ANNUAL REPORT

OF THE

CHIEF SIGNAL OFFICER,

UNITED STATES ARMY,

TO THE

SECRETARY OF WAR,

FOR THE

FISCAL YEAR ENDING JUNE 30, 1882.

IN TWO PARTS.

PART 2.

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1883.

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Table of maximum and minimum temperatures for July, 1881.—Continued.

State or Territory.	Signal Service.			United States army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Indian Territory	Fort Sill	106				
Do	Fort Gibson		68			
Kansas	Leavenworth	100	60	Clay Centre	109	
Do				Yates Centre		56
Kentucky	Louisville	101	62			
Louisiana	Shreveport	105	66			
Maine	Portland	84		Cornish	92	
Do	Eastport		49			
Maryland	Baltimore	96	65	Cumberland, Owing's Mills, and Emmittsburg.		60
Massachusetts	Boston	89	54	Somerset	96	
Do				Williamstown		48
Michigan	Marquette	97	45	Thornville	99	
Minnesota	Moorhead	95				
Do	Saint Vincent		40			
Mississippi	Vicksburg	100	62			
Missouri	Saint Louis	104	62	Pierce City		54
Montana	Fort Keogh	109				
Do	Fort Assiniboine		35			
Nebraska	North Platte	104	58	Lincoln	109	54
Nevada	Winnemucca	97	40	Hot Springs Golconda, Palisade, and Otego.	105	
Do				Carson City		38
New Hampshire	Mount Washington	72	32	Auburn	98	
New Jersey	Barnegat	92		Atco and Vineland	96	
Do	Atlantic City		57	Freehold		56
New Mexico	La Mesilla	105		Fort Union		45
Do	Santa Fé		53			
New York	Rochester	96	54	West Point	97	
Do	Oswego	96		Johnstown		43
North Carolina	Charlotte	100		Weldon	102	
Do	Smithville		61	Highlands		52
Ohio	Columbus	103		College Hill	109	
Do	Cincinnati	103				
Do	Cleveland		56			
Oregon	Roseburg	91	42			
Pennsylvania	Pittsburgh	103	57	Milton	104	
Do				Franklin		44
Rhode Island	Newport	87	57	Fort Adams	91	56
South Carolina	Charleston	103	67	Stateburg		64
Tennessee	Nashville	101		Ashwood and Austin.	102	
Do	Knoxville		59			
Texas	Eagle Pass	112				
Do	Fort Davis		53			
Utah	Salt Lake City	96	46	Promontory	106	
Do				Coalville		39
Vermont	Burlington	90	52	Charlotte	99	
Do				Woodstock		46
Virginia	Norfolk	102		Wytheville and Snowville.		50
Do	Cape Henry		60			
Washington Territory	Almota	103				
Do	Colfax and Dayton		37			
West Virginia	Morgantown	89	55	Flemington	98	
Do				Helvetia		49
Wisconsin	La Crosse	93		Mission House	97	
Do	Milwaukee		55	Neillsville		50
Wyoming	Cheyenne	100	45	Fort Bridger		32

Table of comparative maximum temperatures for the month of July—Continued.

State or Territory.	Maximum for July, 1881, Signal Service.		Highest since Signal Service stations were opened—3 to 10 years.			Highest from any other source.			
	Station.	Temp.	Station.	Year.	Temp.	Place.	Year.	Temp.	Length of record.
		°			°			°	Years.
Missouri	Saint Louis	104	Saint Louis	'74,'79	100	Allenton	1868	109	4
						Jefferson Barracks	1860	103	36
Montana	Fort Keogh	109	Fort Benton	1874	100	Fort Shaw	1872	112	13
			Fort Keogh	1879	100				
Nebraska	North Platte	104	North Platte	1877	107	Fort McPherson	1870	115	15
						Fort Kearney	1857	102	20
Nevada	Winnemucca	97	Winnemucca	1877	104	Camp Halleck	1875	110	13
New Hampshire	Mount Washington	72	Mount Washington	1875	69	Stratford	1868	100	10
						Dunbarton	1880	100	8
						Fort Constitution	1850	96	33
New Jersey	Barnegat & Atlantic City	92	Sandy Hook	1876	100	Haddonfield	1866	102	6
						Newark	1879	99	35
New Mexico	La Mesilla	105	La Mesilla	1880	107	Fort McRae	1873	116	10
						Fort Union	1871	101	30
New York	Oswego and Rochester	96	Oswego	1878	100	Poughkeepsie	1849	105	20
						Newburgh	1849	105	40
						Moriches	1868	105	16
						Fort Columbus	1825	104	59
North Carolina	Charlotte	100	Wilmington	1879	103	Weldon	1879	107	8
						Fort Johnson	1831	102	54
Ohio	Columbus & Cincinnati	103	Cincinnati	1874	103	Marietta	1859	102	53
						College Hill	'68,'79	99	67
Oregon	Umatilla	106	Umatilla	1880	107	Fort Dalles	1853	105	16
Pennsylvania	Pittsburgh	103	Pittsburgh	'76,'78	101	Carlisle Barracks	1868	105	34
						Philadelphia	1866	101	122
Rhode Island	Newport	87	Newport	1878	92	Fort Adams	1867	102	39
South Carolina	Charleston	103	Charleston	1879	104	Charleston	1752	101	?243
Tennessee	Nashville	101	Nashville	'74,'79	101	Castalian Springs	1875	103	5
						Glenwood Cottage	1860	99	10
Texas	Eage Pass	112	Laredo	1879	110	Fort Mason	1860	114	9
						San Antonio	1871	108	34
Utah	Salt Lake City	96	Salt Lake City	1877	98	Mount Carmel	1877	112	7
						Camp Douglas	1871	103	19
Vermont	Burlington	90	Burlington	1878	96	Randolph	1868	102	4
						Lunenburg	1864	97	19
Virginia	Norfolk	102	Norfolk	1876	103	Nottoway	1876	111	2
						Fortress Monroe	1837	102	55
Washington Territory	Almota	103	Dayton	1880	102	Fort Walla Walla	1859	107	10
						Fort Townshend	1870	95	22

Table of maximum and minimum temperatures for October, 1881—Continued.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Indiana	Indianapolis	81	39	Laconia	86	35
Do				Vevay	86	
Indian Territory	Fort Supply	90	24			
Iowa	Des Moines	83	32	Des Moines, Fort Madison, & Logan.	86	
Do				Cresco		26
Kansas	Dodge City	89	29	Wellington	95	
Do				Fort Wallace		11
Kentucky	Louisville	87	43			
Louisiana	Shreveport	94	47			
Maine	Portland	83		Cornish and Dexter		22
Do	Eastport		24			
Maryland	Baltimore	89	39	Fallston and Federalsburgh.	90	
Do				Woodstock		28
Massachusetts	Boston	90	28	Heath		20
Michigan	Port Huron	79		Fort Brady		20
Do	Escanaba		25			
Minnesota	Saint Paul	72				
Do	Moorhead		17	Fort Snelling	75	
Mississippi	Vicksburgh	90	45			
Missouri	Saint Louis	85	43	Neosho	95	
Do				Sedalia		29
Montana	Fort Keogh	73		Fort Assinniboine		—17
Do	Fort Assinniboine		—16			
Nebraska	Omaha	85		Clear Creek	89	
Do	North Platte		25			
Nevada	Winnemucca	75	11	Carson City	78	
New Hampshire	Mount Washington	54	—3	Auburn	88	
New Jersey	Sandy Hook	87		Vineland	92	
Do	Atlantic City		35	Acto		27
New Mexico	La Mesilla	92		Fort Union		18
Do	Fort Bayard and Silver City.		30			
New York	New York City	88		West Point	93	
Do	Buffalo		29	Madison Barracks		17
North Carolina	Hatteras and Kittyhawk.	90		Weldon	92	35
Do	Charlotte		42			
Ohio	Cincinnati and Columbus.	84		Jacksonburgh and Portsmouth.	86	
Do	Toledo		35	Westerville		32
Oregon	Umatilla	69	21			
Pennsylvania	Pittsburgh	89	35	Milton	95	
Do				Dyberry		20
Rhode Island	Newport	78	34	Fort Adams	81	31
South Carolina	Charleston	89	54	Aiken		45
Tennessee	Memphis	89				
Do	Nashville	89	43			
Texas	Edinburgh	94				
Do	Fort Elliott		33			
Utah	Salt Lake City	82	25	Coalville		13
Vermont	Burlington	74	25	Woodstock	83	17
Virginia	Cape Henry			Accotink	91	
Do	Norfolk	89		Snowville		
Do	Chincoteague		42			31
Washington Territory	Almota	72				
Do	Dayton		19			
West Virginia	Morgantown	84	36	Flemington	86	29
Wisconsin	Madison	77	33	Edgerton	82	
Do				Neillsville		24
Wyoming	Cheyenne	76	18	Fort Bridger	78	—3

Deviations from mean temperature.—Under this heading departures exhibited by reports from the regular Signal Service stations are shown in the table of comparative temperatures on the right-hand side of Chart No. II. The following items of importance in connection with this subject are reported by voluntary observers: *Illinois:* Riley, mean temperatue 4°.7 above that of past twenty years; October, 1879, was the only month with a higher temperature; the minimum temperature for each October during the past twenty years has been lower than that of the present year and the monthly range for the present month is the smallest for the same period. *Maine:* Gardiner,

Table of maximum and minimum temperatures for November, 1881—Continued.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Maryland	Baltimore	71	24	Federalsburgh and Woodstock.	77	
Do				Emmittsburgh		18
Massachusetts	Boston	71		Heath		4
Do	Springfield		13			
Michigan	Detroit	66		Lansing	67	
Do	Marquette		8	Fort Brady		—5
Minnesota	Saint Paul	57		Northfield	56	
Do	Saint Vincent		—18			
Mississippi	Vicksburg	80	25	Fayette		22
Missouri	Saint Louis	72	15	Sedalia	76	
Do				Oregon		4
Montana	Fort Benton	63		Fort Shaw		—19
Do	Fort Assinniboine and Fort Shaw.		—18			
Nebraska	North Platte	67	—5	Lincoln	74	
Nevada	Winnemucca	61	5	Golconda	85	
Do				Boca		—34
New Hampshire	Mount Washington	47	—15	Contoocookville	67	
New Jersey	Sandy Hook	73		Vineland	78	
Do	Atlantic City		22	Atco		19
New Mexico	La Mesilla	76		Fort Union		—5
Do	Silver City		18			
New York	Rochester	70		Fort Niagara	71	
Do	Oswego		13	Madison Barracks		—2
North Carolina	Wilmington	81		Highlands		8
Do	Charlotte		20			
Ohio	Columbus	72		Portsmouth	80	
Do	Cleveland	72	15	Bellefontaine		11
Oregon	Umatilla	70	20			
Pennsylvania	Pittsburgh	76		Dyberry		8
Do	Erie		17			
Rhode Island	New Shoreham	70				
Do	Newport		20			
South Carolina	Charleston	80	28	Aiken		22
Tennessee	Knoxville	81	15			
Texas	Uvalde	91				
Do	Mason		19			
Utah	Salt Lake City	56	13			
Vermont	Burlington	65	3	Charlotte	68	
Do				Newport		—7
Virginia	Cape Henry	79				
Do	Lynchburg		24			
Washington Territory	Almota and Pomeroy.	62				
Do	Spokane Falls		3			
West Virginia	Morgantown	76	26	Helvetia		14
Wisconsin	La Crosse	60	5	Manitowoc	63	
Do				Neillsville		—2
Wyoming	Cheyenne	56	9	Fort Fetterman	63	
Do				Fort Bridger		—7

Ranges of temperature at signal service stations.—Monthly ranges in general varied from 45° to 65° over the country east of the Rocky Mountains and from 35° to 55° westward to the Pacific. The smallest ranges were: San Francisco, 22°; Key West and Olympia, 25°; Red Bluff, 28°; Portland, Oreg., 29°; San Diego and Port Eads, 38°; Pike's Peak and Sacramento, 39°. The largest were: Rock Creek, Mont., 88°; Fort Sully, 79°; Fort Buford, 78°; Forts Stevenson and Benton, 77°; Bismarck, 76°; Fort Shaw, 75°; Helena, 72°; Fort Assinnaboine and Huron, 71°. The daily ranges varied in the different districts as follows: New England, 22° at New Shoreham to 34° at Boston and Eastport; Middle Atlantic States, 19° at Albany and 21° at Cape May to 29° at Lynchburg and 31° at Washington; South Atlantic States, 23° at Kittyhawk, Macon, Smithville, and Charleston to 30° at Augusta and Jacksonville; Florida Peninsula, 12° at Key West to 25° at Cedar Keys; East Gulf States, 21° at New Orleans to 31° at Vicksburgh, Mobile, Montgomery and Pensacola; West Gulf States, 21° at Port Eads to 38° at Denison and 39° at Mason; Rio Grande Valley, 35° at Laredo, Brackettville and Castroville to 38° at Uvalde; Ohio Valley and Tennessee, 23° at Columbus and 24° at Indianopolis to 32° at Knoxville and 38° Nashville; Lower Lake region, 22° at Oswego to 26° at Cleveland, Buffalo, and Rochester; Upper Lake region, 20° at Grand Haven and 24° at Port Huron to 30° at Duluth and 31° at Alpena; extreme Northwest, 41° at Moorehead to 48° at Bis-

26th. Fort Cummings, 22d. Deadwood, 13th, very brilliant. Fort Shaw, 5th. Fort Keogh, 5th. Fort Assinniboine, 11th. Uvalde, 28th. Huron, Dak., 18th. Davenport, 13th, 14th, 21st, 22d, 23d. Buffalo, 9th. Columbus, 11th, 14th. Life-Saving Station, No. 6, N. C., 2d, 8th, 11th. New London, 10th, 11th. Fort Union, N. Mex., 26th. Princeton, Cal., 6th, very large and brilliant. Rio Vista, Cal., 9th, 19th, illuminating the heavens like a flash of lightning. Anna, Ill., 21st. Charleston, Ill., 12th, 15th, 17th, 18th, 25th, 28th. Swanwick, Ill., 4th, 5th, 6th, 16th, 28th. New Corydon, Ind., 5th. Vevay, Ind., 1st, 3d, 10th. Monticello, Iowa, 1st, 20th. Muscatine, Iowa, 24th. Topeka, Kans., 6th, 7th, 14th, 20th. Point Pleasant, La., 12th, 14th, 16th, 24th. Woodstock, Md., 8th, 24th, 25th, 26th. Rowe, Mass., 16th, 22d. Fall River, Mass., 11th, 22d. Fayette, Miss., 2d, 3d, 10th. Clear Creek, Nebr., 1st. Genoa, Nebr., 16th, 17th. Freehold, N. J., 11th, 14th. Vineland, N. J., 9th. Waterburgh, N. Y., 22d. Ellsworth, N. C., 13th. Jacksonburg, Ohio, 9th to 15th, 30th. Wooster, Ohio, 9th. Fallsington, Pa., 6th. Statesburgh, S. C., 2d, 3d, 6th, 8th, 10th, 11th, 12th, 15th, 17th, 20th, 22d, 23d, 24th, 29th, 30th, 31st. Austin, Tenn., 14th, 16th, 28th. Beloit, Wis., 4th, 11th, 21st, 28th.

Prairie and forest fires.—From Flint to Port Huron, Mich., 31st, fires raging in fields, forests, and swamps; in nearly every section of the State more or less damage has been done; along the lake shore north of Fort Gratiot the smoke was almost stifling, and in Port Huron for the past three days it has been so thick as to seriously interfere with business. Independence, Kans., 13th to 31st, raged with great fierceness. Fayette, Miss., 29th. Freehold, N. J., 21st to 31st; air filled with smoke for many miles. Atco, N. J., 26th, very extensive. Carson City, Nev., 13th to 16th. New Corydon, Ind., 22d, 23d. Fort Missoula, Mont., 21st to 24th. Dayton, Wash., 19th, 25th. Salt Lake City, 3d, in mountains southeast of city. Fort Custer, 18th to 28th. Fort Keogh, 10th to 24th. Fort Assinniboine, 22d to 28th. Superior City, Mont., 19th to 22d. Fort Gibson, 13th to 29th. Fort Griffin, 20th. Stockton, 25th, 26th, 27th. Fort Sill, 27th. Jacksborough, 22d to 28th. Clarksville, Tenn., 12th, heavy fires along the south side of the Cumberland River; large loss to fences, timber, and crops. Petoskey, Mich., 4th, woods along the C. and G. T. Railroad burning fearfully; city filled with offensive smoke. West Branch, Mich., 5th, forests on fire along the line of the Mackinaw division of the Michigan Central Railroad; 3,000 telegraph poles and 8,000 fence posts burned; all railroad communication cut off and thousands of dollars' worth of standing timber destroyed. Tuscola County, Mich., 11th, the damage by fires will reach many thousands of dollars; timber and fences met with wholesale destruction; in several instances farm buildings were destroyed, entailing heavy loss; in the northern townships several lives were lost. Emmet, Mich., 31st, heavy fires raging without abatement; farmers obliged to leave work and fight for the preservation of their homes. Pana, Ill., 31st, grass and fencing destroyed, incurring a large loss. Tuscola, Ill., 31st, extensive, loss to grain stacks and fencing, $3,000. Province of Ontario, Can., 31st, bush fires widely prevalent and causing great damage. Bay City, Mich., 5th, raging about the city in every direction; for a hundred miles to the north, fences, buildings, and timber destroyed in vast quantities; railroad travel stopped; city enveloped in dense smoke and the air filled with burned leaves and ashes. Clinton County, Ohio, 31st, much fencing and many hay and grain stacks destroyed. Eagle Pass, 19th; Brackettville, 26th; Little Rock, 17th; Escanaba, 1st; Oswego, 31st, very numerous; Morgantown, 28th, dense smoke from forest fires.

Earthquakes.—Santa Barbara, Cal., 30th, 7 p. m., two slight shocks; course of movement north to south; no destruction. Umatilla, Oreg., 9th, a volcanic eruption took place from the side of a mountain situated south of the South Fork of Clearwater River, about twenty miles east of Mount Idaho, and a column of fire and smoke was thrown upwards to a height of several hundred feet.

Sunsets.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from 181 stations show 5,585 observations to have been made, of which 29 were reported doubtful; of the remainder, 5,556, or 85.0 per cent., were followed by the expected weather.

Table of maximum and minimum temperatures for December, 1881—Continued.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Indiana	Indianapolis	63	14	Laconia	65	
Do				Wabash		14
Indian Territory	Fort Gibson	73				
Do	Fort Supply		18			
Iowa	Keokuk	60		Nora Springs		—10
Do	Dubuque		8			
Kansas	Dodge City	72	17	Independence	73	
Do	Leavenworth		17	Topeka		8
Kentucky	Louisville	67	19	Bowling Green	66	21
Louisiana	New Orleans	77				
Do	Shreveport		31			
Maine	Eastport	52	0	Cornish	60	
Do				Dexter		—8
Maryland	Baltimore	71	24	Fallston	74	
Do				Great Falls		14
Massachusetts	Thatcher's Island	67	9	Heath		1
Michigan	Detroit	59		Fort Brady	57	—6
Do	Escanaba		8			
Minnesota	Saint Paul	53		Fort Snelling	52	
Do	Saint Vincent		20			
Mississippi	Vicksburgh	75	33	Fayette	73	32
Missouri	Saint Louis	64	15	Sedalia and Pierce City.	70	
Do		67		Oregon and Saint Louis.		14
Montana	Fort Benton	67				
Do	New Chicago		16			
Nebraska	Omaha			Lincoln	60	
Do	North Platte	59	9	Genoa		6
Nevada	Pioche	65				
Do	Winnemucca		7	Golconda	75	
Do				Boca		—10
New Hampshire	Mount Washington	41	—21	Contoocookville	62	
Do				Grafton		—2
New Jersey	Sandy Hook	69		Atco	70	
Do	Atlantic City		19	Somerville		6
New Mexico	La Mesilla	80		Fort Stanton	70	—1
Do	Silver City		11			
New York	New York	66		Madison Barracks	54	—2
Do	Albany		11			
North Carolina	Wilmington	73		Weldon	74	
Do	Kittyhawk		26	Highlands		12
Ohio	Cincinnati	65		Portsmouth	73	
Do	Cleveland and Columbus.		17	Bellefontaine		13
Oregon	Portland	58		Fort Klamath	50	—1
Do	Umatilla		21			
Pennsylvania	Philadelphia	69		Blooming Grove		
Do	Pittsburgh		15	Franklin		10
Rhode Island	Newport	60	15	Fort Adams	56	14
South Carolina	Charleston	76	33	Aiken, Columbia, & Stateburg.		28
Tennessee	Memphis	70				
Do	Knoxville		23			
Texas	Edinburgh and Rio Grande.	83		Fort Brown	87	32
Do	El Paso and Fort Elliott.		18			
Utah	Salt Lake City	49	17	Blue Creek and Corinne.	50	
Do				Promontory		0
Vermont	Burlington	56	4	Woodstock	62	—1
Virginia	Cape Henry	74		Wytheville		12
Do	Lynchburgh		22			
Washington Territory	Dayton	60				
Do	Colfax and Spokane		10			
West Virginia	Morgantown	68	22	Helvetia	60	15
Wisconsin	La Crosse	54	1	Neillsville	56	—4
Wyoming	Cheyenne	58	11	Forts Bridger and Washakie.		—9

except December, 1877. Wellsborough, mean temperature considerably above the average of the past twenty-five years. *Vermont:* Woodstock, mean temperature 30°.1 or 10°.6 above the mean of the past fourteen years; lowest December mean occurred in 1872, and highest in 1877. Catawissa, mean temperature considerably above the average; month very pleasant. *Virginia:* Wytheville, mean temperature 39°.3 or 4°.5 above the mean of the past seventeen years. *West Virginia:* Helvetia, mean temperature 39°.2 or 6°.31 above the mean of the past six years. Mean temperature for the year 50°.71 or 0°.22 below the mean of the past six years.

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Middle Plateau, 1st, 2d, 3d, 6th, 9th to 12th, 25th to 29th; Northern Plateau, 1st, 2d, 4th, 5th, 8th, 10th to 13th. 15th, 16th, 18th, 19th, 24th to 27th, 29th; North Pacific Coast region, 1st, 2d, 3d, 6th to 10th, 12th, 13th, 14th, 16th, 19th, 20th, 21st, 23d, 25th, 26th, 27th. The following is a report of unusually heavy snow: Spokane Falls, Wash., 24th. The Northern Pacific Railroad Company were obliged to use snow plows on the Spokane division, the snow being from two to three feet deep in that section.

Depth of snow on ground at end of month.—Colorado: Pike's Peak, trace. *Dakota:* Bismarck, 2 inches. *Illinois:* Cairo, 1 inch; Chicago, trace; Charleston, ½ inch; Morrison, ½ inch; Anna, 2½ inches; Riley, trace. *Indiana:* Laconia, ½ inch; Wabash, Logansport, and Vevay, 1 inch; Saint Meinrad, ¼ inch; Indianapolis, trace. *Iowa:* Dana, 1 inch; Fort Madison, 2 inches; Davenport, trace; Des Moines, ¼ inch. *Kentucky:* Bowling Green, 1½ inches. *Maine:* Eastport, trace. *Maryland:* Woodstock, trace. *Massachusetts:* New Bedford, ½ inch. *Michigan:* Marquette, 6 inches: Grand Haven, 5 inches; Escanaba, 2 inches; Detroit, 1½ inches; Alpena, ½ inch; Port Huron, trace; Battle Creek, 2 inches; Litchfield, 1 inch; Kalamazoo, 3 inches. *Minnesota:* Moorhead, trace; Saint Vincent, 10 inches; Saint Paul, less than 1 inch; Duluth, ½ inch. *Missouri:* Saint Louis, 1 inch. *Nebraska:* De Soto, ¼ inch. *New Hampshire:* Mount Washington, 7 inches. *New York:* Pen Yan, 3 inches; Waterburgh, Ithaca and Palermo, 2 inches; Cooperstown, 1½ inches; North Volney, 2½ inches; Friendship, 1 inch; White Plains, trace; Buffalo, 4 inches; Rochester, 2 inches; Oswego, 3 inches. *North Carolina:* Highlands, 5 inches; Charlotte, 4 inches. *Ohio:* North Lewisburgh, New Athens, Bethel, and Jacksonburgh, 2 inches; Bellefontaine and Ruggles, 1 inch; Toledo and Sandusky, ½ inch; Cleveland, 1 inch; Columbus, 1 inch; Cincinnati, ¼ inch. *Pennsylvania:* Dyberry and New Castle, 1 inch; Meadville, 1½ inches; Catawissa, ⅛ inch; Wellsborough, trace; Erie, 10 inches. *Rhode Island:* Newport, trace. *Tennessee:* Ashwood, 2 inches; Chattanooga, ¼ inch. *Vermont:* Burlington, ½ inch. *Virginia:* Wytheville, ½ inch. *Washington Territory:* Spokane Falls, 5 inches. *West Virginia:* Flemington, 1 inch; Morgantown, ¼ inch. *Wisconsin:* Beloit and Embarrass, ½ inch.

Hail.—Dubuque, 20th, from 7.03 to 7.08 p. m. Bangor, Me., 18th, a slight hail-storm between 10 and 11 a. m. North Volney, N. Y., 12th. Greensborough, N. C., 29th. Wytheville, Va., 1st, 29th. Albany, 8th.

Rain, hail, or snow from a cloudless sky.—Wellington, Kans., 7th, shower of spongy hail, lasting three minutes. Bainbridge Island, Wash., 18th, rain. Dyberry, Pa., snow, lasting 30 minutes.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, from 73 to 79; Middle Atlantic States, 67 to 80; South Atlantic States, 66 to 83; Florida Peninsula, 75 to 78; East Gulf States, 68 to 79; West Gulf States, 68 to 85; Rio Grande Valley, 72 to 85; Ohio Valley and Tennessee, 70 to 77; Lower Lake region, 66 to 80; Upper Lake region, 66 to 87; Extreme Northwest, 71 to 87; Upper Mississippi Valley, 65 to 79; Missouri Valley, 65 to 70; Northern Slope, 53 to 71; Middle Slope, 47 to 70; Southern Slope, 56 to 75; Southern Plateau, 50 to 63; Middle Plateau, 42 to 80; Northern Plateau, 73 to 86; North Pacific Coast region, 84 to 86; Middle Pacific Coast region, 84 to 86; South Pacific Coast region, 47 to 80. High stations report the following percentages not corrected for altitude: Cheyenne, 48.0; Pike's Peak, 66.4; Mount Washington, 84.4.

WINDS.

The prevailing winds during the month of December, 1881, at Signal Service stations, are shown on Chart No. II, by arrows, which fly with the wind. Throughout the Ohio Valley, Lake region, Upper Mississippi Valley, and New England, the winds are southerly; in the Middle Atlantic States, westerly; in the South Atlantic and Eastern Gulf States, northeasterly; in the Western Gulf States and Texas, variable; in the Missouri Valley and Northwest, northwesterly; throughout the Northern Slope, Northern Plateau, and North Pacific Coast region, south to west; in California, northwesterly; elsewhere, variable.

Total movements of the air.—The following are the largest total movements at Signal Service stations: Mount Washington, 31,104 miles; Pike's Peak, 17,972; Fort Shaw, Mont., 13,651; Delaware Breakwater, 12,833; New Shoreham, R. I., 12,736; Kittyhawk, N. C., 12,595; Wood's Holl, Mass., 12,166; Thatcher's Island, Mass., 12,064; Hatteras, N. C., 12,035; Cape May, 12,018; Sandy Hook, N. J., 10,791; Sandusky, 10,339; Fort Benton, Mont., 10,118; Portsmouth, N. C., 9,762; Fort Assinniboine, Mont., 9,661; Indianola, 9,621; Barnegat, N. J., 9,524; Macon, N. C., 9,376; Champaign, Ill., 9,321; Port Eads, 9,303; Cheyenne, 9,174; Buffalo, 9,172; Rochester, 9,126; Cape Henry, Va., 8,799; Grand Haven, 8,728; Milwaukee, 8,456; Saint Vincent, Minn., 8,405; Key West,

perature 26°.0, or 4°.0 above the average for several years. *Missouri:* Saint Louis, Missouri Weather Service reports, mean temperature slightly above the average for the past forty-five years. *New Hampshire:* Contoocookville, mean temperature 20°.5, or about 1°.0 below the average for the past twelve years. *New York:* Palermo, mean temperature 20°.3, or 0°.8 below the average for the past twenty-nine years; warmest January during that period occurred in 1880, mean temperature 29°.4, and the coldest, 12°.8, occurred in 1881; the lowest temperature recorded during that period was —31° in January, 1857. North Volney, mean temperature 22°.29, or 0°.48 below the average for the past fourteen years; warmest January during that period occurred in 1880, mean temperature 31°.82; coldest January occurred in 1881, mean temperature 15°.12; the lowest temperature recorded during the past fourteen years was —19°, January 23, 1871. *Ohio:* North Lewisburgh, mean temperature 29°.40, or 1°.03 above the mean for the past fifty-one years. *Vermont:* Woodstock, mean temperature 16°.4, or about 1° above the average for the past fifteen years; highest January mean during that period, 23°.8, occurred in 1880; lowest, 5°.8, occurred in 1875. *West Virginia:* Helvetia, mean temperature 35°.6, or 2°.29 above the average for the past six years; Wytheville, mean temperature 36°.4, or 0°.8 above the average for the past seventeen years.

Table of maximum and minimum temperatures for January, 1882.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	79	24			
Arizona	Tucson	80				
Do.	Prescott		—8			
Arkansas	Little Rock	70	24	Mount Ida	65	15
California	Campo	76	7	Fort Yuma	80	
Do.				Summit		1
Colorado	Denver	67	1			
Do.	Pike's Peak	26	—22			
Connecticut	New Haven	51	—12	Southington	53	—14
Dakota	Rapid City	56		Fort Randall	57	
Do.	Fort Stevenson		—32	Fort Pembina		—40
Delaware	Delaware Breakwater.	56	10			
District of Columbia	Washington	59	8			
Florida	Key West	82		Fort Brook Tampa	84	
Do.	Jacksonville and Pensacola.		32	Fort Barrancas		22
Georgia	Savannah	77		Thornville	77	24
Do.	Augusta		22			
Idaho	Lewiston	51				
Do.	Eagle Rock		—30			
Illinois	Cairo	64		Swanwick and Upper Alton.	67	
Do.	Chicago		1	Elmira and Morrison.		—7
Indiana	Indianapolis	61	7	Vevay	65	
Do.				La Fayette		1
Indian Territory	Fort Gibson	74				
Do.	Fort Supply		—6			
Iowa	Keokuk	60		Cresco		—17
Do.	Dubuque		—5			
Kansas	Dodge City	67	0	Fort Scott	70	
Do.				Fort Wallace		—15
Kentucky	Louisville	65	16	Bowling Green	65	18
Louisiana	New Orleans	77				
Do.	Shreveport		30			
Maine	Eastport	43	—14	Gardiner		—27
Do.	Portland					
Maryland	Baltimore	59	7	Federalsburgh	61	
Do.				Deer Park		—8
Massachusetts	Boston	53	—13	Heath	60	
Do.				South Lee		—24
Michigan	Detroit	56		Fort Brady		—34
Do.	Alpena		—27			
Minnesota	Duluth	47				
Do.	Saint Vincent		—42			
Mississippi	Vicksburgh		30	Fayette	75	28
Missouri	Saint Louis	55		Protem	72	
Do.	Springfield	58	6	Oregon		—4
Montana	Fort Custer			Fort Keogh	50	—37
Do.	Terry's Landing		—36			
Nebraska	North Platte		— 8			
Nevada	Pioche			Golconda	74	
Do.	Winnemucca		—4	Halleck		—34

Table of maximum and minimum temperatures for February, 1882.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	80	32	Auburn		28
Arizona	Tucson	74		Maricopa	92	
Do	Prescott		5			
Arkansas	Little Rock	77	28	Mount Ida	76	16
California	Los Angeles	77		Fort Yuma	78	
Do	Campo		17	Fort Bidwell		—12
Colorado	West Las Animas	68	4	Fort Lyon	69	
Do	Pike's Peak		—17	Fort Garland		—18
Connecticut	New London	55		Southington	52	5
Do	New Haven		7			
Dakota	Fort Sully	67		Fort Randall and Olivet.	70	
Do	Fort Stevenson		—35			
Delaware	Delaware Breakwater.	61	24			
District of Columbia	Washington	62	20			
Florida	Key West	85		Fort Barrancas		26
Do	Pensacola		37			
Georgia	Augusta	78	31	Quitman and Thomasville.	80	
Do	Savannah	78				
Do	Atlanta		31			
Idaho	Fort Lapwai	55				
Do	Eagle Rock		20			
Illinois	Springfield	72		Geneseo	76	
Do	Champaign			Elmira		2
Do	Chicago		11	Riley		2.5
Indiana	Indianapolis	65	15	Logansport	68	
Do				Wabash		12
Indian Territory	Fort Supply	75	12			
Iowa	Keokuk	69		Cedar Rapids	72	
Do	Des Moines		1	Cresco		—12
Kansas	Dodge City	69	7	Clay Centre and Fort Scott.	76	
Do	Leavenworth	69				
Do				Fort Wallace		— 5
Kentucky	Louisville	67	20	Bowling Green	68	20
Louisiana	New Orleans	79				
Do	Shreveport		33			
Maine	Eastport	44	— 5	Cornish and Orono	52	
Do				Dexter		— 8
Maryland	Baltimore	59	23	Federalsburgh	64	
Do				Deer Park		9
Massachusetts	Boston	60		Westborough		—10
Do	Springfield		3			
Michigan	Detroit	58		Niles	68	
Do	Alpena and Marquette.		2	Fort Brady		—11
Minnesota	Saint Paul	57		Fort Snelling	58	
Do	Saint Vincent		—35			
Mississippi	Vicksburgh	80	32	Fayette	78	28
Missouri	Saint Louis	73		Protem	75	
Do	Springfield		13	Sedalia		8
Montana	Fort Benton	62				
Do	Terry's Landing		—37			
Nebraska	North Platte	68	— 4	Genoa		— 7
Nevada	Pioche	52	6	Golconda	62	
Do	Winnemucca	51	—17	Halleck		—40
New Hampshire	Mount Washington	35	—21	Contoocookville	53	— 2
Do				Grafton		— 6
New Jersey	Sandy Hook	59		South Orange	62	
Do	Barnegat		18	Somerville		8
New Mexico	La Mesilla	72		Fort Union		0
Do	Santa Fé		11			
New York	New York City	62		Johnstown		—10.5
Do	Albany		7			
North Carolina	Wilmington	77		Lenoir		18
Do	Smithville		24			
Ohio	Cincinnati	64		Westerville		8
Do	Cleveland		17			
Oregon	Umatilla	56	4	Fort Klamath		—25
Pennsylvania	Pittsburgh	60		Dyberry		— 2
Do	Philadelphia		18			
Rhode Island	Newport	53	10	Fort Adams	53	8
South Carolina	Charleston	78	32	Columbia	78	28

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Table of maximum and minimum temperatures for March, 1882.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Stations.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	86	42	Auburn		33
Arizona	Yuma	95		Maricopa	101	
Do	Prescott		13			
Arkansas	Little Rock	83	39	Mount Ida	84	29
California	Los Angeles	88		Antioch	98	
Do	Campo		15	Summit		—4
Colorado	West Las Animas	77	6	Pagosa Springs	80	—8
Do	Pike's Peak	33	—24.5			
Connecticut	New Haven	59	13	Southington		11
Do	New London	59				
Dakota	Yankton	80		Fort Randall	85	
Do	Fort Stevenson		—23	Pembina		—24
Delaware	Delaware Breakwater.	62	28			
District of Columbia	Washington	71	23			
Florida	Jacksonville	88		Fort Barrancas		41
Do	Cedar Keys, Jacksonvile, and Pensacola.		47			
Georgia	Augusta	89				
Do	Atlanta		34			
Idaho	Fort Lapwai	80				
Do	Eagle Rock		—16			
Illinois	Cairo	73		Anna	78	
Do	Springfield			Geneseo and Morrison.		8
Do	Champaign		21			
Indiana	Indianapolis	71	24	Lacona	78	
Do				Spiceland		21
Indian Territory	Fort Supply	85	17			
Iowa	Des Moines	74	10	Logan	78	4
Do	Davenport		10			
Kansas	Dodge City	81	14	Manhattan and Wellington.		12
Kentucky	Louisville	75	31	Bowling Green	79	30
Louisiana	Shreveport	90	41			
Maine	Portland	54		Orono		2.7
Do	Eastport		10			
Maryland	Baltimore	69	26	Cumberland	72	
Do				Deer Park		13
Massachusetts	Boston	61	15	Somerset	63	
Do	Springfield		15	South Lee		3
Michigan	Port Huron	64		Fort Brady		—12
Do	Alpena		0			
Minnesota	Saint Paul	53		New Ulm	61	
Do	Saint Vincent		—25			
Mississippi	Vicksburgh	84	43	Fayette	86	41
Missouri	Saint Louis	79		Protem	86	
Do	Springfield		24	Corning		9
Montana	Forts Custer and Keogh.		76	Fort Shaw		—19
Do	Fort Shaw		—18			
Nebraska	Omaha	77	5	Lincoln	89	
Do				Genoa		2
Nevada	Winnemucca	72	3	Humboldt	82	
Do				Elko		—7
New Hampshire	Mt. Washington	37	—19.5	Auburn	58	10
New Jersey	Atlantic City	66		Freehold		16
Do	Sandy Hook and Barnegat.		20			
New Mexico	La Mesilla	87		Fort Union		—12
Do	Santa Fé		9			
New York	New York City	67		Johnstown		2
Do	Oswego		15			
North Carolina	Wilmington	82		Murphy		27
Do	Charlotte		30			
Ohio	Cincinnati	70				
Do	Cleveland		22	Jacksonburgh	72	
Do	Columbus, and Sandusky.			Ruggles and New Athens.		18
Oregon	Umatilla	17	26			
Pennsylvania	Pittsburgh	75		Dyberry		8
Do	Erie		21			
Rhode Island	Newport	57	18			
South Carolina	Charleston	85	40	Statesburgh	89	36
Tennessee	Knoxville	83	29			
Do	Chattanooga	88				

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61 to 79; Florida Peninsula, 69 to 72; East Gulf States, 66 to 78; West Gulf States, 57 to 83; Rio Grande Valley, 71 to 84; Ohio Valley and Tennessee, 60 to 71; Lower Lake region, 69 to 78; Upper Lake region, 73 to 80; Extreme Northwest, 69 to 90; Upper Mississippi Valley, 62 to 75; Missouri Valley, 60 to 72; Northern Slope, 54 to 69; Middle Slope, 40 to 56; Southern Slope, 41 to 74; Southern Plateau, 36 to 51; Middle Plateau, 50 to 65; Northern Plateau, 60 to 79; North Pacific Coast region, 74 to 78; Middle Pacific Coast region, 62 to 79; South Pacific Coast region, 37 to 72. High stations report the following percentages not corrected for altitude: Cheyenne, Wyo., 41.9; Pike's Peak, 81.0; Santa Fe, 37.3; Mount Washington, 84.6.

WINDS.

The prevailing winds during the month of March at Signal Service stations are shown on Chart II by arrows flying with the wind. On the New England and Middle Atlantic coasts and over Lakes Ontario, Huron, and Michigan the winds are northwesterly; in the South Atlantic States, southwesterly; in the Gulf States, Tennessee, Indian Territory, and northern Texas, southerly; in the Upper Mississippi and Lower Missouri Valleys, northwesterly; in the Plateau regions, variable, but mostly from south to west; in California, westerly to northwesterly; North Pacific Coast region, southerly.

Total movements of the air.—The following are the largest total movements at Signal Service stations: Mount Washington, 26,488 miles; Pike's Peak, 19,552; Delaware Breakwater, 14,345; New Shoreham, R. I., 13,887; Portsmouth, N. C., 13,686; Hatteras, N. C., 13,356; Kittyhawk, N. C., 12,840; Sandy Hook, 12,741; Champaign, Ill., 12,433; Sandusky, 12,314; Cape May, N. J., 11,807; Indianola, Tex., 11,616; Barnegat, N. J., 11,532; Huron, Dak., 11,300; Cape Henry, Va., 10,953; Milwaukee, 10,641; Macon, N. C., 10,447; Cheyenne, Wyo., 10,339; Moorhead, Minn., 10,215; Grand Haven, Mich., 10,182; Provincetown, Mass., 10,062; Dodge City, Kans., 10,031; Saint Vincent, Minn., 10,009; Omaha, 10,002; Rochester, 9,938; Fort Shaw, Mont., 9,857; Fort Elliott, Tex., 9,839; Eastport, 9,794; North Platte, 9,495; Boston, 9,425; Fort Myer, Va., 9,258; Davenport, 8,960; Erie and Saint Louis, 8,950; Alpena, Mich., 8,908; Bismarck, Dak., 8,887; Newport, R. I., 8,875; Buffalo, 8,811; Detroit, 8,800; Cleveland, 8,776; Fort Assinniboine, Mont., 8,768; Galveston, 8,668; Springfield, Mo., 8,618; Eagle Rock, Idaho, 8,609; Fort Benton, Mont., 8,429; Columbus, Ohio, 8,250; Port Eads, La., 8,248; Atlantic City, N. J., 8,190; New York city, 8,176; Springfield, Ill., 8,157; Louisville, 8,128; Smithville, N. C., 8,093; Oswego, 8,052; Toledo, 8,019; Fort Buford, Dak., 8,008; Umatilla, Oreg., 8,002. The smallest are: Roseburgh, Oreg., 2,279; Uvalde, Tex., 2,732; La Mesilla, N. Mex., 2,757; Phœnix, Ariz., 2,848.

High Winds.—On the summit of Mount Washington the maximum velocity, 118 miles, NW., occurred on the 24th. Velocities of 75 miles per hour or over occurred as follows: 114 miles, S., 1st; 91, NW., 4th; 100, SW., 9th; 108, NW., 20th; 90, NW., 21st; 118, NW., 24th; 75, NW., 25th; 93, SW., 27th; 92, SW., 28th; 90, NW., 31st. On all other dates during the month velocities reached or exceeded 50 miles per hour, with the exception of 5th, 12th, 15th, 16th, 17th, 22d. On the summit of Pike's Peak, Colo., the maximum velocity, 92 miles, N., occurred on 20th. Other high velocities occurred as follows: 60, NW., 1st; 60, SW., 3d; 58, SW., 4th; 58, SW., 10th; 56, SW., 11th; 58, SW., 16th; 60, SW., 17th; 50, SW., 19th; 78, N., 21st; 62, SW., 25th; 62, NW., 28th; 66, NW., 29th. Other stations reporting velocities of 50 miles per hour or over are as follows: Umatilla, Oreg., 52, W., 28th; Fort Assinniboine, Mont., 56, W., 28th; Fort Benton, Mont., 50, W., 1st; Fort Shaw, Mont., 51, SW., 27th, and 57, SW., 28th; Helena, Mont., 56, SW., 28th; Fort Custer, Mont., 64, W., 28th; Fort Keogh, Mont., 50, W., 28th; Cheyenne, Wyo., 52, NW., 28th; Fort Washakie, Wyo., 60, W., 28th; Huron, Dak., 50, NW., 5th, and 66, NW., 20th; Palestine, Tex., 60, S., 18th; Indianola, Tex., 53, N., 21st; Rochester, N. Y., 50, N., 21st; Columbus, Ohio, 54, W., 21st; Champaign, Ill., 50, SW., 9th; Delaware Breakwater, Del., 52, SE., 1st; Cape Henry, Va., 52, NW., 13th; Kittyhawk, N. C., 50, N., 24th.

Local storms.—Savannah, Ga., 28th, during the morning a tornado passed through the counties of Effingham, Washington, Bibb, and Randolph, of this State. Its track was about half a mile wide, and it passed from west to east. Several lives were lost; trees, fences, houses, and telegraph poles were blown down. Columbus, Ohio, 21st, severest storm experienced for years passed over city at 5 a. m. The wind continued to blow a gale all day; maximum velocity, 54 miles, W., was reached at 5.15 p. m. A large number of buildings in course of construction were damaged; outhouses, fences, signs, etc., were blown down. Cleveland, 9th, 8.35 p. m., during a severe storm Saint Mary's Catholic Church was unroofed; a store on Broadway had its front blown in and considerable other damage of minor nature was done in the city; 27th, severe storm; between 12.30 and 1 p. m. rain fell in torrents. A new frame building was blown over and crushed; another was moved two feet from its foundation; a frame store was also blown down; trees were uprooted, windows broken, and lumber piles were scattered. A high wall,

Table of maximum and minimum temperature for March, 1882—Continued.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Connecticut	New Haven	72	21	Southington	69	22
Dakota	Fort Bennett and Yankton.	86		Forts Hall and Sully	88	
Do	Fort Meade		8	Fort Pembina		—6
Delaware	Delaware Breakwater.					
District of Columbia	Washington	84	27			
Florida	Key West	88		Live Oak	90	50
Do	Pensacola		52	Waldo	90	
Georgia	Augusta and Savannah.	87		Way Cross	91	
Do	Atlanta		48	Calhoun		38
Idaho	Fort Lapwai	80				
Do	Cœur d'Alene		20			
Illinois	Springfield	83		Anna and Charleston.	86	
Do	Chicago		25	Riley		18
Indiana	Indianapolis	80	24	Vevay	86	
Do				Spiceland		23
Indian Territory	Fort Gibson	85	34			
Iowa	Des Moines	83		Cedar Rapids	91	
Do	Dubuque		25	Clinton and Cresco		20
Kansas	Dodge City	87	26	Clay Center	94	
Kentucky	Louisville	85	31	Bowling Green	84	31
Louisiana	Shreveport	98	47	Alexandria	94	
Do				Amiti City		42
Maine	Portland	62		Dexter	62	2
Do	Eastport		9			
Maryland	Baltimore	82	29	Emmittsburg	86	24
Do				Fallston, Owing's Mills, Sandy Springs, and Woodstock.		24
Massachusetts	Springfield	71		Somerset	77	
Do	Boston		19	Heath		14
Michigan	Detroit and Grand Haven.	71		Niles	79	
Do	Alpena		12	Fort Brady		11
Minnesota	Saint Paul	82				
Do	Saint Vincent		—8			
Mississippi	Vicksburgh	86	47	Hernando	92	37
Do				Bateville, Grenada, and Lake.		37
Missouri	Springfield	89		Protem	90	
Do	Saint Louis		29	Curryville		21
Montana	Fort Keogh	84				
Do	Fort Shaw and Deer Lodge.		14	Fort Ellis and Blackfeet Agency.		19
Nebraska	Omaha	84		Fremont	90	
Do	North Platte		25			
Nevada	Winnemucca	78	18	Humboldt	89	
Do	Pioche		18	Boca		2
New Hampshire	Mt. Washington	36	—13	Contoocookville	64	
Do				New Market		11
New Jersey	Barnegat and Little Egg Harbor.	74		Atco	81	
Do	Atlantic City		24	Somerville		21
New Mexico	La Mesilla	95		Fort Stanton		5
Do	Santa Fé		18			
New York	Rochester	73	19	Fort Hamilton	75	
Do	Buffalo		19	Plattsburgh Barracks.		11
North Carolina	Charlotte	83	36	Salisbury	86	20
Do				Lumberton	86	
Ohio	Cincinnati	82		Portsmouth	90	
Do	Cleveland and Toledo.		22	New Athens and Ruggles.		20
Oregon	Roseburgh	80		Fort Klamath		7
Do	Umatilla		30			
Pennsylvania	Pittsburgh	83		Dyberry		14
Do	Erie		21			
Rhode Island	Narragansett Pier	66	23			
South Carolina	Charleston	86	46	Saint Matthews	90	26
Tennessee	Memphis	88		Austin		30
Do	Knoxville		36			
Texas	Rio Grande City	107				
Do	Grierson Springs		20			

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17th, 9 groups, 175 spots; 2 very large groups south of center; 1 easily seen without telescope; 6 groups, 95 spots; 1 visible without glass; 24th, 3 groups, 35 spots; 1 large group has disappeared; 1 large spot west of center; 25th, 3 groups, 30 spots; 27th, 5 groups, 25 spots; 28th, 3 groups, 20 spots, all of which are small; 30th, 3 groups, 18 spots. Mr. David Trowbridge, at Waterburgh, N. Y., reports: 3d, 6 groups, 12 spots; faculæ in west; 7th, 7 groups, 12 spots; faculæ in east; 15th, 7 groups, 22 spots, several of which are large; 1 group in east easily seen without telescope; 1 large group in west; 16th, 7 groups, 25 spots; 1 group has disappeared and 1 appeared by rotation. There are visible 10 spots included in one penumbra in the large group which is still plainly visible without telescope; it occupies fully one-fifteenth of the solar diameter; 17th, 6 groups, 22 spots; 1 group has disappeared and another is very faint; the large group still seen with unassisted eye; 18th, 6 groups, 26 spots; 1 group has appeared and 1 has disappeared by rotation; 2 groups now visible without telescope; 22d, 4 groups, 7 spots; the 2 large groups near west margin are no longer visible without telescope, 1 of which was visible for 6 days without aid of glass; 23d, light groups, 12 spots; 24th, 4 groups, 7 spots; 1 large group has disappeared by rotation; 25th, 3 groups, 7 spots; faculæ near the large group and in the east; 26th, 2 groups, 4 spots; large group has disappeared by rotation; 29th, 1 group, 1 spot; faculæ; 30th, 1 group, 3 spots; faculæ in east. Mr. H. D. Gowey, at North Lewisburgh, Ohio, reports: Sun spots were observed one very clear day during the month; they were largest and most active from 15th to 21st; smallest and least numerous on 29th and 30th; the groups and spots were exceedingly large from 17th to 19th.

The following record of observations has been forwarded by Mr. A. G. Bender, Sacramento, Cal.: 4th 2 p. m., 4 groups, 15 spots; 2 new groups, 9 spots, appeared since the 31st ultimo; 4th and 5th, 4 groups, 15 spots; 11th, 2 p. m. 6 groups, 25 spots; 1 new group, 9 spots; 1 group, 1 spot reappeared by rotation; 12th, 4 p. m., 6 groups, 35 spots; 1 group, 5 spots, has disappeared by rotation and 1 group, 5 spots, has reappeared by rotation; 13th and 14th, 6 groups, 40 spots; 15th, 4 p. m., 7 groups, 45 spots; 1 new group, 1 spot; 16th, 4 p. m., 6 groups, 40 spots; 1 group, 1 spot has reappeared by rotation, and 1 group, 1 spot has disappeared; 17th, 3.30 p. m., 6 groups, 45 spots; 1 new group, 3 spots; 1 group 1 spot has disappeared by rotation; 18th, half-past three p. m., 6 groups, 40 spots; 20th, half-past three p. m., 5 groups, 40 spots, 1 group, 1 spot has disappeared by rotation; 21st, half-past three p. m., 6 groups; 1 new group, 1 spot; 22d, half-past three p. m., 6 groups, 40 spots; 23d, 4 groups, 35 spots; 1 group, 10 spots has disappeared by rotation; new spots have appeared in the old groups; 24th, half-past three p. m., 3 groups, 20 spots; 1 group, 10 spots has disappeared by rotation; 25th, half-past three p. m., 2 groups, 10 spots, some of which are faint; 1 group, 10 spots, has disappeared by rotation; 26th, 2 groups, 10 spots; 27th half-past three p. m., 1 group, 1 spot; 10 spots has disappeared by rotation; 28th, 2 groups, 3 spots, 1 new group, 2 spots; 29th, 1 group, 2 spots; 1 group, 1 spot has disappeared by rotation; 30th, 3.30 p. m., 1 new group, 6 spots; 1 group, 2 spots has disappeared by rotation. At all observations during the month, when 10 or more spots have been reported, the number given is estimated. At Winnemucca, Nev., 20th, 2 large spots were observed on the sun through an ordinary marine glass. They were also visible on 21st, Cincinnati, 17th. Professor Stowe, of the Cincinnati Observatory, reports that the largest number of sun spots ever observed here were seen this morning, numbering 360 in 7 distinct groups, 2 of which could be seen with the unassisted eye. They could also be seen without the aid of the telescope on the 19th.

The following report was made by Mr. Arthur Binns, second officer on the steamship City of Paris, of the Inman Line, and furnished through the courtesy of the New York Herald Weather Service: At noon of April 22d, in 49° 03′ N., 22° 00′ W., a black spot was observed on the sun's surface about 6′ from the southwest edge.

Meteors.—Rio Vista, Cal., 12th; Monticello, Iowa, 26th; Woodstock, Md., 16th; Protem, Mo., 6th; Somerville, N. J., 18th; Moorestown, N. J., 16th; North Volney, N. Y., 16th; North Lewisburgh, Ohio, 16th; Stateburgh, S. C., 10th, 20th; Cedar Keys, Fla., 14th; Yuma, Ariz., 5th, 28th. The following reports of a remarkable meteor were received too late to appear in the March Review:

Fort Assinniboine, Mont., March 8th, 8.30 p. m., an enormous meteoric stone fell southeast of station, lighting up the surrounding country as if caused by a vivid flash of lightning. Upon striking the earth a violent jar was felt resembling an earthquake shock, which was followed by a loud report like that of a cannon. The interval between the shock and report is variously estimated from four to eight minutes. At Fort Benton, Mont., about 10 p. m., a shock like that produced by an earthquake was felt. At Coal Banks, Mont., a bright glare was observed, followed a few minutes later by a loud report. A trembling of the earth was distinctly felt.

Migration of birds.—*Geese flying northward:* Somerset, Mass., 2d, 14th, 26th; Fall River, Mass., 8th; Newport, R. I., 30th; Clear Creek, Nebr., 17th, 20; Moorestown, N. J., 12th; Readington, N. J., 23d; Embarrass, Wis, 29th, 30th; Shreveport, La., 23d; Grand Haven, Mich., 19th; Port Huron, Mich., 29th; Fort Yates, Dak., 1st; Bismarck, Dak., 15th;

Table of maximum and minimum temperatures for May, 1882—Continued.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Colorado	West Las Animas	85		Fort Lyon	88	
Do	Denver		34	Fort Lewis		22
Do	Pike's Peak	35	4			
Connecticut	New Haven	76	31	Southington	85	
Dakota	Rapid City	89		Fort Randall	91	
Do	Yankton	88		Fort Yates		18
Do	Fort Buford		22			
Delaware	Del. Breakwater	76	42			
District of Columbia	Washington	86	37			
Florida	Key West	91		Fort Brook Tampa	95	
Do	Pensacola		52	Live Oak		46
Georgia	Savannah	91		Way Cross	98	
Do	Atlanta		45	Madison		31
Idaho	Lewiston	88				
Do	Eagle Rock		24			
Illinois	Cairo	83		Charleston	87	
Do	Champaign		33	Riley		27
Indiana	Indianapolis	80	37	Logansport	90	32
Indian Territory	*Fort Gibson	88	41			
Iowa	Des Moines	83		Guttenburgh and Nora Springs.		24
Do	Dubuque		31			
Kansas	Leavenworth	89		Clay Centre	95	
Do	Dodge City		39	Wellington		34
Kentucky	Louisville	85	44	Bowling Green	84	32
Louisiana	Shreveport	93	49	Cheneyville	108	
Do				Franklin		34
Maine	Portland	72		Fort Preble	77	
Do	Eastport		29	Gardiner		28
Maryland	Baltimore	83	38	Emmitsburg	87	
Do				Woodstock		29
Massachusetts	Boston	81	31	Westborough	83	
Do				Heath		26
Michigan	Grand Haven	76		Hastings	83	20
Do	Escanaba		20			
Minnesota	Saint Paul	77		Minneapolis	79	
Do	Saint Vincent		22			
Mississippi	Vicksburgh	90		Waynesborough	100	41
Do	Starkville		50	Lake		41
Missouri	Saint Louis	89		Jefferson Barracks		34
Do	Springfield		41			
Montana	Cartersville	91				
Do	Deer Lodge		21			
Nebraska	North Platte	87	33	De Soto	89	
Do					92	
Nevada	Winnemucca	86	23	Humboldt		
New Hampshire	Mount Washington	46	4	Contoocookville	80	
Do				Grafton and New Market.		30
New Jersey	Little Egg Harbor	88		Readington	88	
Do	Atlantic City and Cape May.		34	Atco		28
New Mexico	La Mesilla	95		Deming	97	
Do	Santa Fé		32	Fort Union		23
New York	Albany	79		Troy and West Point.	88	
Do	Rochester		29	Johnstown		24
North Carolina	Kittyhawk	87		Wadesboro	94	
Do	Smithville		43	Goldsboro		34
Ohio	Cincinnati	83		North Lewisburgh and New Athens.		30
Do	Cleveland		31			
Oregon	Umatilla	96	34			
Do	Roseburgh		34			
Pennsylvania	Pittsburgh	82		Fallington	83	
Do				Dyberry		20
Do	Erie and Williamsport.		32			
Rhode Island	Newport	75		Fort Adams	70	33
Do	Narragansett Pier		34			
South Carolina	Charleston	87	52	Allendale, Cheraw, Hardwell, and King's Tree.	94	
Do				Florence		32
Tennessee	Memphis	90		Milan and Withe	92	
Do	Knoxville		41	Erin		36

*Observations from 1st to 12th.

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ing settlement in the Indian Territory, on the night of the 8th, a most violent tornado occurred, almost destroying the entire place. Fifty-nine houses were totally demolished and twenty-seven damaged to a more or less extent. Twenty-one persons were killed and forty-two wounded. Settlements Nos. 5 and 7 of the Osage Mining Company were the ones visited, the latter receiving only the partial force of the storm. The fall of rain was very great and was accompanied by a large quantity of hailstones, which fell as far north as Fort Gibson. A washout occurred on the Missouri, Kansas and Texas Railroad near Armstrong, causing suspension of travel. At Paris, Tex., the storm was also severe, and great damage was done to property.

Vandalia, Ill., 5th: A heavy rain-storm accompanied by strong wind swept over this region at 6 p. m., causing considerable damage in this city and in the vicinity of the town of Crouch.

Warrenton, Mo., 9th: A tornado struck the Central Wesleyan College building about 12.15 a. m. completely wrecking it. There were seven persons sleeping in the building at the time who escaped unhurt. Parts of the roof were carried for a distance of half a mile, and some of the timbers were driven into the ground to a depth of from two to three feet. The damage is estimated from ten to fifteen thousand dollars. At Mound City, Atchison County, the damage done was very great. Large trees were twisted off and others uprooted.

Jerseyville, Ill., 9th: Severe storm passed over this county, striking this city about 1 a. m. The heavy walls of a business house were blown down, together with a brick smokestack and numerous chimneys. Several outbuildings in vicinity were blown down. Near Newbern 40 miles of fence was destroyed, and in that section the storm was accompanied by hail, which did much damage to wheat.

Bunker Hill, Ill., 9th: The storm of wind and rain of last night was most severe. Large numbers of shade and forest trees were uprooted.

Minneapolis, Minn., 9th: It is reported that a school-house, 5 miles southwest of Lakefield, was struck by a tornado yesterday. The building was lifted and scattered over the prairie. It was occupied by a teacher and eleven pupils, all of whom are more or less injured. The storm appeared in the form of a funnel-shaped cloud, which bounded along the prairie and passed into Herron Lake, sucking up water to a height of 100 feet.

Memphis, 10th: The severe storm which swept over this section yesterday afternoon did considerable damage. To the south and in the vicinity of Moor's Landing trees and fences were blown down.

Fort Benton, Mont., 12th: Severe storm during night, wind attaining a velocity, for a few minutes, of 70 miles per hour. No serious damage resulted.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for May, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 89.5 per cent. The percentages for the four elements are: Weather, 92.9; Direction of the Wind, 88.8; Temperature, 88.2; Barometer, 87.9 per cent. By geographical districts they are: For New England, 84.8; Middle Atlantic States, 87.8; South Atlantic States, 91.2; East Gulf States, 90.1; West Gulf States, 91.3; Lower Lake region, 90.6; Upper Lake region, 88.3; Tennessee and Ohio Valley, 90.7; Upper Mississippi Valley, 90.4; Lower Missouri Valley, 89.8; Northern Pacific Coast region, 77.1; Middle Pacific Coast region, 96.9; Southern Pacific Coast region, 87.5.

There were 69 omissions to predict (21 being due to the absence of reports from the Pacific coast) out of 3,813, or 1.8 per cent. Of the 3,744 predictions that have been made 53, or 1.42 per cent., are considered to have entirely failed; 85, or 2.27 per cent., were one-fourth verified; 292, or 7.80 per cent., were one-half verified; 521, or 13.92 per cent., were three-fourths verified; 2,793, or 74.59 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

Cautionary signals.—Ninety-one cautionary signals were displayed during the month of May, of which 73, or 80.2 per cent., were justified by winds of 25 miles per hour, at or within 100 miles of the station. Thirteen off-shore signals were displayed, of which 6, or 46.2 per cent., were fully justified; 10, or 76.9 per cent., were justified as to direction; and 6, or 46.2 per cent., were justified as to velocity. One hundred and four signals of all kinds were displayed, of which 79, or 76 per cent., were justified. The above does not include signals ordered at 69 display stations where the velocity is estimated only. Seventeen signals were reported late.

NAVIGATION.

Stage of water in rivers.—In the table on the right-hand of Chart III are given the highest and lowest stages of water observed at Signal Service stations during the month of May,

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Frosts.—Frosts occurred in the various States and Territories as follows: *California:* Campo, 5th, 21st, 23d; San Gorgonio, 13th, 14th, 21st; *Colorado:* On summit of Pike's Peak, 2d, 3d, 8th, 9th, 10th, 11th, 14th; *Dakota:* Fort Bennett, 4th; Alexandria, 3d, 5th; *Illinois:* Chicago, 1st; Riley, 1st, 5th; *Iowa:* Cresco and Monticello, 5th; Muscatine, 1st, 5th; Nora Springs, 19th; Dubuque, 1st; *Kentucky:* Bowling Green, 4th; *Michigan:* Lansing, 5th; Detroit, 6th; Marquette, 10th, 11th, 20th; *Minnesota:* Moorhead, 4th; *Montana:* Fort Ellis, 20th; *Nebraska:* North Platte, 3d, 4th, 5th; *Nevada:* Carson City, 7th, 21st, 22d; *New Hampshire:* Mount Washington, 1st, 2d, 3d, 5th, 6th, 20th, 29th; *New York:* Friendship and Palermo, 2d, 12th; *New Mexico:* Santa Fé, 13th; *Ohio:* North Lewisburg, 2d; Westerville, 20th; *Pennsylvania:* Meadville, 6th; Dyberry, 12th, 22d; *Rhode Island:* Newport, 2d; *Utah:* Coalville, 22d; *Vermont:* Burlington, 2d, 12th; Woodstock, 12th, 30th; *Wisconsin:* Milwaukee, 1st, slightly damaging tender plants; La Crosse, 5th; Embarras, 1st, 11th; *Wyoming:* Fort Washakie, 22d.

Table of maximum and minimum temperatures for June, 1882.

State or Territory.	Signal Service.			United States Army post surgeons or voluntary observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Mobile	100		State line	105	
Do	Montgomery		61	Calera		43
Arizona	Tucson	108		Texas Hill	111	
Do	San Carlos	105				
Do	Fort Apache and Prescott.		36			
Arkansas	Fort Smith	101	50	Madison	103	35
Do	Little Rock	98	55	Arkansas City, Prescott, and Walnut Ridge.	103	
California	Red Bluff	102		Borden		
Do	Campo		31	Mammoth Tank	112	
Colorado	West Las Animas	100	46	Fort Lyon	100	
Do	Pike's Peak	47	2	Fort Garland		30
Connecticut	New Haven	91	46	Southington	95	52
Dakota	Fort Sully	95		Morriston	98	
Do	Fort Stevenson		33			
Delaware	Del. Breakwater	88	50			
District of Columbia	Washington	95	51			
Florida	Jacksonville	96	65	Live Oak	100	
Do				Fernandina and Waldo.		62
Georgia	Augusta			Smithville	114†	
Do	Savannah	97		Way Cross	103	
Do	Atlanta		56	Madison		43
Idaho	Lewiston	96				
Do	Eagle Rock		34			
Illinois	Springfield	93		Charleston and Peoria.	97	
Do	Chicago		42	Riley		39
Indiana	Indianapolis	94	45	Laconia	98	
Do				La Fayette		42
Indian Territory	Fort Supply	103	38			
Iowa	Des Moines			Ames	98	
Do	Keokuk	92		Clinton		33
Do	Dubuque		41			
Kansas	Dodge City	100	43	Manhattan & Yates Center.		40
Kentucky	Louisville	95	50	Bowling Green	97	52
Louisiana	Shreveport	101	59	Vermillionville	107	
Do				Franklin		38
Maine	Portland	93				
Do	Eastport		42			
Maryland	Baltimore	97	53	Emmitsburgh		45
Massachusetts	Boston	94		Somerset	96	
Do	Provincetown		46	Heath		40
Michigan	Port Huron	88		Niles	91	
Do	Escanaba		37			
Minnesota	Saint Paul	88				
Do	Moorhead		35			
Mississippi	Vicksburgh	99	57	Hernando	106	
Do				Okolona		44
Missouri	Springfield	98	46	Sedalia	98	42
Do				Oregon		287
Montana	Fort Keogh	96				
Do	Deer Lodge and Missoula.		32			

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TEMPERATURE OF WATER FOR JULY, 18[illegible].

STATIONS.	Temperature at bottom. Max.	Min.	Average depth of water in inches.
Atlantic City	86.0	[illegible]	[illegible]
Alpena	74.0	[illegible]	17
Augusta	99.0	65.0	[illegible]
Baltimore	81.5	79.0	1
Boston	67.2	56.0	25
Buffalo	74.2	67.2	10
Burlington, Vt.	73.5	62.5	[illegible]
Cedar Keys	89.0	82.0	[illegible]
Charleston	88.0	83.0	95.0
Chicago	73.8	63.0	[illegible]
Chincoteague	97.0	70.0	1.40
Cleveland	80.0	72.0	14
Detroit	75.0	68.0	24
Duluth	74.0	49.0	14.4
Del. Breakwater	75.0	68.0	9.0
Eastport	47.0	44.5	79.3
*Escanaba	71.0	56.0	15.0
Galveston	88.0	78.0	14.1
Grand Haven	81.0	59.0	19.0
Indianola	88.0	83.8	8.8
Jacksonville	86.0	84.0	16.0
Key West	89.8	86.0	16.5
Marquette	63.0	56.0	9.0
Milwaukee	74.5	66.0	8.0
Mobile	86.6	86.7	16.9
New Haven	73.6	63.7	13.1
New London	68.0	56.0	13.0
Newport	63.8	56.8	11.3
New York	73.5	64.0	22.5
New Shoreham	67.4	61.1	9.4
Norfolk	86.0	80.0	22.0
Pensacola	86.3	82.0	16.8
Portland, Maine	62.0	56.5	26
Portland, Or.	71.7	64.8	37.7
Port Eads	88.2	81.8	8.8
Punta Rassa	91.5	83.5	11.7
Sandusky	83.0	69.3	10
Sandy Hook	75.8	67.5	6
San Francisco	62.6	57.0	30
Savannah	87.0	82.0	11.9
Smithville	85.0	79.5	10
Thatcher's Island	63.7	57.0	7
Toledo	87.0	76.0	11.5
Wilmington	87.0	82.5	19
Woods' Holl	70.5	65.0	6

* Observations for only part of month—See text.

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No. II.

INT WEATHER MAP.
SHCK, U.S. ARMY.
THE BENEFIT OF COMMERCE AND AGRICULTURE.
EVAILING WINDS FOR JULY, 1881.
29.95
29.9
29.85
68°
29.85
55°
29.82
64°
29.85
29.85
60°
65°
62°
29.87
29.9
65°
70°
29.95
75°
30.0
80°
83°
30.02
Punta Rassa
83°
30.07
Key Wes
86°
30.04
Havana
Cape May
Norfolk
Kittyhawk
Cape Hatteras
Charleston
Savannah
Jacksonville
Lake City
New Orleans
Boston
Rochester
Toronto
Chicago
Cairo
Memphis
Vicksburg
Mobile
Atlanta
Indianapolis
Pittsburgh
Philadelphia
Washington
Lynchburg
Knoxville
Nashville
Louisville
Dubuque
Davenport
Omaha
Leavenworth
Topeka
Dodge
Yankton
Bismarck
Fort Assiniboine
Fort Custer
Fort Keogh
Fort Maginnis
Fort Shaw
Fort Benton
Fort Cross
Fort Stevenson
Fort Buford
Fort Pembina
Fort Totten
Fort Sully
Fort Randall
Fort Niobrara
Fort Sidney
Fort Hays
Fort Dodge
Fort Riley
Fort Leavenworth
Fort Sill
Fort Gibson
Fort Smith
Fort Clark
Fort Brown
Fort Ringgold
Fort Duncan
Fort Bliss
Fort Stanton
Fort Wingate
Fort Lowell
Fort Grant
Fort Yuma
Fort Mohave
Fort Bidwell
Fort Klamath
Fort Boise
Fort Hall
Fort Douglas
Fort Fetterman
Fort Laramie
Fort Sanders
Fort Bridger
Fort Ell

AVERAGE PRECIPITATION FOR JULY.

DISTRICTS.	Average for July. For many years.	Average for July. For 1881.	Comparison of July, 1881, with the average for many years.
	Inches.	Inches.	Inches.
New England	4.79	2.71	1.57 deficiency.
Middle Atlantic States	4.40	2.15	2.25 deficiency.
South Atlantic States	5.59	6.36	0.77 excess.
Florida Peninsula	5.44	7.26	1.82 excess.
Eastern Gulf States	5.19	3.03	2.16 deficiency.
Western Gulf States	4.21	3.53	0.68 deficiency.
Tennessee	4.33	1.93	2.40 deficiency.
Ohio Valley	5.27	2.69	2.58 deficiency.
Lower Lake Region	3.74	2.10	1.64 deficiency.
Upper Lake Region	3.52	3.64	0.12 excess.
Upper Mississippi Valley	4.58	4.69	0.11 excess.
Minnesota	3.45	1.72	1.73 deficiency.
Lower Missouri Valley	5.13	3.24	1.89 deficiency.
Upper Missouri Valley	2.71	2.20	0.51 deficiency.
North Pacific Coast Region	0.75	0.98	0.23 excess.
Middle Pacific Coast Region	0.01	Trace	Normal.
South Pacific Coast Region	0.05	0.05	Normal.

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