

southwestward off the coast to east-central South Carolina, thence to Savannah, Ga., thence over extreme southern Alabama, Mississippi, Louisiana, and eastern Texas to Corpus Christi, Tex., and thence to the Rio Grande Valley above Rio Grande City, Tex. The western limit of freezing weather is shown by a line traced from the California coast in about latitude north 38° southwestward, inside of the coast line, to extreme south-central California. Compared with the limits of freezing weather for December, 1889, the line showing the southern limit for the current month was about two degrees farther south on the immediate Atlantic coast; about the same from the Atlantic coast to Louisiana; and two to three degrees farther south in Louisiana and eastern Texas. On the Pacific coast the line of freezing weather was about four degrees farther south on the California coast and about three degrees farther west along the southern border of the country.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges of temperature occurred from eastern and central Montana southeastward over the western part of the Dakotas, and at Denver, Colo., where they equalled or exceeded 80°, whence they decreased eastward to the eastern part of the upper lake region, where they were less than 50°, and thence increased eastward to northern New England, where they were more than 70°. From the upper Missouri valley the monthly ranges decreased southeastward to less than 20° in southern Florida, southward to less than 40° on the west Gulf coast, southwestward to less than 60° in southern Arizona, and to less than 40° in southern California, and westward to less than 30° along the middle and north Pacific coasts. In northwestern Nevada the monthly ranges exceeded 70°.

The following are some of the extreme monthly ranges :

Greatest.		Least.	
Fort Maginnis, Mont.....	87.0	Key West, Fla.....	15.0
Valentine, Nebr.....	83.0	San Francisco, Cal.....	23.0
Denver, Colo.....	80.0	Fort Canby, Wash.....	27.0
Carson City, Nev.....	72.0	San Diego, Cal.....	31.0
Northfield, Vt.....	71.0	Galveston, Tex.....	39.0

FROST.

An unusually heavy frost was reported at Keeler, Cal., on the 6th; on the 17th potato vines, strawberry blossoms, and sprouts on fig trees were reported killed at Hammond, La.; and on the 16th and 17th cane sprouts were reported nipped

by frost at Grand Coteau, La. No frost was reported in Florida, save in the extreme north-central part on the 17th. Frost was reported along the Gulf coast from Mobile, Ala., to Corpus Christi, Tex.; along the southern border of the country from Texas to the Pacific coast, and generally over California. Compared with December, 1889, the southern limit of frost along the Atlantic coast for the current month was about 3° farther north; along the middle Gulf coast the southern limit was about the same; on the west Gulf coast frost occurred 2° to 3° farther south in December; from Texas westward frost was reported to the extreme southern boundary of the country and along the California coast for each month. In the south Atlantic and Gulf states frost was reported most frequently in Mississippi, where it was noted for thirteen dates; in Texas for eleven dates; in Georgia and Louisiana for eleven dates; in Alabama for nine dates; in South Carolina for eight dates; and in Florida for one date. On the Pacific coast frost was reported in California for twenty-five dates; in Oregon for twenty-two dates; and in Washington for two dates. Frost was reported in seven of the south Atlantic and Gulf states on the 17th; in six on the 14th; in five on the 16th and 22d; in four on the 13th, 21st, and 23d to 25th; in three on the 18th; in two on the 9th and 31st; and in one on the 1st, 8th, 10th to 12th, 19th, 20th, and 28th to 30th. On the 2d to 7th, 26th, and 27th no frost was reported in the south Atlantic or Gulf states. In California frost was reported on the 1st, 2d, 4th to 16th, 19th to 23d, 26th to 29th, and 31st; in Oregon on the 1st to 14th, and 16th to 23d; and in Washington on the 4th and 11th.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for January, 1890:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass.....	41.8	33.5	8.3	39.1	32.4
Canby, Fort, Wash.....	46.0	39.5	6.5	41.0	36.0
Cedar Keys, Fla.....	75.0	62.9	12.1	70.7	66.0
Charleston, S. C.....	61.8	55.8	6.0	59.3	59.3
Eastport, Me.....	41.0	36.5	4.5	39.5	20.6
Galveston, Tex.....	70.8	51.1	19.7	64.9	64.0
Key West, Fla.....	75.5	71.9	3.6	74.0	73.4
Nantucket, Mass.....	43.0	37.0	6.0	39.8	34.6
New York City.....	43.0	36.4	6.6	40.0	40.2
Portland, Oregon.....	40.1	32.5	7.6	36.4	31.8

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for January, 1890, as determined from the reports of nearly 1,800 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest monthly precipitation reported for January, 1890, was 33.40, at Upper Mattole, Humboldt Co., Cal., and the precipitation amounted to 20.00 in eastern California between the thirty-eighth and fortieth parallels and on the west-central coast of California. Within an area extending from southwestern Washington over western Oregon and northwestern California, and in areas in east-central Arkansas, south-central Indiana, south-central Illinois, southeastern Missouri, west-central Tennessee, and east-central Texas, the

monthly precipitation exceeded 10.00. In areas in southwestern Arizona, south-central Colorado, north-central New Mexico, northeastern South Dakota, and at stations near the southern coast of Great Salt Lake, Utah, no precipitation was reported; and less than 0.50 fell in areas in southeastern California, central Florida, south-central Georgia, west-central Idaho, western Kansas, southeastern Louisiana, western Maryland, northern Minnesota, northeastern and eastern Montana, western Nebraska, northern, eastern, and western North Dakota, western Texas, southern and eastern West Virginia, and eastern Wyoming. In the Atlantic coast states the heaviest monthly precipitation occurred in central New York, where it exceeded 7.00; in the central valleys, in east-central Illinois, where it exceeded 14.00; on the eastern slope of the Rocky Mountains, in northwestern Wyoming, where it exceeded 6.00; in the plateau region, in east-central Nevada, where it exceeded 9.00; and on the Pacific coast, on the California coast north of the fortieth parallel, where it exceeded 30.00, and in eastern California between the thirty-eighth and fortieth parallels, and on the west-central California coast, where it exceeded 20.00.

The precipitation for January, 1890, was below the normal in the Atlantic and east Gulf states, and from the upper lake region westward to eastern Oregon and Washington; it was also below the normal from the upper Missouri valley, southward over eastern Colorado and central New Mexico. Elsewhere the precipitation was generally in excess of the average amount for January. The greatest deficiencies were noted on the North Carolina coast, where they exceeded 5.00, and on the middle coast of the Gulf of Mexico, where they exceeded 4.00. The greatest excesses in precipitation were reported in the middle Mississippi and middle and lower Ohio valleys, where they were more than 5.00, and where in central Indiana they exceeded 7.00, and on the Pacific coast south of the Columbia River, where they were more than 4.00, and where at Los Angeles, Cal., they exceeded 5.00. The very unequal distribution of precipitation for the month is shown by the fact that at stations in New York, Arkansas, Tennessee, Indiana, Ohio, Michigan, Minnesota, Illinois, Missouri, Indian Territory, Colorado, Utah, Washington, and southern California, the monthly precipitation was the greatest, while at stations in Pennsylvania, Virginia, North Carolina, Georgia, Florida, Alabama, Louisiana, and North Dakota it was the least ever reported for January. The greatest precipitation previously noted for January was generally reported in Florida in 1889; on the middle Pacific coast in 1878; and on the south Pacific coast in 1886. The least precipitation previously reported for January was generally noted in Florida in 1888; in the east Gulf states in 1880; on the southeastern slope of the Rocky Mountains, in the southern plateau region, and on the south Pacific coast in 1887; and on the north and middle Pacific coasts in 1889. Elsewhere the periods of occurrence were irregular.

For January, 1890, the average percentages of the precipitation in districts where the precipitation was in excess of the average for the month were about as follows: west Gulf states, 141 per cent.; Ohio Valley and Tennessee, 150 per cent.; lower lake region, 148 per cent.; upper lake region, 143 per cent.; extreme northwest, 109 per cent.; upper Mississippi valley, 187 per cent.; Missouri Valley, 122 per cent.; middle-eastern slope of the Rocky Mountains, 243 per cent.; southeastern slope of the Rocky Mountains, 136 per cent.; southern plateau region, 170 per cent.; middle plateau region, 228 per cent.; north Pacific coast, 120 per cent.; middle Pacific coast, 165 per cent.; south Pacific coast, 226 per cent. In districts where the precipitation was below the average for the month the percentages of the normal were about as follows: New England, 66 per cent.; middle Atlantic states, 46 per cent.; south Atlantic states, 22 per cent.; Florida Peninsula, 18 per cent.; east Gulf states, 38 per cent.; Rio Grande Valley, 75 per cent.; northeastern slope of the Rocky Mountains, 43 per cent.; northern plateau region, 85 per cent. The statement of percentages of precipitation by districts shows that the greatest excess above the normal amount for January occurred on the middle-eastern slope of the Rocky Mountains, where the unusually heavy rainfalls at stations in Indian Territory made the precipitation for the current month nearly two and one-half times greater than the January average for that district, and on the south Pacific coast, where the rainfall was more than double the usual amount for January. The greatest deficiencies are shown in the Florida Peninsula, where but 18 per cent. of the normal fell, and the precipitation was less than one-half the usual amount for January in the middle and south Atlantic states, the east Gulf states, and on the northeastern slope of the Rocky Mountains.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for January for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for January, 1890; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for

January during the period of observation and the years of occurrence:

State and station.	County.	Average for the month of Jan.	Length of record.	Total for Jan., 1890.	Departure from average.	(5) Extreme monthly precipitation for January.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Arkansas.</i> Lead Hill	Boone	2.58	8	7.37	+4.79	7.37	1889	1.33	1887
<i>California.</i> Sacramento	Sacramento	3.77	36	7.44	+3.67	15.04	1862	0.19	1889
<i>Colorado.</i> Fort Lyon	Bent	0.18	15	.....	.....	0.68	1886	T.	1876
<i>Connecticut.</i> Middletown	Middlesex	4.29	28	2.84	-1.45	7.18	1859	1.45	1876
<i>Florida.</i> Merritt's Island	Brevard	4.02	12	0.56	-3.46	10.45	1878	0.56	1890
<i>Georgia.</i> Forsyth	Monroe	5.25	16	2.87	-2.38	10.08	1883	2.22	1880
<i>Illinois.</i> Peoria	Peoria	1.70	32	2.80	+1.10	4.27	1862	0.20	1872
<i>Indiana.</i> Riley	McHenry	1.95	39	2.65	+0.70	5.96	1876	0.45	.....
<i>Logansport</i>	Cass	1.95	15	5.69	+3.74	5.69	1890	0.23	1881
<i>Iowa.</i> Vevay	Switzerland	3.99	23	7.37	+3.38	9.03	1876	0.75	1874
<i>Kansas.</i> Creco	Howard	1.32	18	1.90	+0.58	3.72	1886	0.38	72-'84
<i>Monticello</i>	Jones	1.65	35	1.90	+0.25	3.77	1886	0.29	1865
<i>Logan</i>	Harrison	1.28	21	1.09	-0.19	3.10	1881	0.10	1872
<i>Louisiana.</i> Lawrence	Douglas	1.23	25	2.50	+1.27	3.05	1878	0.12	1875
<i>Wellington</i>	Sumner	0.73	11	.....	.....	1.53	1886	0.18	1881
<i>Maine.</i> Grand Coteau	St. Landry	6.92	7	2.55	-4.37	13.30	1883	2.52	1887
<i>Maryland.</i> Gardiner	Kennebec	3.75	48	3.18	-0.57	7.32	1887	0.92	1849
<i>Massachusetts.</i> Cumberland	Allegany	2.16	18	1.46	-0.70	3.90	1878	0.30	1887
<i>Amherst</i>	Hampshire	3.34	54	3.34	0.00	5.87	1870	0.99	1849
<i>Newburyport</i>	Essex	3.69	11	2.85	-0.84	7.76	1886	1.60	1875
<i>Bristol</i>	Bristol	4.44	17	2.24	-2.20	7.60	1878	1.57	1879
<i>Michigan.</i> Kalamazoo	Kalamazoo	2.48	14	3.45	+0.97	4.90	1876	1.10	1879
<i>Thornville</i>	Lapeer	1.97	13	3.38	+1.41	3.38	1890	0.58	1879
<i>Minnesota.</i> Minneapolis	Hennepin	1.21	24	1.04	-0.17	3.01	1886	0.06	1869
<i>Montana.</i> Fort Shaw	Lewis & Clarke	0.62	19	0.30	-0.32	2.50	1881	0.00	1869
<i>New Hampshire.</i> Hanover	Grafton	2.91	45	2.48	-0.43	9.75	1851	0.31	1853
<i>New Jersey.</i> Moorestown	Burlington	3.51	26	1.79	-1.72	5.82	1882	1.13	1867
<i>South Orange</i>	Essex	4.13	18	2.91	-1.22	7.15	1889	1.17	1876
<i>New York.</i> Cooperstown	Otsego	2.43	36	4.39	+1.96	4.39	1890	0.32	1860
<i>Palermo</i>	Oswego	3.15	36	4.11	+0.96	6.50	1874	0.16	1884
<i>North Carolina.</i> Lenoir	Caldwell	4.45	18	1.10	-1.35	9.60	1878	1.10	1890
<i>Ohio.</i> N. Lewisburgh	Champaign	3.70	18	5.20	+1.50	8.67	1876	0.44	1877
<i>Wauseon</i>	Fulton	2.22	16	4.14	+1.92	4.14	1890	1.29	1879
<i>Oregon.</i> Albany	Linn	8.66	13	110.65	+1.99	14.45	1867	2.22	1882
<i>Eola</i>	Polk	6.04	20	7.63	+1.59	16.68	1888	2.53	1875
<i>Pennsylvania.</i> Dyberry	Wayne	3.22	20	2.74	-0.48	4.75	1878	0.70	1872
<i>Grampian Hills</i>	Clearfield	3.73	19	4.41	+0.68	5.47	1888	1.21	1872
<i>Wellsborough</i>	Tioga	6.88	10	1.98	-4.90	12.17	1886	1.98	1890
<i>South Carolina.</i> Statesburgh	Sumter	3.87	8	10.90	+2.97	6.04	1885	0.90	1890
<i>Tennessee.</i> Austin	Wilson	5.40	21	8.65	+3.25	18.11	1882	2.66	1886
<i>Milan</i>	Gibson	5.63	6	9.11	+3.48	9.11	1890	4.45	1884
<i>Texas.</i> New Elm	Austin	4.31	16	4.21	-0.10	10.56	1882	1.00	1887
<i>Vermont.</i> Strafford	Orange	3.49	16	3.70	+0.21	5.50	1887	1.70	1878
<i>Virginia.</i> Birdsneat	Northampton	3.78	21	1.02	-2.76	6.75	1882	1.00	1876
<i>Wisconsin.</i> Madison	Dane	1.94	24	1.81	-0.13	3.65	1874	0.40	1878
<i>Washington.</i> Fort Townsend	Jefferson	2.06	19	4.65	+2.59	4.65	1890	0.66	1859

*1865, 1867, 1872.

†Received too late for discussion.

The above table shows that at Logansport, Ind., fifteen years record, Thornville, Mich., thirteen years record, Cooperstown, N. Y., thirty-six years record, Wauseon, Ohio, sixteen years record, Milan, Tenn., six years record, and Fort Townsend, Wash., nineteen years record, the precipitation for the current month was the greatest, while at Merritt's Island, Fla., twelve years record, Lenoir, N. C., eighteen years record, and Wellsborough, Pa., ten years record, it was the least reported for January.

EXCESSIVE PRECIPITATION.

The table of excessive precipitation shows that precipitation

to exceed 30.00 fell at one station in California; to exceed 20.00 at two stations in California; to exceed 10.00 at thirteen stations in California; five stations in Illinois; three stations in Indiana and Oregon, respectively; two stations in Washington; and at one station in Arkansas, Missouri, Tennessee, and Texas. The greatest monthly precipitation, 33.40, was reported at Upper Mattole, Humboldt Co., Cal.

In January of preceding years precipitation to equal or exceed ten inches has been reported most frequently in Oregon, where it was noted for twenty-seven years; in California for twenty-three years; in Washington for twenty years; in Alabama for thirteen years; in Florida, Georgia, Louisiana, Mississippi, New York, North Carolina, Tennessee, and Virginia, for from five to ten years, inclusive; and in Arizona, Arkansas, Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Nevada, New Hampshire, New Jersey, Ohio, Pennsylvania, and Texas, for from one to four years, inclusive. In states and territories other than those named, precipitation to equal or exceed ten inches has not been reported for January of preceding years. Among the heavier rainfalls reported for January of preceding years are: 24.36 at San Francisco, Cal., in 1862; 26.50 at Fort Gaston, Cal., in 1866; 22.30 at Fort Gaston, Cal., in 1867; 26.23 at Camp Lincoln, Cal., in 1867; 22.69 at Redding, Cal., in 1878; 25.69 at Emigrant Gap, Cal., in 1881; 41.63 at Upper Mattole, Cal., in 1888; 27.00 at Astoria, Oregon, in 1851; 21.52 at Astoria, Oregon, in 1855; 22.16 at Astoria, Oregon, in 1871; 24.50 at Neah Bay, Wash., in 1864; 21.70 at Neah Bay, Wash., in 1866; 20.50 at Tatoosh Lighthouse, Wash., in 1871; 30.50 at Neah Bay, Wash., in 1874; 22.30 at Neah Bay, Wash., in 1887. Exclusive of the instances and years cited, precipitation to equal or exceed fifteen inches has been reported for twelve years in California; for eight years in Oregon; for seven years in Washington; for two years in Georgia, Louisiana, and Massachusetts; and for one year in Arizona, Illinois, and Indiana.

Precipitation to equal or exceed 2.50 in twenty-four hours was reported at seventeen stations in California, at fourteen stations in Tennessee, at thirteen stations in Indiana, at eight stations in Missouri, at four stations in Louisiana, at seven stations in Illinois and Texas, at five stations in Arkansas, at three stations in Mississippi, at two stations in Kentucky and Oregon, and at one station each in Indian Territory, North Carolina, and Ohio. Among the heavier rainfalls reported for this period were: 6.45, at Huntsville, Tex., on the 2d; 5.96, at Upper Mattole, Cal., on the 29th; 5.20, at Fullerton, Ark., on the 1st; 4.41, at Indianapolis, Ind., on the 1st; 4.36, at Atwood, Ill., on the 12th; 4.26, at Los Gatos, Cal., on the 25th; 3.97, at Ironton, Mo., on the 1st; 3.00, at Austin and Watkins, Tenn., on the 15th.

In January of preceding years precipitation to equal, or exceed, 2.50 inches in twenty-four hours has been reported most frequently in Georgia, Louisiana, and Tennessee, where it has been noted for eleven years; in Alabama, California, Florida, Massachusetts, Mississippi, New York, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia, and Washington, for from five to ten years, inclusive; and in Arizona, Arkansas, Connecticut, Delaware, Illinois, Indiana, Indian Territory, Iowa, Kentucky, Maine, Maryland, Michigan, Missouri, New Hampshire, New Jersey, South Carolina, and Wisconsin, for from one to four years, inclusive. In states and territories other than those named, precipitation to equal, or exceed, 2.50 inches in twenty-four hours has not been reported for January of preceding years. Among the heavier January rainfalls for this period in preceding years are: 6.38, at Jupiter, Fla., 11-12th, 1889; 6.03, at Hephzibah, Ga., 19-20th, 1889; 5.71, at Shreveport, La., 13th, 1885; 5.35, at Monroe, La., 2d, 1886; 8.40, at Point Pleasant, La., 1st-2d, 1886; 7.00, at Emory Grove, Md., 30th, 1879; 6.00, at Fayette, Minn., 6th, 1883; 6.32, at Lynchburgh, Va., 23d, 1885. At Upper Mattole, Cal., 31.68 fell from January 27 to 31, 1888.

The only report of precipitation to equal, or exceed, 1.00 inch in one hour was 4.36, in one hour, at Atwood, Ill., 1st.

In January of preceding years precipitation to equal, or exceed, one inch in one hour has been reported for two years in Illinois, and for one year each in Florida, Georgia, Texas, and California. In states and territories other than those named precipitation to equal, or exceed, one inch in one hour has not been reported for January of preceding years. Among the heavier rainfalls noted for this period in January of preceding years are: 1.60, in one hour, at Cairo, Ill., 17th, 1876; 1.03, in twenty-eight minutes, at Titusville, Fla., 4th, 1889.

Table of excessive precipitation, January, 1890.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2-50 inches, or more, in 24 hours		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Arkansas.</i>						
Forrest City.....	Inches.	Inches.		Inches	h. m.	
Fulton.....		2.50	2			
Helena (1).....	10.13	5.20	1			
Do.....		3.16	2			
Little Rock.....		2.90	15			
Newport.....		2.73	1-2			
<i>California.</i>						
Alcatraz Island.....	10.66					
Anderson.....	10.56	2.51	24			
Berkeley.....	11.16	3.63	25			
Colegrove.....		3.72	25			
Eureka.....	18.26	3.72	11-12			
Ferndale.....	22.17	2.96	24			
Fort Gaston.....	18.29					
Georgetown.....	19.90	2.60	25			
Grass Valley.....	18.01	2.88	25			
Hydesville.....	17.31					
Iowa Hill.....	20.87	2.82	17			
Do.....		3.20	25			
Jolon.....		4.10	24-25			
Julian.....		2.56	25-26			
Los Angeles.....		4.17	25-26			
Los Gatos (2).....	16.45	3.20	24			
Do.....		4.26	25			
Mendocino.....	12.41					
Oakland (1).....	10.22					
Pasadena.....		2.70	25-26			
Presidio of San Francisco.....	11.06					
Upper Mattole.....	33.40	2.96	13			
Do.....		3.98	16			
Do.....		5.96	29			
Vacaville (1).....	12.37	2.54	24			
<i>Illinois.</i>						
Atwood.....	14.62	4.36	12	4-36	1 00	12
Centralia.....	10.38					
Flora.....	10.06					
Greenville.....		3.03	•			
Jordan's Grove.....		2.62	1			
Louisville.....		3.00	•			
Mascoutah.....	10.00	3.10	•			
Pana.....	11.65	5.25	•			
Do.....		2.75	6-7			
White Hall.....		2.99	12			
<i>Indiana.</i>						
Connersville.....		2.50	6-7			
Farmland.....		3.00	1			
Franklin.....		2.80	1			
Huntingburgh.....	11.90	2.50	6			
Indianapolis.....	10.20	4.41	1			
Marengo.....		4.20	6-7			
Marion.....		3.20	1			
New Providence.....		2.60	6			
Point Isabel.....		3.10	1			
Richmond.....		2.71	5-6			
Shelbyville.....		2.55	1			
Spiceland.....		3.80	1-2			
Vevay.....		2.92	6			
Worthington.....	10.69	4.00	1-2			
<i>Indian Territory.</i>						
Fort Gibson.....		2.80	22			
<i>Kentucky.</i>						
Frankfort (1).....		2.53	15			
South Fork.....		2.90	19-20			
<i>Louisiana.</i>						
Alexandria.....		3.72	15			
Coushatta.....		2.50	4			
Grand Cane.....		2.50	4			
Shreveport.....		2.62	1-2			
<i>Mississippi.</i>						
Holly Springs.....		2.50	14			
Okalona.....		3.70	15			
Vicksburg.....		2.53	15			
<i>Missouri.</i>						
Carthage.....		2.65	11-12			
Ironton.....	10.50	3.75	1			
Jerome.....		3.97	1			
New Haven.....		5.00	4-6			
Oak Ridge.....		2.50	1			
Saint Charles (1).....		2.50	1			
Saint Louis.....		3.57	1			
Willow Springs.....		2.90	1			
<i>North Carolina.</i>						
Washington.....		2.60	29-30			
<i>Ohio.</i>						
Georgetown.....		2.71	14-15			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall in inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Oregon.</i>						
Astoria.....	12.64					
McMinnville.....	14.21	2.50	29			
Do.....		3.36	31			
Portland.....	11.13					
<i>Tennessee.</i>						
Arlington.....		2.50	1			
Ashwood.....		2.70	20			
Austin.....		3.00	15			
Do.....		2.55	21			
Bollivar.....	10.70	2.90	1			
Grand Junction.....		2.68	14-15			
Kingston.....		3.57	20-21			
Memphis.....		2.78	2			
Milan (1).....		2.50	1			
Nashville.....		2.78	14-15			
Nunnally.....		2.53	15			
Rockwood.....		2.80	21			
Savannah.....		2.55	15			
Watkins.....		3.00	15			
Woodstock.....		2.50	2			
<i>Texas.</i>						
Brazoria.....		3.18	2-3			
College Station.....		4.37	2			
Columbia.....		3.40	3			
Do.....		3.00	15			
Huntsville.....	10.46	6.45	2			
Houston.....		3.44	3			
LaGrange.....		4.30	2			
New Ulm.....		2.63	2			
<i>Washington.</i>						
Fort Canby.....	12.07					
Vancouver Barracks.....	12.55					

*December 31, 1889, and January 1, 1890.

MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfalls during January, 1890, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.		10 min.		1 hour.	
	Date.	Inch.	Date.	Inch.	Date.	Inch.
Bismarck, N. Dak.*						
Boston, Mass.....		0.03	27	0.05	27	0.17
Buffalo, N. Y.....		0.04	6	0.08	6	0.15
Cincinnati, Ohio.....		0.05	15	0.10	15	0.25
Chicago, Ill.*						
Detroit, Mich.....		0.03	19	0.05	19	0.15
Galveston, Tex.....		0.25	15	0.40	4	0.75
Jupiter, Fla.*		0.15	30	0.28	30	0.80
Marquette, Mich.*						
New York City.....		0.03	15	0.05	15	0.25
New Orleans, La.....		0.05	29	0.07	29	0.10
Norfolk, Va.....		0.05	16	0.08	30	0.24
Savannah, Ga.†				0.05	3	0.05
San Francisco, Cal.....		0.16	24-25	0.32	24-25	0.55
Saint Louis, Mo.*						
Washington City.....		0.01	30	0.02	30	0.10

* No record on account of snow and other causes. † Incomplete.

SNOW (snowfall in inches and tenths.)

The greatest depth of snowfall reported for the month was two hundred and twenty-nine inches at Cisco, Cal.; at Towle's, Cal., one hundred and ninety-four inches were reported, and at Emigrant Gap, Cal., a total depth of one hundred and sixty-nine inches was measured. At Ruby Hill, east-central Nevada, the monthly snowfall was one hundred and eleven inches. Exclusive of the depths above noted the maximum depth of snowfall in the several states and territories where ten inches, or more, of snow fell was as follows: 73 at Era, east-central Idaho; 69 at Veronia, extreme northwestern Oregon; 59 at Atlantic, extreme northern upper Michigan; 52 at Camp Sheridan, extreme northwestern Wyoming; 39 at Fort Spokane, extreme east-central Washington; 38 at Corinne, northwestern Utah; 36 at Number Four, north-central New York; 28 at Green Bay and Embarrass, extreme east-central Wisconsin; 24 at Eastport, Me., East Berkshire, extreme north-central Vermont, and Wiers Bridge and West Milan, eastern New Hamp-

shire; 21 at Virginia City, southwestern Montana, and at Spearfish, southwestern South Dakota; 19 at Aspen, west-central Colorado; 17 at Des Moines, Iowa; 16 at Wakefield, north-central Kansas, at Saint Vincent Minn., at Oregon, northwestern Missouri, and at Blue Knob, south-central Pennsylvania; 14 at Fort Wingate, west-central New Mexico; 13 at Lowell and Lynn, northeastern Massachusetts, and David City, east-central Nebraska. On the Atlantic coast measurable snow, trace, fell as far south as south-central North Carolina; in the central valleys as far south as northern Tennessee and northern Arkansas; in the Rocky Mountain and plateau regions north of a line traced from central Indian Territory south of west to extreme southeastern Arizona; on the Pacific coast a depth of five inches was reported at Julian, San Diego Co., Cal., of which four inches fell on the 5th, and one inch on the 18th. During the latter half of the month about one hundred and twenty miles of the Central Pacific Railroad crossing the summit of the Sierra Nevada Mountains was blocked by snow.

Snowfalls of ten inches or more were reported, as follows, and in states and territories where the maximum depth was below that amount, the station reporting the greatest is given: *Arizona.*—Fort Apache and Whipple Barracks, 5.5. *Arkansas.*—Winslow, trace. *California.*—Cisco, 229; Towle's, 194; Summit, 192; Emigrant Gap, 169; Truckee, 162; Boca, 146; Sims, 109.5; Susanville, 76.5; Fort Bidwell, 69.7; Colfax, 55; Placerville, 19; El Dorado and Girard, 15.5; Shingle Springs, 13.5; Redding, 12.5. *Colorado.*—Aspen, 19; Emma, 18; Fraser, 14; Breckenridge, 10.5; Climax, 10.3. *Connecticut.*—Waterbury, 5. *Idaho.*—Era, 73; Fort Sherman, 35; Boise City, 12.4. *Illinois.*—Atwood, 8. *Indiana.*—Dana, 7.1. *Indian Territory.*—Fort Reno, 1.5. *Iowa.*—Des Moines a, 17.4; Des Moines b, 16; Clarinda, 15; Fayette, 13.5; Blakeville, Carroll, and Vinton, 12; Independence, 11.8; Sioux City, 11.5; Hampton, 11; Cresco, Sac City, and Storm Lake, 10. *Kansas.*—Wakefield, 15.5; Fremont, 12.5; Wichita, 10.6; Concordia, Fort Leavenworth, and Manhattan, 10.5; Salina, 10.2. *Kentucky.*—Newport Barracks, 2.5. *Maine.*—Eastport, 24.3; Cornish and Orono, 10. *Maryland.*—Cumberland, 1.5. *Massachusetts.*—Lowell and Lynn, 13; Fitchburg a and Newport a, 12; Fitchburg b and Groton, 11; Clinton, Leominster, Salem, and Wakefield, 10. *Michigan.*—Atlantic, 59; Calumet, 49.3; Lathrop, 42; Saint Ignace, 38; Sault de Ste. Marie, 35.3; Marquette, 32; Fort Brady, 31.4; Alpena, 27.9; Bear Lake, 25.5; Grayling and Traverse City, 20; Fort Mackinac, 18; Evan and Roscommon, 16; Benzonia and Crystal Falls, 15.5; Weldon Creek, 15; Charlevoix, 14.8; Otsego, 13.5; Buchanan and Manchester, 12; Hart 10. *Minnesota.*—Saint Vincent, 16.4; Sheldon, 11.8; Minneapolis, 10.4. *Missouri.*—Oregon, 16.1. *Montana.*—Virginia City, 21.2; Fort Logan, 13. *Nebraska.*—David City, 13.2; Palmer and Weeping Water, 12; West Point, 11.8; Howe, 11.5; Genoa, 11.2; Omaha, 10.9; Crete, 10.2; Ravenna, 10.1; Tecumseh and West Hill, 10. *Nevada.*—Ruby Hill, 111; Virginia City, 72.4; Elko, 69; Verdi, 67; Lewers' Ranch, 62.3; Tuscarora, 59; Carson City a, 56.9; Carson City b, 55.1; Reno a, 54.2; Austin, 47.5; Genoa, 42.3; Burner's Ranch, 36; Beowawe, 35; Reno b, 34; Winnemucca, 33; Fenelon, 33.5; Humboldt, 31.5; Downeyville, 30.9; Eureka, 30; Sodaville, 29; Ely, 27; Mill City, 25; Battle Mountain, 24; Toano, 23.5; Palisade, 23.2; Carlin, 22.5; Wells, 21; Hot Springs, 20.5; Golconda, 18.5; Tecoma, 17; Brown's, 13.5; Hawthorn, 11.5; Clair, 10.3; Belmont, 10.1; Ferguson's Ranch and Tehachapi, 10. *New Hampshire.*—Wiers Bridge and West Milan, 24; Lake Village, 22; Wolfborough, 21; Belmont, Hanover a, and Plymouth, 18; Hanover b, 16.5; Manchester a, 16.2; Bristol, 16; Strafford, 15; North Sutton, 13.4; Antrim, Concord, and Manchester b, 13; North Conway and Walpole, 12; Newton, 11. *New Jersey.*—South Orange, 1. *New Mexico.*—Fort Wingate, 14.5. *New York.*—Number Four, 34.8; Utica, 28.7; Spencerport, 24.8; Potsdam, 23.8; Ilion, 22.7; Turin, 21.5; Humphrey, 20.1; Eden, 19; Coustableville, 18; Ampersand, 17.6; Canton, 16.9; Sherman, 16.5; North Hammoud, 16.3; Brookfield, 15; Palermo

14.5; Kendall, 13; Geneva, 10.8; South Canisteo, 10.7; Fleming, Keene Valley, and Queensbury, 10. *North Carolina*.—Bryson City, 0.5. *North Dakota*.—Bismarck, 8.3. *Ohio*.—Kent, 9. *Oregon*.—Veronia, 68.6; Saint Helen, 60.1; Forest Grove, 39; East Portland, 38; Hood River, 35.9; Portland, 35.3; Beulah, 30; McMinnville and Huntington, 28.5; The Dalles, 28; North Powder, 26; Telocaset, 24.5; Astoria, 22.5; La Grande, 22; Jordan Valley, 20.8; Grass Valley, 15.2; Joseph, 14.5; Hubbard, 14; Baker City, 13.2; Eola and Lone Rock, 12.5. *Pennsylvania*.—Blue Knob, 16; Greenville, 11; Corry and Honesdale, 10. *Rhode Island*.—Bristol, Kingston, and Providence, 4. *South Dakota*.—Spearfish, 21; Canton, 16.5; *Tennessee*.—Cumberland Gap, 0.1. *Texas*.—Fort Elliott, 2. *Utah*.—Corinne, 38; Ogden, 33.5; Salt Lake City, 30.8; Kelton and Nephi, 25; Levan, 19.5; Beaver, 18.5; Promontory, 17; Terrace, 12.5. *Vermont*.—East Berkshire, 23.6; Chelsea, 22; Strafford, 21; Jacksonville, 19; Northfield, 16.8; Brattleborough and Burlington, 16; Lunenburg, 12; Hartland, 11. *Virginia*.—Bolar, 1. *Washington*.—Fort Spokane, 39; Blakely, 31.8; Vancouver Barracks, 29; Spokane Falls, 24.8; Walla Walla, 22.7; Fort Walla Walla, 20; Fort Canby, 17.5; Fort Townsend, 12.5; Olympia, 12. *West Virginia*.—Buckhannon, 5.8. *Wisconsin*.—Green Bay, 28.4; Embarrass, 28.1; Phillips, 24; Medford, 21.5; Summit Lake, 18; Oshkosh, 14.5; Haywood, 14; Grantsburgh and Waucousta, 12. *Wyoming*.—Camp Sheridan, 52.5; Saratoga, 16; Fort Washakie, 13.6; Fort Bridger, 12.5.

DEPTH OF SNOW ON GROUND AT CLOSE OF MONTH.

Chart iv shows the depth of snow reported on the ground at the close of the month. In New England snow was reported on the ground to southern Massachusetts, and in central New Hampshire and eastern Maine the depth exceeded ten inches. In the middle Atlantic states no snow was reported south of central New York, and in the extreme east-central part of that state a depth of three inches was noted. In the lower lake region trace was reported along the south coast of eastern Lake Ontario and in the southern part of western New York. In the upper lake region there was a depth of over thirty inches in central upper Michigan and east-central Wisconsin, and snow was reported on the ground to central lower Michigan. In the central valleys snow was reported on the ground to east-

central Kansas, and there was a depth of ten inches in east-central South Dakota, and a depth of eighteen inches at Saint Vincent, Minn. In the Rocky Mountain and plateau regions snow was reported on the ground to central Colorado, southern Utah, and southern Nevada, and a depth of over forty inches was reported in central Idaho, and a depth of over thirty inches in central and extreme west-central Nevada. In the Pacific-coast states snow was reported in the mountains east of the Sacramento River and north of the thirty-eighth parallel, in eastern and northern Oregon, and eastern Washington. In northeastern California and north-central Oregon a depth of more than twenty inches was reported.

HAIL.

Hail was reported as follows: 1st, Ark., 2d, 3d, and 4th, Cal., 5th, Cal., Kans., Me., N. H. 7th, Kans., Mo. 8th, N. Y. 9th, Wash. 11th, Kans., Mass., Mich., N. H., Pa. 12th, Ill., Mo. 14th, Ill. 15th, Mass., N. Y., Pa. 16th, Cal., Oregon. 17th, Cal. 19th, Ark., Cal. 20th, N. H. 21st, Cal., Conn., Pa. 22d, Cal., Ill., N. C. 23d, N. C. 24th, Pa. 25th, Nev., Oregon, Wash. 26th and 27th, Nev. 29th, Ala., Oregon. 30th, Nev., Wash. 31st, Mass.

SLEET.

Sleet was reported as follows: 1st, Ind., N. J. 3d, Ariz., Cal., Iowa, Kans., Mass., Minn. 4th, Cal., D. C., Iowa, Mich., Minn., Mo., Nebr., Wis. 5th, Cal., Iowa, Kans., Minn., Mo., N. Y., N. C., Tex., Vt. 6th, Ill., Ind. T., Kans., Mo., N. H., N. Y. 7th, Ariz., Ill., Ind. T., Kans., Mo., Pa. 8th, Mass., N. Y., Pa. 9th, Ind., Iowa, Ohio, Va. 10th, Mass., Nebr., N. Y., Oregon. 11th, Conn., Iowa, Kans., Mass., Mo., Nebr., N. H., N. Y., Ohio, Pa., Vt. 12th, Cal., Conn., Iowa, Kans., Mich., Mo., N. H., N. Y. 13th, Kans., Mich., Mo., N. H., N. Y., Ohio, Tenn., Vt. 14th, Ariz., Ark., Ill., Ind., Mo., Ohio, Pa., Tenn. 15th, Cal., Conn., Ind., Mass., N. H., N. Y., N. C., Pa., Tenn. 16th, Ind., Me., N. Y., Pa., Tenn. 18th and 19th, Kans. 20th, Ark., Ill., Ind., Ky. 21st, Conn., D. C., Kans., Mass., Mo., N. J., Pa., Tenn., Tex., Va. 22d, Ark., Ill., Ind., Kans., Minn., Mo., N. C., S. C., Tenn., Va. 23d, Conn., Ga., Ind., Ky., Mo., N. Y., N. C., S. C., Tenn., Va. 14th, Kans., Oregon. 26th, Kans. 27th, Mass. 29th, Oregon, S. C., Tenn., Va. 30th, Ohio, Oregon, Pa. 31st, Conn., Mass., Vt.

WINDS.

The prevailing winds during January, 1890, are shown on chart ii by arrows flying with the wind. In New England the winds were mostly from west to northwest; in the middle Atlantic states, the lower lake region, on the middle-eastern slope of the Rocky Mountains, and over the southern plateau region from south to west; in Florida from north to east; in the east and west Gulf states, and on the north Pacific coast, from south to east; in the Ohio Valley and Tennessee, and over the northern plateau region, from southeast to southwest; in the upper lake region from southwest to northwest; in the extreme Northwest and in the Missouri Valley from north to northwest; in the upper Mississippi valley from south to northwest; in the middle plateau region from southeast to northeast; on the middle Pacific coast from southeast to east; on the south Pacific coast from northeast to east; and in the south Atlantic states, and over the northeastern and south-eastern slopes of the Rocky Mountains, variable.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour were reported at regular stations of the Signal Service as follows: 2d, 50, se., at Fort Canby, Wash. 8th, 68, w., at Buffalo, N. Y. 9th, 56, w., at Cheyenne, Wyo.; 65, nw., at Wood's Holl, Mass.; 66, nw., at Block Island, R. I., and 60, nw., at New Haven, Conn. 12th, 56, sw., at Saint Louis, Mo., and 54, w., at Springfield, Mo. 13th, 50, nw., at Wood's Holl, Mass.; 54,

w., at Northfield, Vt.; 52, w., at Oswego, N. Y.; 60, w., at Rochester, N. Y.; 90, sw., at Buffalo, N. Y.; 50, s., at Toledo, Ohio; 72, sw., at Port Huron, Mich.; 58, sw., at Grand Haven, Mich., and 56, nw., at Lexington, Ky. 15th, 50, s., at Fort Canby, Wash. 16th, 55, nw., at Block Island, R. I., and 56, nw., at Wood's Holl, Mass. 20th, 64, w., at Buffalo, N. Y.; 54, w., at Rochester, N. Y.; 52, w., at Port Huron, Mich., and 50, w., at Grand Haven, Mich. 21st, 50, nw., at Buffalo, N. Y. 22d, 56, nw., at Wood's Holl, Mass.; 53, nw., at Block Island, R. I.; 55, nw., at New York City, and 50, nw., at Buffalo, N. Y. 24th, 54, sw., at Marquette, Mich., and 56, w., at Cheyenne, Wyo. 25th, 58, w., at Cheyenne, Wyo., and 51, sw., at Fort Canby, Wash. 26th, 52, s., at Fort Canby, Wash. 27th, 87, s., at Fort Canby, Wash. 28th, 78, s., at Fort Canby, Wash. 29th, 63, s., at Fort Canby, Wash. 30th, 58, s., at Fort Canby, Wash.; 56, w., at Cheyenne, Wyo., and 54, w., at Valentine, Nebr. 31st, 60, s., at Fort Canby, Wash.

LOCAL STORMS.

The most disastrous storms of the month occurred from the middle Mississippi valley to the Great Lakes, and thence eastward to New England during the 12th and 13th, within the area of a low pressure storm which first appeared as a feeble disturbance in the middle Rio Grande valley the night of the 11th, and thence moved northeastward with greatly increased energy, passing over the middle Mississippi valley to Lake