

loss about \$50,000." At Pocahontas another "struck the town about 9 p. m., taking a course east of north, track about a quarter of a mile wide, storm lasting thirty seconds; it either demolished or unroofed all the buildings (which were of wood) in the village, and the roaring of the storm was heard miles away. The black cloud and accompanying noise were afterwards distinctly seen and heard from Hatchie bridge, a few miles east of Pocahontas, and at 10:40 p. m. a cyclone (tornado) crossed the track of the Memphis and Charleston railroad at a point about ten miles east of Pocahontas, where the storm did not last over fifteen or twenty seconds, (at this place the track was about 1,000 feet wide,) three houses were blown away, others were more or less damaged, and a house roof and some furniture were carried a distance of three miles." As low pressure area No. X passed eastward over the Southern States on the 15th and 16th, tornadoes occurred at Dallas, Texas, and Walterboro, S. C. The following notes, chiefly newspaper extracts, are to hand: "Dallas, 15th, 1 to 2 p. m., cloudy, with three distinct strata of clouds moving easterly, southerly and northwesterly, falling temperature and barometer; at 2 p. m. a murky, cone-shaped mass of vapor arose west of the north horizon, and swiftly moved southward;" * * * "the roar of the scudding volume presaged the storm;" * * * "it was preceded by hail and followed by heavy rain, which continued intermittently to flood the streets of Dallas for two hours. The hail-stones were flatish-oblong, two to six inches in circumference, one to two inches across and three-fourths to one and one-half in thickness. The black, green-rimmed cone, gradually changing from perpendicular to horizontal, rose and fell in its motion like a monster wave as it sped with its apex pointing south. Before reaching the city the storm-scud parted in an apparent effort to change its course to the westward, the main part veering to the southeast and the other assuming the shape of a waterspout, twirling south of west. The course of the main cloud, which evidently shot upward before reaching the city, is not known; but subsequent developments indicate that the scud again parted, one portion going due east and expanding and the other taking a southwesterly course, assuming the shape of an inverted funnel, gradually lowered until it struck the ridge dividing Ten-mile and Five-mile creeks, seven miles south of Dallas, * * * where it made a conjunction, near Greer's farm, with the body which helped to form the tornado, after which it suddenly changed its course to northeasterly along the valley of Five-mile creek." Another report says: "The angry visitors, one traveling westerly from Trinity river, the other easterly towards the river, were not more than 300 yards wide until they collided near the Greer farm—when united they attained a width of three-fourths of a mile; the contact was preceded by rapid, vivid and blinding lightning, and followed by three deafening crashes of thunder. The force of the wind was terrific." * * * "The cyclone (tornado) having spent its force at the Belt place, the storm took its original course southward." Again: "The motion of the funnel-shaped body which first separated from the cone northwest of Dallas, and also of the other body which afterwards separated from the main scud east of Dallas, was rotary from southeast to northwest, or from right to left, until they collided at Greer's farm. After conjunction the bodies moved as one mass northeastward; but its motion was completely reversed (?), the whirl (?), as is evidenced by the debris and partially destroyed fencing, being from northwest to southeast. After the storm a dead sparrow was picked up, the head of which was completely encased with ice. The track of tornado along Five-mile creek was about eight miles long and two (?) in width; near Lisbon fifteen houses were completely demolished, six others and many out-houses damaged, and about twenty-five persons (ten seriously) more or less injured; fencing was destroyed for a distance of eight miles." The tornado that "traversed the southern portion of South Carolina on the evening of the 16th was almost as violent in Alabama. It swept across the State from Otto, through Lee county, Alabama, tearing down houses and uprooting trees, and passed into Georgia. At Otto the cyclone (tornado) approached in a circular cloud that was seen two miles off, and came with a deep, humming sound. The cloud appears to have rebounded from the earth at intervals. Loss heavy; fields washed smooth by heavy rains. Railroad traffic towards Alabama from South Carolina was stopped on two roads, the tracks being under water for hundreds of yards." The tornado "passed through the centre of Walterboro, S. C., about 4 p. m.; its approach was heard for about three minutes and the storm lasted two minutes; the storm (wind) came from the south about a minute, then shifted to northwest, with new fury; * * * the destruction commenced about one mile south of the village, * * * and some farms were desolated to the east of us; it was followed by terrible thunder-storms all night and deluge of rain next day; it demolished about one-half of the dwellings and every (seven) church; in eastern portion of town trees and ruined houses were massed together in every direction, and all the streets and landmarks totally obliterated; six persons killed, five severely injured, and a number of others cut and bruised. The destruction was accomplished in less than two minutes." At Oakley, about forty miles ENE. of Walterboro, "all the houses occupied by negroes were leveled, one negro killed and many injured; similar casualties are reported from various points along the track of the tornado." On the 27th, at 1 p. m., a very severe storm occurred at Pilot Point, Texas, "sweeping buildings, roofs, trees, fences, &c., in every direction, raising a church twenty feet from the foundation and causing a total destruction of it; maximum measured velocity of wind, NW. 64 miles; rain-fall from 1 to 1:45 p. m., 3.00 inches."

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of omissions to be 0.9 per cent, and of verifications to be 82.9 per cent. The percentages for the four elements are, for the Weather, 88.3; Wind direction, 84.6; Temperature, 81.1; Barometer, 77.6. The percentages of verifications by geographical districts are: New England, 81.8; Middle States, 87.2; South Atlantic States, 82.0; East Gulf States,

85.5; West Gulf States, 81.9; Lower Lake region, 83.2; Upper Lake region, 81.8; Tennessee and the Ohio valley, 84.4; Upper Mississippi valley, 81.5; Lower Missouri valley, 80.1; Northern Pacific coast region, 78.4; Central Pacific coast region, 83.6; Southern Pacific coast region, 90.5. Of the 3,665 predictions that have been made, 132, or 3.6 per cent, are considered to have entirely failed; 109, or 3.0 per cent, were one-fourth verified; 554, or 15.1 per cent, were one-half verified; 526, or 14.4 per cent, were three-fourths verified; 2,334, or 63.9 per cent, were fully verified, so far as can be judged from the tri-daily weather maps.

Cautionary Signals.—192 Cautionary Signals were displayed during the month, of which 128, or 66.7 per cent, were justified. 96 Cautionary Off-shore Signals were displayed, and of these 92, or 95.8 per cent, were justified as to direction; 80, or 83.3 per cent, were justified as to velocity. Of the Cautionary Off-shore Signals 50 were changed from Cautionary. 288 signals of both kinds were displayed, of which 208, or 72.2 per cent, were fully justified. The above does not include signals ordered at 47 display stations, where the velocity is only estimated and not measured. 84 cases were reported of winds of 25 miles or over where signals were not ordered.

NAVIGATION.

Stage of Water in Rivers.—In the table on the right-hand side of chart No. III are given the highest and lowest readings of the Signal Corps river gauges for the month, with the dates. The Missouri rose above the danger point at Omaha on the 9th. Excepting the Savannah and Red, the rivers reached their lowest points at or near the close of the month.

Ice on Lakes, Rivers, &c.—*Missouri*—Ft. Hale, Dak., 14th, first steamboat passed up river. *Red River of the North*—Ft. Pembina, Dak., ice breaking up and moving; 12th, river free of ice; 14th, first steamer passed the fort going south. Pembina, Dak., 2nd, teams continue to cross on the ice; 3d, rapid rise in river; 8th, ice moving; 10th, ice moved out, but gorged one-fourth mile below station; 11th, ice gorge moved out; 12th, navigation opened, much floating ice; 13th, first boat of season departed; 19th, first boat of season arrived. *Mississippi*—St. Paul, 21st, first steamboat arrived. *Hudson*—Albany, N. Y., 1st, schooner arrived from New York city, first through boat of season; 2nd, river clear of ice; 4th, first passenger boat from New York city. *Connecticut*—Lunenburg, 25th, ice passed out. *Kennebec*—Gardiner, Me., 3d, ice broke below bridge and moved down about forty yards; 5th, river clear for one mile below bridge; 10th, river open, having been closed for nine days in April; 11th, ice came down from Augusta. *Penobscot*—Bangor, Me., 24th, ice passed out at 10 a. m.; navigation resumed. *Lake Superior*—Duluth, Minn., 28th, first boat of season departed. *Lake Michigan*—Chicago, 1st, navigation opened; 29th, first vessel arrived from Lake Huron. *Green Bay*—Escanaba, Mich., 4th, ice in bay; 11th, ice cracking; 25th, first boat of season arrived and reported having been twenty-four hours in breaking her way through the ice in the harbor; ice moving out very rapidly; navigation opened. Portage Point, four miles from Escanaba, 10th, ice moving out. *Grand Traverse Bay*—Northport, Mich., 14th, ice moving, harbor partly clear; 15th, ice all driven up the bay, harbor clear; 21st, thin ice in harbor; 26th, first vessel arrived from Chicago; 27th, second steamer arrived; 29th, first vessel from Milwaukee. *Mackinac Straits*—18th, ice broken up between old Mackinac and Mackinac Island; 21st, boats from Lake Huron can reach Point St. Ignace, the north passage being open and the shores free of ice; Mackinac Island, docks free of ice. *Lake Huron*—Alpena, Mich., 5th, first boat of season arrived; 11th, Thunder Bay river clear of ice. Port Huron, 3rd, steamer "Milton D. Ward" made first trip from this port, being first vessel out on the lake, navigation opened. *St. Clair River*—Port Huron, 10th to 15th, river full of floating ice. *Detroit River*—Detroit, 1st, floating ice; 2nd, first steamer left for Cleveland. *Lake Erie*—Toledo, Ohio, 6th, first boat of season arrived. Propeller Enterprise, at Buffalo 24th, from St. Clair river 19th, reported lake almost free of ice until within a few miles of Buffalo, when an immense field of rotten ice was encountered. Buffalo, 26th, ice in bay too solid for vessels to force their way through to the lake. *Niagara River*—Buffalo, 5th, river frozen over; 7th, river open; 16th, floating ice; 22nd, much floating ice, first steamer of season arrived; 26th, ice drifting in a compact field across the entrance of the harbor, completely obstructing navigation. Ft. Niagara, 28th, 29th, 30th, floating ice in river. *Welland Canal*—St. Catharines, Ont., 21st, water let into canal. *Lake Ontario*—Oswego, 9th, first vessel of season arrived; 14th, first vessel of season departed. First steamer of season down the lake from Kingston to Cape Vincent on the 19th, 41 days later than last year. Madison Barracks, 9th, loaded teams crossed bay on the ice; 15th, last team crossed; 26th, bay clear of ice, navigation open. *Lake Champlain*—West Charlotte Vt., 9th, teams crossed ice, which had continued for 53 days; 19th, ice moving a little; 23rd, ice moving with north wind, lake has been covered with ice for 81 days; 24th, ferry boats crossed. Burlington, Vt., 23rd, ice breaking up; reference to records extending over a period of sixty years shows but one other instance where the lake remained so long closed as this year; 24th, first boat of season crossed lake. Plattsburg Barracks, 27th, 28th, ice disappeared. *St. Lawrence River*—Montreal 16th, ice moving; 23rd, channel free of ice, steamer left Boucherville for Montreal. Quebec, 16th, first outward-bound steamer left port. *Magdalen Islands*—28th, steamer "Albert" arrived at Pictou, bringing first mail of season from these Islands, reports winter moderate, field ice left early, and very little ice to be seen in the Gulf.

High Tides.—Cape Lookout, N. C., 10th, 19th; Atlantic City, N. J., 18th, flooding meadows, and submerging about six miles of telegraph line. Barnegat, N. J., 17th. Gloucester, Mass., 18th, two tidal waves, first at 12:30 p. m., and the second at 4 p. m., raising water along the wharves about two and one-half feet; vessels aground. Indianola, 23rd, 24th, tide flooding streets to an average depth of ten inches; in lower portion of town water 2 feet deep. Galveston, 23rd.