

WINDS.

The prevailing direction of the winds for the month of *March*, 1880, is shown by arrows flying with the wind, on chart No. II. The prevailing winds throughout the country east of the Rocky Mountains except in Texas and along the South Atlantic and Florida coasts were *northwesterly*. Along the Atlantic coast from Boston southward to Norfolk the prevailing direction at every station was *northwest*.

Total Movements of the Air.—The following are the *largest* total movements recorded in miles at the Signal Service stations during the month of *March*, 1880: Pike's Peak, 19,785; Delaware Breakwater, 15,269; Sandy Hook, 14,140; Cape Lookout, 13,715; Kittyhawk, 13,426; Thatcher's Island, 13,095; Indianola, 12,419; Barnegat, 12,344; Cape Henry, 12,187; Cape Hatteras, 11,996; Wood's Holl, 11,913; Portsmouth, N. C., 11,982. There is no report from Mt. Washington, owing to frost interfering with the registering apparatus, but velocities exceeding 50 miles were reported on 21 days. The following are the highest, 3rd, 6th, 12th, 17th and 24th, NW. 84 miles; 25th, N., 90; 22nd, NW., 93; 5th, 14th, 26th, NW., 96; 7th, W., 102. The *smallest* movements are Nashville, 2,314; Deadwood, 2,337; Roseburg, Or., 2,883; Tucson, Ariz., 2,873; Uvalde, Tex., 2,939; Visalia, Cal., 3,034; La Mesilla, N. M., 3,218; Lynchburg, Va., 3,286; Ft. Buford, Dak., 3,300; Los Angeles, Cal., 3,622.

Local Storms.—Indianapolis, Ind., 4th., about 10.30 p. m. a severe tornado visited the city, passing through the northern section, in a direction from southwest to northeast. The storm-cloud appeared as an immense dark mass with a long trunk extending downward toward the earth, and accompanied by a loud rumbling noise like an approaching train of cars. The cloud, during its progressive movement, pursued a zigzag course, alternately changing from NE. to SE., which was indicated by the debris. The destruction to property was estimated at \$100,000. Alto, Ind., 4th. about 10 p. m. severe wind and rain storm, one house destroyed and its nine occupants injured—one fatally. La Fayette, Ind., 4th. about 10 p. m. heavy wind and rain storm, causing considerable damage. Spencer, Ind., 4th. about 10 p. M. heavy wind and rain storm, fences and out-buildings destroyed. Liberty, Ind., 5th. a very severe wind and rain storm from the west in the early morning, causing considerable damage. Toledo, 4th, 11.15 p. m., a severe tornado passed over the city from southwest to northeast, causing immense damage to property, killing two persons and injuring several others. At several points in the storm's path the rotary movement from right to left of the destructive winds—a characteristic feature of the tornado—was developed, as shown by the direction of the debris. Persons who were out during the storm reported vivid lightning and heavy thunder in the south and southwest. Shortly before the storm broke upon the city the barometer fell rapidly and the atmosphere was decidedly close and oppressive. Madison, Ind., 5th, at 2, a. m. a heavy wind and rain-storm, causing great loss to property. Clayton, Bourbon co., Ala., 15th, a very severe storm of wind and rain during the night delayed all railroad communication in the vicinity, and trees and fences were generally destroyed. One house was completely demolished, and others more or less damaged. Pike co., Ala., 18th., a destructive tornado was reported to have passed across the southern portion of the county during the evening, causing great damage to timber and fencing, and blowing down and unroofing houses. The tornado struck about three miles west of Smilie's bridge on Corench river, and took an easterly course for a distance of ten miles, when it disappeared. The buildings and fences on fourteen plantations were scattered in ruins.

The following notes are of interest respecting the unusually heavy wind-storms of the 26th and 27th: Las Cruces, N. M., 26th, very violent sand storm, filling the air with dust. Omaha, Neb., 26th, very sudden and violent west wind, overturning buildings; 27th, heavy wind still continued, three houses blown down—many unroofed; dummy trains could not cross railroad bridge during the day. Leavenworth, Kan., 27th, blinding dust-storm almost obscuring the sun at 10 a. m. Ft. Gibson, Ind. Ter., 27th, violent wind-storm, blowing down flag-staff at Post and injuring buildings slightly; Ft. Davis, Tex., violent sand-storm; Corsicana, Tex., 26th, severe wind-storm, doing considerable injury; St. Louis, 27th, wind SW. 60 miles at 8 a. m., and several times during the day reached a velocity of 48 miles; Keokuk, Iowa, 27th, violent wind-storms, SW. 37 miles; Davenport and Dubuque, Iowa, and Springfield, Ill., 27th, violent thunder-storms with heavy wind, remarkable fall in the barometer; Milwaukee, Wis., 27th, wind 40 miles E. and barometer lowest on record, much damage to city property and shipping; Knoxville, Tenn., 27th, violent SW. wind, blowing down saw-mill killing one man; Morristown, Dak., 27th, high wind-storm unroofing buildings; Louisville, Ill., 27th, most violent wind-storm in many years; New Corydon, Ind., 27th, very violent gale, estimated velocity 60 miles; Muscatine, Iowa, 27th, worst storm of wind and rain that has ever visited this section, barometer remarkably low; Lawrence, Kan., 27th, violent wind storm maximum velocity 70 miles from 3 to 5 a. m.; Wellington, Kan., 27th, severe NW. gale, much damage to buildings; Cedar Vale, Kan., 26th and 27th, violent gale, much damage to fences, trees and buildings; Ashley, Mo., 27th, high wind, blowing down trees and fences; Pierce City, Mo., 27th, 2 a. m., high wind from the NW., blowing down much fencing; Geneva, Neb., 26th, violent wind storm from the west; Howard, Neb., 27th, most violent wind storm for many years, dust gathered in drifts from 1 to 2½ feet in depth; Ringgold, Ohio, 27th, heavy wind and hail storm. Professor Nipher reports this storm as the "most remarkable phenomenon of the month. It covered the entire State, except the extreme southern part. The atmosphere was filled, during the whole day, with a fine grayish dust, which, in the western part of the State and in eastern Kansas, was so dense as to obscure the light of the sun and to render objects invisible at a distance of from 100 to 300 yards. The wind was very high, coming, in most cases, from the west and northwest."

Sand Storms.—Ft. Garland, Col., 12th, (13th violent). Umatilla, Or., 5th, most violent; maximum velocity, 62 miles W. at 12 and 12.30 p. m., accompanied with electricity so intense that it was impossible to touch anemometer wire or battery without experiencing severe shock; 25th, very violent and accompanied with much electricity. Las Cruces, N. M., 26th; Davis, Tex., 27th: Ft. Yuma, 7th, 25th.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for March, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.4 per cent. The percentages for the four elements are: Weather, 87.1; Direction of the Wind, 82.1; Temperature, 86.0; Barometer, 86.1 per cent. By geographical districts they are: for New England, 85.5; Middle States, 86.6; South Atlantic States, 87.0; Eastern Gulf States, 84.4; Western Gulf States, 79.4; Lower Lake region, 87.3; Upper Lake region, 87.1; Tennessee and the Ohio valley, 83.7; Upper Mississippi valley, 85.6; Lower Missouri valley, 87.2; Northern Pacific region, 77.5; Central Pacific coast region, 87.5; Southern Pacific coast region, 88.3. There were 14 omissions to predict out of 3,813, or 0.37 per cent. Of the 3,799 predictions that have been made, 137, or 3.60 per cent, are considered to have entirely failed; 109, or 2.87 per cent, were one-fourth verified; 443, or 11.66 per cent, were one-half verified; 463, or 12.19 per cent, were three-fourths verified; 2,647, or 69.68 per cent, were fully verified, so far as can be ascertained from the tri-daily weather maps.

Cautionary Signals.—260 Cautionary Signals were displayed during the month, of which 225, or 86.5 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of the station: 94 Off-shore Signals were displayed, of which 85, or 90.4 per cent, were fully justified; 90, or 95.7 per cent, were justified as to direction; 86, or 91.5 per cent as to velocity; and 3, or 3.2 per cent, were not justified either as to direction or velocity. 52 of the Off-shore were changed from Cautionary. 354 Signals of both kinds were displayed, of which 310, or 87.6 per cent, were fully justified. The above does not include signals ordered for 50 display stations, where the velocity is only estimated. 67 cases of winds of 25 miles and over per hour, from scattering stations, were reported, and for which signals had not been ordered.

NAVIGATION.

In the table on the right-hand side of chart No. III are given the highest and lowest readings of the Signal Service river gauges for the month, with the dates of the same. The *Red River* at Shreveport rose gradually during the month from about 10 feet on the 1st to nearly 23 feet on the 31st. The *Arkansas* at Little Rock rose 4 feet from the 2nd to the 11th, remained almost stationary until the 17th, then fell to end of month. The *Missouri* varied but little throughout the month, the total range at the three stations, Yankton, Omaha and Leavenworth, being from 3 to 4 feet; above Yankton it continued frozen until the latter part of the month—see notes on ice given below. The *Mississippi* remained closed at St. Paul until the 29th; from La Crosse to St. Paul the total range did not exceed 4 feet; at Cairo the water fell slowly from 1st to 6th, it then rose slowly, and, passing the danger-line (40 feet) on the 9th, reached 44 feet 7 inches from the 21st to the 25th, after which it slowly fell and passing the danger-line on the 30th reached 38 feet 11 inches on the 31st; at Memphis the water continued almost stationary and within a few inches of danger-line (34 feet) from the 1st to the 18th when it passed the danger-line and continued a few inches above that point to the end of month, the total monthly range being only 17 inches; at Vicksburg the water rose slowly from the 2nd, and passing the danger-line (41 feet) on the 11th, reached 42 feet 11 inches on the 31st; at New Orleans it rose slowly from the 18th, and, passing the danger-line on the 10th, reached the maximum height, 13 inches above the danger-line, on the 28th. Notwithstanding the long continued high stage of water from Cairo to New Orleans the amount of damage reported was comparatively small; the principal crevasses reported were (1) above Arkansas City, flooding town and adjoining plantations, (2) near Gaines' Landing, flooding the Yellow Bayou country, and (3) in Bayou La Fourche, near Lockport, causing little damage. The most damage probably occurred at Cairo, where one-fourth of the city grounds were overflowed 3 to 5 feet by "snipe" water. The *Ohio* at Pittsburg, fell from 9 ft. 5 in. on the 1st, to 6 ft. 9 in. on the 4th, rose to 14 ft. on the 6th, fell to 6 ft. 6 in. on the 14th, rose to 10 ft. 9 in. on the 17th, fell to 5 ft. on the 27th, rose to 9 ft. 6 in. on the 29th and fell to 8 ft. 3 in. by end of month; at Cincinnati the water continued almost stationary, (at about 28 ft.) until the 6th, when a rapid rise set in reaching 44 ft. 9 in. on the 10; on the 12th the water commenced falling and reached 21 ft. 11 in. on the 26th, after which it rose slowly to end of month; at Louisville a rise of 8 ft. occurred from the 8th to 12th, and the water remained comparatively high until the 20th, after which it fell to 8 ft. 8 in. on the 28th. The *Tennessee* at Chattanooga generally rose from the beginning of the month to the 18th, when the water reached 37 ft. 7 in. or 4 ft. 7 in. above danger-line, after which it fell, passing the danger-line (33 ft.) on the 20th and reaching 7 ft. 2 in. on the 31st; on the 19th the low lands near the city were overflowed. The *Cumberland* at Nashville rose from 34 ft. on the 1st to 40 ft. on the 4th; fell to 32 ft. on the 7th, after which it rose and passing the danger-line, (42 ft.) on the 12th reached 46 ft. 6 in. on the 17th; it remained almost stationary at this high stage until the 20th, after which it fell rapidly, and on the 31st reached 11 ft.; portions of the city were flooded and houses had to be vacated. The *Savannah* at Augusta remained almost stationary until the 9th, when a rapid rise set in; on the 17th the water reached the highest stage, (28 ft. 5 in.) after which it fell to 9 ft. at end of month. The *Alabama* at Montgomery, from the 15th to the 20th, overflowed