

*Droughts.*—Wellington, Kan., 30th, streams and springs drying up. Mendon, Mass., 30th, many wells dry. Westborough, Mass., 30th, brooks, springs and wells very low. Antrim, N. H., streams unusually low.

*Snow from Cloudless Sky.*—Lawrence, Kan., 27th. New Ulm, Minn., 28th. Santa Fe, 5th.

### RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, 63 to 75. Middle Atlantic States, 66 to 90. South Atlantic States, 65 to 83. Eastern Gulf States, 69 to 83. Western Gulf States, 64 to 82. Ohio valley and Tennessee, 64 to 80. Lower Lake region, 69 to 75. Upper Lake region, 66 to 86. Upper Mississippi valley, 63 to 71. Lower Missouri valley, 60 to 79. Red River of the North Valley, 78 to 85. Texas, 66 to 82. Middle Plateau, 36 to 59. California, 43 to 59. Oregon, 74 to 83. *High stations* report the following percentages not corrected for altitude: Mt. Washington, 88.6; Pike's Peak, 60.6; Santa Fe, 55.2; Cheyenne, 56.1; Denver, 64.3.

### WINDS.

The prevailing winds at Signal Service stations are shown on chart No. II, by arrows which fly with the wind. *Westerly* winds have prevailed in the Lake region and New England; *northwesterly* winds in the Middle States; *northeasterly* in the South Atlantic and East Gulf States; elsewhere east of the Rocky Mountains they have been *northerly*, except in the Upper Mississippi valley, where they were from *northwest to southwest*.

*High Winds.*—On Mount Washington a velocity of 105 miles, NW., occurred on the 21st, and 102, NW., on the 7th and 12th. Maximum velocities ranging from 52 to 96 miles, occurred on eighteen other days; these high winds were from the northwest on all but five days, four from the south and one from the southwest. Maximum velocities exceeding fifty miles or more occurred elsewhere as follows: Kittyhawk, N. 50, on the 23rd; Cape Lookout, E. 50, on the 4th; Buffalo, SW. 52 on the 7th; Cape May, NW. 60 on the 21st; Pike's Peak, W. 70, on the 20th.

The following are the largest total movements in the various districts: Pike's Peak, 15,645. Cape Lookout, 12,763. Wood's Holl, 12,316. Indianola, 12,109. Cape May, 11,667. New Shoreham, 11,602. Mount Washington, 10,087, incomplete on account of frost-work. Sandusky, 8,976. North Platte, 8,827. Alpena, 8,202. Breckenridge, 8,112. Bismarck, 8,085. Winnemucca, 6,040. The *smallest* are: Roseburg, 1,135. La Mesilla, 1,208. Visalia, 1,580. Lynchburg, 1,722. Augusta, 2,066. Salt Lake City, 2,000. Uvalde, 2,620. Helena, 2,838. Nashville, 2,893. Leavenworth, 3,031. Springfield, Mass., 3,068.

*Local storms*, worthy of record, have been noted in connection with the various high and low areas, except as follows: A violent tornado at Keachi, De Soto parish, La., at 4:30 p. m., November 9th. Its course was from north to south, in a path about two hundred and fifty yards wide; length from eight to ten miles. On Moore's plantation, four miles distant, a gin house was blown down, killing one man and four mules. The chapel and other buildings, connected with the Baptist Female college, at Keachi, were unroofed or badly damaged; seven other buildings were torn to pieces or much damaged. In Keachi, one person was killed and nine were injured, three seriously. Serious damage was done at other places in the parish to buildings and other property. On the 13th a violent wind storm occurred in Santa Ana valley, Cal., prostrating all the wind mills and telegraph wires and delaying trains, several of which were ditched.

*Whirlwind.*—Yuma, Cal., 21st, traveling from southwest to northeast; cloud funnel-shaped, upper end lagged behind so as to incline the column about 70° from the perpendicular; cloud about ten feet in diameter and appeared to revolve from left to right.

*Sand-Storms.*—Visalia, Cal., 17th, 18th, very severe on the 19th, killing large numbers of sheep. Umatilla, Or., 7th, very severe. Near Mammoth Tank, Cal., 16th, worst ever known; stopped railway traffic for sixteen hours.

### VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily indications for November, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.2 per cent. The percentages for the four elements are: Weather, 89.6; Direction of the Wind, 82.6; Temperature, 87.2; Barometer, 81.0 per cent. By geographical districts they are: for New England, 82.7; Middle States, 80.4; South Atlantic States, 84.4; Eastern Gulf States, 86.6; Western Gulf States, 89.8; Lower Lake region, 86.2; Upper Lake region, 87.5; Tennessee and the Ohio valley, 86.6; Upper Mississippi valley, 84.2; Lower Missouri valley, 83.3; Northern Pacific coast region, 78.4; Central Pacific coast region, 88.0; Southern Pacific coast region, 91.7. There were 32 omissions to predict out of 3,690 or 0.87 per cent. Of the 3,658 predictions that have been made, 166, or 4.54 per cent. are considered to have entirely failed; 101, or 2.76 per cent. were one-fourth verified; 378, or 10.33 per cent. were one-half verified; 442, or 12.08 per cent. were three-fourths verified; 2,571, or 70.29 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

*Cautionary Signals.*—218 Cautionary Signals were displayed during the month, of which 190, or 87.2 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of, the station. 68 Off-shore Signals were displayed, of which 60 or 91.2 per cent, were fully justified, and 64 or 94.1 per cent, justified as to direction. Forty-five of the Off-Shore were changed from Cautionary.

286 Signals of both kinds were displayed, of which 250 or 87.4 per cent, were fully justified. 56 cases of winds of 25 miles and over per hour, from scattered stations, were reported, for which signals had not been ordered. The above does not include signals ordered for 49 display stations, where the velocity is only estimated. Thirty-one signals were ordered late.

## NAVIGATION.

*Stage of Water in Rivers.*—In the table on the right-hand side of chart No. III are given the highest and lowest stages of water, as recorded on the Signal Service river gauges, during November, 1880. During the entire month the rivers throughout the country continued remarkably low, no freshet worthy of special note being recorded. The *Missouri* remained almost stationary throughout the month, the largest monthly range at any individual station being 17 inches at Omaha; on the 18th it commenced to freeze at Yankton. In all the other rivers there was a general tendency to rise during the 1st, (ending Nov. 6th,) and 2nd, (ending Nov. 13th,) weeks, and, except at stations in the lower Mississippi, a general fall during the 3rd and 4th weeks.

*Ice in Rivers and Harbors.*—Below is a summary of the data in reference to the formation of ice upon navigable streams, canals and in the harbors at Lake ports. Ice commenced forming in large quantities in the rivers of the Northwest about the middle of the month and in those over the eastern portions of the country from the 19th to the 22nd. The early closing of the canals of Pennsylvania and New York entailed large losses upon those interested therein. The following items are arranged geographically: *Missouri river.*—Fort Bennett, Dak., 17th, river frozen over, navigation closed; 18th, people crossing on the ice. Omaha, Neb., 14th to 30th floating ice; 16th, ferry boats stopped running. Leavenworth, the river full of ice from the 17th to the end of the month. *Platte River.*—North Platte, Neb., 5th, ice 3 inches thick. Clear Creek, Neb., 16th, river closed; 19th, teams crossing on ice; 30th, heavily loaded wagons "still crossing." *Middle Loup River.*—Austin, Sherman co., Neb., 30th, teams crossing on ice. *Red River of the North.*—St. Vincent, Minn., 11th, river freezing; 12th, navigation closed. *Mississippi.*—St. Paul, Minnesota, 13th to 16th, floating ice; navigation closed on the 16th; 17th, river frozen over. La Crosse, Wis., 14th and 16th, floating ice; 19th, river frozen over. Dubuque, Ia., 16th, floating ice, navigation closed, earliest date on record; 22nd, frozen over, men crossing; 23rd, teams crossing. Fulton, Ill., and Clinton, Ia., 15th, navigation closed—same date as in 1872, but earlier than any other recorded date—at Clinton, ice in river on 17th, gorged on 18th and 13 inches thick on the 30th. Davenport, Ia., 21st, river frozen along banks; 22nd, gorged and closed on earliest date on record; 25th, frozen over; 26th, people crossing; 28th, teams crossing. Muscatine, Ia., 16th, floating ice; 21st, river closed by ice, "earliest closing on record;" 29th, first team crossed—ice in channel 7 inches thick. Burlington, Ia., 16th, floating ice quite dangerous to navigation, last boat passed down, navigation closed; 18th to 21st, floating ice; 22nd, gorged; 23rd, frozen over, people crossing; 30th, teams crossing. Montrose, Iowa, 21st, river frozen over. Keokuk, Iowa, 17th, first ice in river, Illinois side closed; 18th, navigation closed, heavy floating ice; 19th, canal frozen over; 22nd to 30th, heavy floating ice. St. Louis, Mo., 18th, navigation suspended; 18th to 30th, floating ice. *Des Moines River.*—Boonsboro, Ia., 15th, river frozen, men crossing; 18th, teams crossing. Des Moines, 16th, river frozen over. Keokuk, Ia., 20th, Des Moines river frozen over near the mouth. *Kansas River.*—Lawrence, Kan., 18th, frozen over. *Neosho or Grand River.*—Fort Gibson, Ind. Ter., 18th, frozen over; 19th, ice 3 inches thick. *Rock River.*—Frozen over at Lyndon, Ills., on the 14th and at Rockford, Ill., on the 17th. *Ohio River.*—Pittsburg, Pa., 18th, 19th and 23d, ice in river; 22d, frozen over. *Monongahela River.*—Morgantown, W. Va., 22nd to 28th, frozen over; 29th, opening; 29th, Cheat river opening; 30th, ice in Monongahela breaking up; at two a. m. ice gorged for a distance of four miles. *Susquehanna River.*—West Branch—Milton, Pa., 24th, frozen over; North Branch—Catawissa, 26th, closed by ice. *Delaware River.*—Philadelphia, 23rd, floating ice. *Hudson River.*—Albany, 21st and 22nd, floating ice; 23rd frozen over; 21st, ice formed on canal; 22nd, navigation on canal suspended; 25th, navigation entirely closed; 24th, closed from Albany to Hudson. In a report on the closing of the Hudson, at Newburgh, N. Y., based on observations recorded by Hutchings and Mr. James H. Gardiner, and giving details for the years 1740, 1755, 1764, 1770, 1779, 1785, 1789 to 1831, 1834 to 1838 and 1850 to 1878, only five November dates appear, which are as follows:—November 28th, 1796; November 20th, 1797; November 23rd, 1798; November 13th, 1820 and November 29th, 1823. In a table, published in Hough's *New York Meteorology, 2nd series*, giving the dates of closing of the Hudson at Albany, and based upon observations for the years 1645, 1646 and 1790 to 1872, the following November dates, prior to the 25th, are found:—13th, 1820; 23rd, 1798 and 24th, 1645. In another table in the same work, giving the closing at Hudson from 1817 to 1870, inclusive, the following November dates only appear:—25th, 1838 and 30th, 1820. *Connecticut River.*—Springfield, Mass., 22nd, frozen over. New Haven, 24th, navigation on river closed; river full of floating ice; earliest date of closing of navigation during the past 48 years. *Watuppa Lake.*—Mass., 27th, ice 4 inches thick. *Penobscot River.*—Bangor, Me., 24th, ice quite thick; 27th, navigation closed on the earliest date for the past 38 years. At this port, it has occurred but twice previously in November since 1544, namely, on November 30th, 1871, and November 29th, 1875. *Kennebec River.*—Gardiner, Me., 23rd, river closed. From a record of the closing of this river for the past 94 years, it appears that earlier dates have only been recorded on 8 years, as follows: November 16th, in 1820 and