

marbles to hen's eggs, and fell in such quantities that, at some points of the storm path, on the following morning, they were gathered to the depth of two feet, and again, even as late as noon, some portions of the wagon roads were covered with a "perfect bedding of hail-stones." The loss to the farming community is estimated at \$30,000. No such storm has ever visited this section since 1833, when the hail was about as large, and the path identical. Hadley, Me., 21st, most violent and destructive storm within the memory of the oldest inhabitant; all glass on the north sides of buildings, where not protected, was broken; Tobacco and corn crops a total loss; trees were stripped of their foliage, and, in some instances, those having a diameter of about one foot, were twisted or broken off; dead birds were found under almost every tree. Sparta, Ky., 21st, hail-stones size of hen's eggs, causing great damage to fruit and corn. St. John, N. B., 21st, great damage to crops in parts of Kent county, particularly in the parishes of Richibucto and Welford. Hadlyme, Conn., 21st, most violent since July 28th, 1838, when half the windows in the town were destroyed, and much other damage done. Hail-stones size of large walnuts; the damage to farming industries will reach many thousand dollars.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, from 68 to 90; Middle Atlantic states, 56 to 81; South Atlantic states, 53 to 82; East Gulf states, 68 to 76; West Gulf states 56 to 77; Ohio valley and Tennessee, 58 to 76; Lower Lake region, 64 to 72; Upper Lake region, 63 to 74; Upper Mississippi valley, 61 to 75; Missouri valley, 64 to 74; Red River of the North valley, 59 to 73; Texas, 52 to 62; Middle Plateau, 30 to 42; Southern Plateau, 43 to 61; California, 33 to 77; Oregon, 46 to 64; Washington Territory, (Olympia,) 71. *High stations* report the following percentages not corrected for altitudes: Pike's Peak, 69.0; Santa Fe, 55.0; Cheyenne, 55.8; Denver, 47.6; Mt. Washington, 81.8.

WINDS.

The prevailing winds during the month of July, 1881, at Signal Service stations, are shown on chart No. II by arrows, which fly with the wind. Between the 82d and 92d meridians, *westerly*. Along the South Atlantic coast, *southeast*, and on the Middle Atlantic and New England coasts, *southwest to northwest*. In the Western Gulf states and Missouri valley, *east and south*. Over Texas and the eastern Rocky Mountain slope, *south and southeast*. In the Plateau regions, *southerly*, and along the Pacific coast, *westerly*.

Total Movements of the Air.—The following are the largest total movements at the Signal Service stations: Mt. Washington, 14,442; North Platte, 11,319; Hatteras, 10,543; Portsmouth, N. C., 10,175; Moorhead, 9,657; Chincoteague, 9,434; San Francisco, 9,384; Kittyhawk, 9,082; Ft. Sill, 8,904. The *smallest* are: La Mesilla, 1,406; Silver City, 1,910; Phoenix, 1,989; Memphis, 2,063; Florence, 2,351; Lynchburg, 2,526; Uvalde, 2,596; Springfield, Mass., 2,641; Roseburg, 2,688; Lewiston, 2,709; Nashville, 2,721; Augusta, 2,728; Fredericksburg, 2,837; San Antonio, 2,850; Morgantown, 2,855; Tucson, 2,861.

High Winds.—Winds of 50 miles per hour and over were reported as follows: On summit of Mt. Washington, 13th, 14th, 16th; maximum velocity, 60 miles, NW., 13th. On summit of Pike's Peak no high winds were reported during the month, the maximum, 40, SW., occurred on the 10th. Sandusky, 56, NW., 12th. Cape May, 60, SW., 14th. Kittyhawk, 60, N., 7th.

Local Storms.—Few storms of this character have occurred during the month, at least those particularly destructive, and, except the violent tornado at New Ulm, Minn., none accompanied with any unusual demonstration of force or attended with great loss of life and property have been reported. On the afternoon of the 15th, the terrible tornado which visited portions of southern Minnesota, appeared first as a violent northwest storm over the western portion of the state and eastern Dakota, in the vicinity of Big Stone and Traverse Lakes. With increasing energy the storm traveled southeasterly down the valley of the Minnesota river, desolating portions of the following counties: Big Stone, Lac Qui Parle, Swift, Chippewa, Renville, Sibley, Brown, Nicollet and Blue Earth. The general atmospheric conditions preceding and accompanying the formation of this storm, are given as follows: Since the 10th there had prevailed, with remarkable persistence, an area of comparatively low pressure over the western portions of Iowa and Minnesota, and the eastern portions of Nebraska and Dakota. There was considerable variability in the barometric readings within the area of low during this period, ranging, as they did, from 29.65 to 29.96. At midnight of the 10th, the winds, throughout the four states above mentioned, were from N. to E., with temperatures ranging from 57° to 74°. On the following morning, with the advent from Saskatchewan valley of an area of low pressure, the barometer fell from 0.03 to 0.18 inch below the normal, followed over Iowa and Nebraska by a veering of winds to the SE., occasional light rains and slowly rising temperature. Eliminating the element of diurnal change, there was noted the steady advance northward of a high thermal belt, coupled with the significant constancy of southerly winds south of parallel 45° and of W. to NW. winds to the northward as far as Manitoba. These conditions continuing unabated, there appeared on the afternoon of the 15th