

**Massachusetts.**—Princeton, 16th.  
**Michigan.**—Lansing, 1st; Alpena, 1st, 5th, 25th; Mackinaw City, 1st, 15th, 16th, 17th; Escanaba, 15th, 16th, 17th; Thornville, 17th; Marquette, 15th, 25th.  
**Minnesota.**—Duluth and Saint Vincent, 16th.  
**Montana.**—Helena, 9th, 10th, 15th, 23d, 29th; Fort Maginnis, 10th, 14th, 15th, 23d, 24th, 29th; Fort Shaw, 14th, 15th, 16th, 18th, 23d, 24th; Fort Benton, 14th to 17th; Fort Assinaboine, 14th, 25th; Poplar River, 15th; Fort Custer, 19th, 24th.  
**Nevada.**—Fort Halleck, 9th, 10th, 11th, 18th, 19th, 20th, 30th, 31st; Winnemucca, 10th, 11th, 31st; Fort McDermit, 10th, 12th, 14th.  
**New Hampshire.**—Mount Washington, 1st, 2d, 16th, 17th, 18th, 27th, 31st; Berlin Mills, 2d, 26th.  
**New York.**—North Volney, 1st, 2d, 17th; Buffalo, 1st, 15th, 16th; Ithaca, 16th; Le Roy, 16th, 26th; Rochester, Oswego, and Madison Barracks, 17th.  
**Ohio.**—Elyria, 1st; Cincinnati, Wauseon, and North Lewisburg, 27th; Columbus, 27th, 28th; Napoleon and Tiffin, 28th.  
**Oregon.**—Fort Klamath, 8th, 9th, 15th, 16th; Lakeview, 10th, 18th, 29th; Linkville, 15th, 16th, 29th, 30th.  
**Utah.**—Frisco, 10th, 11th, 12th, 18th, 19th, 21st, 22d; Salt Lake City, 10th, 19th.  
**Vermont.**—Burlington, 16th; Newport, 16th, 17th; Charlotte, 17th.  
**Wyoming.**—Fort Bridger, 11th, 18th, 19th, 22d, 31st.

## MONTHLY SNOWFALLS.

[Expressed in inches and tenths.]

The following stations report monthly snowfalls of one inch or more:

**California.**—Summit, 31; Emigrant Gap, 15; Cisco, 14.5; Truckee, 8.5; Boca, 7; Fort Bidwell, 1.  
**Colorado.**—Pike's Peak, 7.8.  
**Dakota.**—Richardton, 2.2.  
**Indiana.**—Farmland, 6.2; Spiceland and Mauzy, 6; Sunman, 4; Richmond, 3.5; Marion, 1.  
**Michigan.**—Marquette, 1.  
**Montana.**—Fort Shaw, 4.3; Fort Assinaboine, 4; Fort Benton, 2.7; Helena, 1.1.  
**Nevada.**—Otego, 12; Toano, 5.8; Wadsworth, 5; Palisade, 4; Carlin, 3.5; Battle Mountain, 2.2; Elko, Winnemucca, and Hot Springs, 2; Carson City, 1.5.  
**New Hampshire.**—Mount Washington, 4.4.  
**Ohio.**—West Milton, 4.5; North Lewisburg, 3; Yellow Springs and College Hill, 1.  
**Oregon.**—Lakeview, 5.  
**Utah.**—Ogden, 5; Frisco, 2; Salt Lake City, 1.9.  
**Wyoming.**—Fort Bridger, 3.3.

## DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

**Colorado.**—Pike's Peak, 1.8.  
**Wyoming.**—Fort Bridger, 2.3.

## HAIL.

Yuma, Arizona: at 10.30 a. m. of the 3d a thunder-storm, with high wind and hail, set in. Hail fell from 10.58 to 11.05 a. m.; the stones were large and consisted of pressed snow, covered with a thick coat of clear ice. Maximum velocity of the wind during the storm, thirty miles per hour from the east.

Red Bluff, California: on the 16th heavy rain, with violent thunder and lightning, began at 8 p. m. Hail-stones, varying from one-fourth to an inch in diameter, fell to a depth of three inches, breaking many windows and damaging young orange, lemon, almond, and other fruit trees, vines, and plants. This hail storm was more violent than any that has occurred here for several years.

Tatoosh Island, Washington Territory: a thunder-storm, with heavy rain, set in at 6 a. m. of the 28th; rain, with hail squalls at intervals, continued until 10.20 p. m. Between 1 and 1.10 p. m. a heavy fall of hail occurred, the stones consisted of solid ice one-third of an inch in diameter.

Hail also fell in the various states and territories on the following dates:

**California.**—San Francisco, 16th; Susanville, 26th, 30th.  
**Illinois.**—Windsor, 20th.  
**Kansas.**—Wyandotte, 23d.  
**Maine.**—Gardiner, 27th.  
**Massachusetts.**—Boston and Amherst, 30th.  
**Michigan.**—Pentwater, 17th.  
**Nebraska.**—Genoa, 22d.  
**New Jersey.**—Atlantic City, 30th.  
**New Mexico.**—Fort Bayard, 3d.  
**New York.**—Rochester and Palmyra, 1st; Factoryville and North Volney, 15th; Auburn, 17th.  
**Ohio.**—Elyria, 1st.  
**Oregon.**—Astoria, 28th; Albany, 31st.  
**Texas.**—Silver Falls, 7th.  
**Virginia.**—Rappahannock, 26th.  
**Washington Territory.**—Walla Walla, 18th; Bainbridge Island, 20th; Fort Canby, 28th.

## SLEET.

Sleet occurred in the various states and territories, as follows:

**Dakota.**—Fort Buford, 19th.  
**Michigan.**—Grand Haven, 1st.  
**Nevada.**—Winnemucca, 18th.  
**New York.**—Oswego, 1st, 2d, 15th.  
**Ohio.**—Garrettsville, 1st; Wauseon, 27th.  
**Pennsylvania.**—Erie, 1st.  
**Texas.**—Silver Falls, 28th.  
**Vermont.**—Burlington, 2d.

## RAIN FROM CLOUDLESS SKY.

The following is from the "Charlotte Chronicle" of October 21, 1886, published in Charlotte, North Carolina:

Citizens in the southeastern portion of the city have witnessed for three weeks or more a very strange phenomenon, and it is to the effect that every afternoon at 3 o'clock there is a rainfall in one particular spot, which lasts for half an hour. Between two trees at the hour named there falls a gentle rain while the sun is shining, and this has been witnessed every day during the past three weeks by the people in the neighborhood.

The Signal Service observer at Charlotte makes the following statement in regard to the phenomenon:

An unusual phenomenon was witnessed on the 21st; having been informed that for some weeks prior to date rain had been falling daily after 3 p. m. on a particular spot near two trees, corner of 9th and D streets, I visited the place and saw precipitation in the form of rain drops at 4.47 and 4.55 p. m., while the sun was shining brightly. On the 22d I again visited the place and from 4.05 to 4.25 p. m. a light shower of rain fell from a cloudless sky. The two trees referred to are red oaks, with limbs trimmed to within a few feet of the trunks, and are surrounded by many more of the same kind; they stand four or five feet apart and one hundred yards from the summit of a knoll at the base of which is a small ravine. Sometimes the precipitation falls over an area of half an acre but always appears to centre at these two trees and, when lightest, occurs there only.

## WINDS.

The most frequent directions of the wind during October, 1886, are shown on chart ii by the arrows flying with the wind; they are also given in the table of miscellaneous meteorological data. In New England, the middle and south Atlantic states, and in Florida they were generally from the north; in the Lake region, extreme northwest, and in the Missouri and upper Mississippi valleys they were mostly from the south or southwest; in the middle and southern Pacific coast regions they were generally westerly; in other portions of the country they were variable.

## HIGH WINDS.

[In miles per hour.]

Wind-velocities of fifty or more miles per hour were recorded during the month, as follows:

Mount Washington, New Hampshire, 76, sw., 1st; 60, w., 2d; 57, w., 4th; 50, nw., 5th; 70, w., 8th; 70, w., 9th; 50, w., 11th; 70, w., 12th; 60, s., 14th; 80, w. and nw., 15th; 78, nw., 16th; 50, sw., 20th; 80, sw., 21st; 89, w., 22d; 76, nw., 23d; 61, w., 25th.

Pike's Peak, Colorado, 52, w., 9th; 72, w., 10th; 76, sw., 19th; 54, w., 22d; 56, nw., 23d; 72, w., 30th; 68, sw., 31st.  
 Frisco, Utah, 50, sw., 10th.  
 Galveston, Texas, 55, nw., 12th.  
 Sandusky, Ohio, 53, w., 14th.  
 Detroit, Michigan, 52, w., 14th.  
 Grand Haven, Michigan, 52, n., 14th.  
 Port Huron, Michigan, 50, sw., 14th.  
 Saint Louis, Missouri, 52, sw., 14th.  
 Buffalo, New York, 63, sw., 14th.  
 North Platte, Nebraska, 60, s., 18th.  
 Fort Canby, Washington Territory, 50, s., 27th.

LOCAL STORMS.

Atlantic City, New Jersey: light rain, with thunder and lightning, prevailed during the night of the 29-30th until 1 a. m., when the rain began falling very heavily and the electrical part of the storm became unusually violent. Hail-stones fell from 4 to 4.05 a. m., diameter one-half an inch. The total precipitation during the storm was 6.15 inches. The wind varied from ne. to nw., with a maximum velocity of twenty-five miles per hour from the north, at 11.30 a. m.

Block Island, Rhode Island: on the 30th light rain fell from 2 to 3.40 p. m., followed by high northeast winds, greatest velocity forty-two miles per hour. During the night the wind continued high and on the morning of the 31st, was blowing briskly from the southeast, backing to northeast, maximum velocity thirty-two miles per hour.

Boston, Massachusetts: rain fell during the greater part of the 30th, heavy in the afternoon and very heavy between 10 and 11 p. m. Large hail-stones fell from 10.30 to 10.45 p. m. The wind was from the northeast throughout the day, attaining between 9 p. m. of the 30th and 2.45 a. m. of the 31st the force of a heavy gale.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger-points at the various river stations; the highest and lowest depths for October, 1886, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, October, 1886.

[Expressed in feet and tenths.]

Stations.	Danger-point on range.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana.....	29.9	31	6.7	1	2.9	3.8
<i>Arkansas River:</i>						
Fort Smith, Arkansas.....	22.0	1	3.2	18, 19, 20	1.4	1.8
Little Rock, Arkansas.....	23.0	1	5.0	26, 27, 28	1.3	3.7
<i>Missouri River:</i>						
Yankton, Dakota.....	24.0	1, 2, 3	16.6	29, 30, 31	15.4	1.2
Omaha, Nebraska.....	18.0	1 to 5	7.0	31	6.2	0.8
Leavenworth, Kansas.....	20.0	4	6.2	19	4.9	1.3
<i>Mississippi River:</i>						
Saint Paul, Minnesota.....	14.5	30	2.7	10	2.0	0.7
La Crosse, Wisconsin.....	24.0	1, 2	5.4	15	4.0	1.4
Dubuque, Iowa.....	16.0	24	6.2	13	4.3	1.9
Keokuk, Iowa.....	14.0	28	4.5	14, 16, 17	3.2	1.3
Saint Louis, Missouri.....	32.0	30, 31	7.0	18, 19	6.3	1.3
Calro, Illinois.....	40.0	7	7.7	28, 29	4.0	3.7
Memphis, Tennessee.....	34.0	9, 10	6.2	30, 31	3.8	2.4
Vicksburg, Mississippi.....	41.0	14	4.5	31	0.6	3.9
New Orleans, Louisiana.....	13.0	12	5.7	31	1.6	4.1
<i>Ohio River:</i>						
Pittsburg, Pennsylvania.....	22.0	1, 2, 3	6.3	14, 15	5.1	1.2
Cincinnati, Ohio.....	50.0	6	8.8	31	3.3	5.5
Louisville, Kentucky.....	25.0	7 to 10	5.0	27 to 31	2.7	2.3
<i>Cumberland River:</i>						
Nashville, Tennessee.....	40.0	1	2.4	28 to 31	0.6	1.8
<i>Tennessee River:</i>						
Chattanooga, Tennessee.....	33.0	29, 30	2.0	23 to 26	1.2	0.8
<i>Monongahela River:</i>						
Pittsburg, Pennsylvania.....	29.0	1, 2, 3	6.3	14, 15	5.1	1.2
<i>Savannah River:</i>						
Augusta, Georgia.....	32.0	1 to 4, 6 to 13	5.8	25	5.2	0.6
<i>Mobile River:</i>						
Mobile, Alabama.....		12	19.1	27	15.4	3.7
<i>Sacramento River:</i>						
Red Bluff, California.....		18	1.1	1, 15	0.3	0.8
Sacramento, California.....		20, 21	8.5	1 to 16	7.5	1.0
<i>Willamette River:</i>						
Portland, Oregon.....		1, 2, 3	2.8	6	-0.2	3.0
<i>Colorado River:</i>						
Yuma, Arizona.....		1	15.5	26 to 31	15.0	0.5

Owing to the low stage of water in the Mississippi and Ohio Rivers during October, considerable difficulty was experienced by steamboat navigators. After the 27th, travel on these rivers was practically suspended. On the 20th the steamer "Gus Fowler" ran aground above Mound City and did not get free until 4 a. m. of the 21st. The "Belle Memphis" was four days in making the trip from Saint Louis, Missouri, to Cairo, Illinois; the captain reports that she was aground several times and dragged the bottom of the river nearly the entire distance. The observer at Little Rock, Arkansas, reports that navigation was closed on the Arkansas River on the 11th on account of the low water. At Portland, Oregon, the Willamette River was lower on the 6th than it has been at any time since river observations have been taken.

HIGH TIDES.

Owing to the storm that prevailed in the Gulf of Mexico from the 9th to the 12th very high tides were raised along the Gulf coast on the latter date from Cedar Keys, Florida, to Corpus Christi, Texas. Along the coast of Louisiana and eastern Texas the tide was higher and more destructive to life and property than any that has occurred within several years. The notes given below, in reference to this storm and the accompanying high tide, are from the reports of observers:

Sabine Pass, Jefferson county, Texas: this village is located at the mouth of the Sabine River, which forms the boundary line between Texas and Louisiana, the town is elevated only four feet above the mean tide and is bounded by a swamp on the west and by Lake Sabine on the northeast. On account of the heavy storm that prevailed over the Gulf of Mexico on the 9th, 10th, and 11th the tide was unusually high at Sabine Pass on the 11th, although the wind was light. During the morning of the 12th the wind blew a gale from the northwest and at 2 p. m. the water of the Gulf began flowing through the town; the water continued to rise rapidly, and in less than two hours nearly every house in the town was moved from its foundations and the country for fifteen miles inland overflowed with salt water. The loss of life was great, over one hundred persons being drowned. Many miles of rice fields were destroyed and hundreds of cattle drowned. The village of Johnson's Bayou, in Cameron county, Louisiana, is about fifteen miles east of Sabine Pass, and is located on a ridge extending along the Gulf coast, ten feet above the mean tide; behind the town is an extensive swamp. The tide was unusually high throughout the 11th and morning of the 12th; at 4 p. m. the wind was blowing with hurricane force and the water from the Gulf flowed over Johnson's Bayou and twenty miles inland, drowning fifty persons and completely destroying the village. Along the coast from Johnson's Bayou to Sabine Pass, the whole country was flooded, completely destroying all crops and drowning hundreds of cattle and horses.

Mobile, Alabama: on the 12th the wind shifted from the northeast to southeast and blew hard, causing a very high tide in Mobile Bay. Several washouts occurred on the Louisville and Nashville Railroad between New Orleans and Mobile. The observer at Pensacola, Florida, states that high easterly winds prevailed during the 11th, with tide higher than has been known for twenty-one years.

Manatee, Manatee county, Florida: on the 12th the highest tide of several years occurred, doing slight damage to the wharves on the north side of the river.

New Orleans, Louisiana: on the 11th and 12th very high easterly winds prevailed, causing Lake Pontchartrain to fill and overflow with water from the Gulf, submerging the lower portions of the city and all the country in the vicinity of the lake.

High tides were also reported on the following dates:

- Eastport, Maine, 1st, 2d, 3d.
- Smithville, North Carolina, 1st, 2d, 3d.
- Augusta, Georgia, 1st, 8th.
- Sandy Hook, New Jersey, 27th.