d. The average precipitation was 3.43, or 0.04 below normal; the greatest monthly amount, 6.72, occurred at Gloversville, and the least, 1.03, at Madison Barracks.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 74.8°, or 0.5° above normal; the highest was 100°, at Saxon on the 16th and Chapel Hill, Rockingham, and Tarboro on the 30th; the lowest was 40°, at Linville on the 1st. The average precipitation was 3.99, or about 0.50 below normal; the greatest monthly amount, 8.84, occurred at Flat Rock, and the least, 1.42, at Willington.—*O. F. von Herrmann.*

North Dakota.—The mean temperature was 61.7°, or 2.9° below normal; the highest was 109°, at Portal on the 14th, and the lowest, 20°, at Woodbridge on the 7th. The average precipitation was 3.75, or 0.09 below normal; the greatest monthly amount, 10.40, occurred at McKinney, and the least, 0.20, at Grafton.—*B. H. Bronson.*

Ohio.—The mean temperature was 68.1°, or 2.0° below normal; the highest was 102°, at Bethany on the 15th, and the lowest, 31°, at Hillhouse on the 21st. The average precipitation was 2.85, or 0.97 below normal; the greatest monthly amount, 6.92, occurred at Pomeroy, and the least, 0.92, at St. Ignatius College, Cleveland.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 77.4°; the highest was 109°, at Alva on the 22d, and the lowest, 36°, at Prudence on the 4th. The average precipitation was 3.12; the greatest monthly amount, 7.77, occurred at Purcell, and the least, 1.16 at Woodward.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 60.2°, or 1.7° above normal; the highest was 94°, at Grants Pass and Pendleton on the 6th, and Riverside on the 12th; the lowest was 19°, at New Bridge on the 10th. The average precipitation was 2.15, or 0.15 above normal; the greatest monthly amount, 6.83, occurred at Bay City, and the least, 0.51, at Arlington.—*B. F. Pague.*

Pennsylvania.—The mean temperature was 64.°8, or 4.2° below normal; the highest was 96°, at Aqueduct on the 25th, and Coatesville, Gettysburg, and Lebanon on the 30th; the lowest was 28°, at Saegers-town and Shingle House on the 2d. The average precipitation was 3.38, or 0.69 below normal; the greatest monthly amount, 6.42, occurred at Neshaminy, and the least, 1.11, at Cannonsburg.—*T. F. Townsend.*

South Carolina.—The mean temperature was 79.2°, or 1.7° above normal; the highest was 103°, at Gillisonville on the 27th, and the lowest, 49°, at Holland on the 1st. The average precipitation was 5.44, or 0.82 above normal; the greatest monthly amount, 11.75, occurred at Pinopolis, and the least, 1.32, at Mount Carmel.—*J. W. Bauer.*

South Dakota.—The mean temperature was 65.0°, or 1.5° below normal; the highest was 104°, at Cherry Creek on the 12th, and the lowest, 24°, at Castlewood on the 7th. The average precipitation was 3.44, or 0.25 below normal; the greatest monthly amount, 7.76, occurred at Watertown, and the least, 0.21, at Edgemont.—*S. W. Glenn.*

Tennessee.—The mean temperature was 75.4°, or 1.2° above normal; the highest was 104°, at Milan on the 14th and at Savannah on the 23d,

and the lowest, 38°, at Erasmus on the 1st. The average precipitation was 2.94, or 1.31 below normal; the greatest monthly amount, 7.39, occurred at Greenville, and the least, 0.78, at Pope.—*H. C. Bate.*

Texas.—The mean temperature for the State was 0.5° above the normal. There was a general deficiency over the panhandle and west Texas, ranging from 0.1° to 1.2°, and along the coast the temperature ranged from the normal to 1° below, except in the vicinity of Brazoria, where there was an excess. Over other portions of the State there was a general excess, except in the vicinity of Dallas, Waco, Fredericksburg, and New Braunfels, where there was a slight deficiency. The excess ranged from 0.1° to 2.5° over north, central, and west Texas, and from 0.2° to 3.5° over southwest and east Texas, with the greatest in the vicinity of Hearne. The highest was 111°, at Childress on the 24th, and the lowest, 42°, at Sierra Blanca on the 30th. The average precipitation for the State was 0.81 below the normal. There was a general deficiency, except over the northern portion of central Texas, the western portions of north and west Texas, and in the vicinity of Cuero, Luling, San Marcos, and Boerne, where there was an excess ranging from 0.03 to 2.13, with the greatest in the vicinity of Fort Worth. The deficiency ranged from 0.01 to 3.53 over east and southwest Texas, the east portions of west and north Texas, the panhandle, and the southern portion of central Texas, and from 0.91 to 5.55 over the coast district, with the greatest deficit in the vicinity of Houston. The greatest monthly amount, 9.20, occurred at Temple, and the least, trace, at Fort Stockton.—*I. M. Clina.*

Utah.—The mean temperature was 63.2°; the highest was 104°, at Manti on the 22d, and the lowest, 20°, at Soldier Summit on the 2d. The average precipitation was 0.24; the greatest monthly amount, 0.77,

occurred at Thistle, and the least, trace, at Cisco and Giles.—*J. H. Smith.*

Virginia.—The mean temperature was 71.7°, or 2.0° below normal; the highest was 103°, at Farmville on the 25th, and the lowest, 30°, at Guinea on the 2d. The average precipitation was 3.18, or 0.50 below normal; the greatest monthly amount, 11.56, occurred at Guinea, and the least, 0.71, at Spottsville.—*E. A. Evans.*

Washington.—The mean temperature was 61.4°, or 2.4° above normal; the highest was 100°, at Kennewick on the 30th, and the lowest, 28°, at Cascade Tunnel on the 14th and 17th. The average precipitation was 2.22, or 0.28 above normal; the greatest monthly amount, 5.33, occurred at North Bend, and the least, 0.30, at Sunnyside.—*E. N. Salisbury.*

West Virginia.—The mean temperature was 69.3°, or about 3.0° below normal; the highest was 96°, at Point Pleasant on the 30th, and the lowest, 35°, at Burlington on the 4th and at Nuttallburg on the 5th. The average precipitation was 4.31, or about normal; the greatest monthly amount, 6.77, occurred at Parkersburg, and the least, 1.31, at Burlington.—*H. L. Ball.*

Wisconsin.—The mean temperature was 63.2°, or 3.6° below normal; the highest was 100°, at Medford and White Hall on the 14th, at City Point on the 15th, and at Prairie du Chien on the 17th; the lowest was 22°, at Barron and Spooner on the 1st. The average precipitation was 5.41, or 1.50 above normal; the greatest monthly amount, 9.86, occurred at Amherst, and the least, 2.95, at Crandon.—*W. M. Wilson.*

Wyoming.—The mean temperature was 60.4°, or about normal; the highest was 104°, at Wamsutter on the 12th, and the lowest, 24°, at Fort Washakie on the 17th. The average precipitation was 1.47, or 0.29 below normal; the greatest monthly amount, 4.19, occurred at Sundance, and the least, 0.03, at Wamsutter.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

On June 4th at Vicksburg and on the 9th at New Orleans the Mississippi fell below the danger line; the river had been in flood eighty days at Vicksburg and seventy-five at New Orleans.

All the rivers have now sunk to low summer stages, in many instances interrupting navigation. During the month local freshets of short duration occurred in the rivers of New York and North Carolina.

The highest and lowest water, mean stage, and monthly range at 114 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River. (Reported by A. F. Sims, Albany, N. Y.)—The regimen of the Hudson for the month would be uneventful were it not for the fact that the copious rains of the 8th and 9th caused an abnormal June freshet. The river began to rise slowly on the afternoon of the 9th, and by 10 p. m. was within 4 feet of the string-piece of the wharves at Albany, N. Y. The water reached its highest point at 3 p. m. of the 10th, and half the sidewalks on the west side of Quay street were awash. The People's Line Steamer had to make her landing at the high wharf near Van Rensselaer Island, as the upper wharf was submerged. Reports from the tributaries say that the water was over the banks on the 9th, and that many acres of land under cultivation were submerged and considerable damage caused by the overflow.

On the morning of the 10th the water poured over the State dam at Troy to such a depth that the dam could be located only by a slight roughness in the current. The water has not been so high in June for twenty-five years.

Susquehanna River and branches. (Reported by E. R. Demain, Harrisburg, Pa.)—The rainfall averaged only about half the normal amount within the Susquehanna River basin, and consequently the stages of the water in nearly all streams of the system were below the average for June. In the lower Susquehanna a good stage was maintained notwithstanding the long period of dry weather, the water coming

mostly from the north branch. At Harrisburg the average gauge reading was only 0.1 foot lower than for June, 1896, while the rainfall during the month was only half as great. On the West Branch exceptionally low stages ruled and at Cedar Run and Sinnemahoning the water was below the zero of the gauge during the entire month. The gauge readings for this part of the system averaged 0.5 of a foot as against 2.1 feet in June, 1896. The Juniata averaged about 1 foot lower than during the same period last year. The North Branch was the only river of the system reporting higher stages than last year, due, doubtless, to a heavier rainfall in the northern counties of Pennsylvania and in New York State.

Rivers of South Atlantic States. (Reported by E. A. Evans, Richmond, Va.; C. F. von Herrmann, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga.; and J. B. Marbury, Atlanta, Ga.)—The low water prevailing in the James River during May continued throughout June, and no changes of any importance were recorded. The weather over the James River basin was dry, and hence there was nothing to cause any increase in the low stage of water usual at this season. The extreme range of the river on the gauge was from -0.2 to 1.0 feet. On the lower river the water is becoming more than usually brackish, owing to the decrease in the volume of fresh water coming down the river.

The precipitation throughout North Carolina for June was below the normal, and although the number of rainy days was large, and some heavy local rains occurred, the rainfall seemed to have a very slight influence on the stages of the rivers. The stages were irregular, but all low, declining gradually from the highest during the first decade to the lowest during the last. The Roanoke only attained a stage of 10 feet, and that on one date. Navigation of the lower courses of the streams has been limited during the month, as is usually the case during June. Owing to the dry state of the soil, very heavy rains would now be required to cause dangerous rises in the rivers of North Carolina.

The streams of South Carolina were at a very low stage from the 16th to the 30th. There was good steamboat water on the Wateree beyond Camden. Navigation was suspended on the Pedee at Cheraw, from the 16th to the 18th, and from the 27th to the 30th, but continued uninterrupted from Winyah Bay up to Drake. The Congaree was navigable to Granby Falls. There was but little traffic on the Edisto, the Little Pedee, the Lumber and Black rivers, throughout the month, on account of low water. The Lynch and Santee remained at navigable stages.

Heavy rains in the upper portion of this State and in North Carolina on the 6th, 7th, and 8th caused moderate freshets on the upper Pedee, the upper Wateree, the Broad, and Congaree. At Camden the stream rose from a 10-foot stage on the 8th to a gauge reading of 20.0 feet, with heavy driftwood, on the 9th. The rains were unusually heavy in the upper part of Spartanburg County on the 6th and 7th. Lowland crops were covered with water to the depth of 3 to 6 feet, and cultivated lands were badly washed. Two wooden bridges were swept away at Whitney, 10 miles above Spartanburg. Several cotton mills on the