

MISCELLANEOUS PHENOMENA.

DROUGHT.

Key West, Fla., 4th: but 0.88 inch of rain has fallen since the 27th of December last; all cisterns are extremely low and many completely empty; families living on the outskirts of the city are depending on supplies brought from the large Government cistern at Fort Taylor; water is carted around in the streets and sold. Quite a heavy rain fell on the 11th, breaking the drought and replenishing the water supply to a limited extent.

FOREST AND PRAIRIE FIRES.

Forest and prairie fires were reported as follows: Fort Sill, Ind. T., 2d to 17th, 20th to 30th; Tribune, Kans., 8th, 12th to 14th; Cedar Springs, S. C., 13th; Fort Reno, Indian T., 9th, 13th, 17th, 30th; Las Animas, Colo., 14th; Fort Bidwell, Cal., 29th; Pike's Peak, Colo., on the 31st, extensive prairie fires were observed to the southeastward of Colorado Springs.

HALOS.

Solar halos were recorded on every day during the month in some part of the country; they were least frequent on the 4th, 8th, 9th, 13th, 14th, and 26th; and most frequent on the 10th, 15th, 19th, 23d, and 24th; they were observed on from ten to fifteen dates in the following states, and territories: Dakota (maximum), Florida, Iowa, New York, Ohio, Texas, Washington, and Wisconsin.

Only a few lunar halos were recorded from the 1st to the 15th, and on the 30th, and 31st, but during the remainder of the month they were extensively observed, being most frequent on the 23d and 24th; none were reported on the 10th and 13th;

they were recorded on the largest number of dates in California and Oregon; in a number of states they were not reported at all.

METEORS.

Meteors were observed, as follows: 1st, Omaha, Nebr. 3d, Mount Vernon, Ala. 6th, Clear Lake, Iowa; Kalamazoo, Mich.; Beverly, N. J. 7th, Wauseon, Ohio; Corry, Pa. 8th, Kalamazoo, Mich., and Wauseon, Ohio. 10th, Clear Lake, Iowa; Tribune, Kans. 13th, Tribune, Kans. 14th, Clear Lake, Iowa. 15th, Auburn, Ala.; Vevay, Ind. 16th, Lead Hill, Ark.; Cedar Keys, Fla. 20th, Yuma, Ariz. 27th and 28th, Clear Lake, Iowa. 30th, Parkston, Dak. 31st, Wilson, Kans.

MIRAGE.

Moorhead, Minn.: villages, hills, timber, and lakes situated to the northeast, east, and southeast of station, and ordinarily not visible from this place, were distinctly seen at 3 p. m. on the 22d.

Fort Assinaboine, Mont.: the banks of Milk River, situated about ten miles northeast of this place, were plainly visible nearly all day on the 15th; objects appeared to be elevated about 5° to 6° above the surface of the ground.

Mirages occurred also, as follows: Webster, Dak., 5th; Cedar Hills, Tex., 8th; Marquette, Nebr., 12th to 14th; Tribune, Kans., 12th to 14th, 18th, 20th, 23d; Cedar Keys, Fla., 19th.

SAND STORMS.

Sand storms were reported, as follows: Fresno, Cal., 1st, 30th, 31st; Fort Mojave, Ariz., 7th, 17th, 18th; Yuma, Ariz., 8th; Willcox, Ariz., 8th, 10th, 11th; Pekin, Ill., 21st; Boise Barracks, Idaho, 31st.

VERIFICATIONS.

INDICATIONS FOR 33 HOURS IN ADVANCE.

The percentages of verifications of the tri-daily indications for March, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for all districts east of the Rocky Mountains for March, 1888, were made by Prof. Cleveland Abbe, except those for Minnesota and Dakota, which were made at Saint Paul, Minn., by 1st Lieutenant Thomas M. Woodruff, 5th Infantry, U. S. Army, Acting Signal Officer; those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Junior Professor C. F. Marvin.

Percentages of indications verified, March, 1888.

States.		States.	
Maine.....	72.55	Kentucky.....	77.42
New Hampshire.....	73.77	Ohio.....	71.77
Vermont.....	67.97	West Virginia.....	79.97
Massachusetts.....	71.55	Indiana.....	78.90
Rhode Island.....	73.84	Illinois.....	80.26
Connecticut.....	72.42	Lower Michigan.....	76.10
Eastern New York.....	71.90	Upper Michigan.....	72.42
Western New York.....	73.13	Wisconsin.....	73.68
Eastern Pennsylvania.....	74.48	Minnesota*.....	67.29
Western Pennsylvania.....	69.52	Iowa.....	74.68
New Jersey.....	77.10	Kansas.....	76.87
Delaware.....	73.61	Nebraska.....	75.94
Maryland.....	73.94	Missouri.....	80.52
District of Columbia.....	72.81	Colorado.....	76.48
Virginia.....	75.61	Eastern and Southwestern Dakota*	68.69
North Carolina.....	78.03	Southern California*	81.84
South Carolina.....	75.10	Northern California*	78.00
Georgia.....	73.00	Oregon*.....	77.55
Eastern Florida.....	76.68	Washington Territory*	73.74
Western Florida.....	72.23	By elements:	
Alabama.....	78.26	Weather.....	81.14
Mississippi.....	80.29	Wind.....	74.51
Louisiana.....	83.77	Temperature.....	68.50
Texas.....	75.16		
Arkansas.....	80.52	General average.....	75.42
Tennessee.....	78.26		

* In determining the general average percentage for the different elements, Minnesota, Dakota, and the Pacific coast states have not been included.

CAUTIONARY SIGNALS.

Of the total number of cautionary and storm signals ordered during March, 1888, it was practicable to determine the justification or failure of forty; justified, twenty-five, or 62.50 per cent. Of the above, thirty-eight were ordered for cautionary signals; number justified, twenty-four or 63.16 per cent. Two storm signals were ordered; justified, one or 50.00 per cent. Total number of direction signals ordered, forty-five; justified, thirty-nine, or 86.67 per cent. Number of signals ordered for easterly winds, thirty; justified, twenty-seven, or 90.00 per cent. Number of signals ordered for westerly winds, fifteen; justified, twelve, or 80.00 per cent.

Number of storms without signals forty-two. Number of signals ordered late, *i. e.*, after the justifying velocity had begun, five, or 12.50 per cent.

COLD-WAVE SIGNALS.

Total number of cold-wave signals ordered from Office Chief Signal Officer, two hundred and thirteen; justified, one hundred and fifteen, or 53.99 per cent. Ninety-eight cold-wave signals were ordered during the month by the Signal Service Officer at Saint Paul, Minn., of which, sixty, or 61.22 per cent., were justified.

LOCAL VERIFICATIONS.

The following extracts from the published reports of state weather services for March, 1888, show the percentages of verification of weather and temperature signals for the several states:

Michigan.—Weather and temperature signals are now displayed in one hundred and forty towns in the state, and on the baggage-cars of twenty-six trains on eight principal railroads of the state.

The indications and cold-warnings are issued by the Chief Signal Officer and distributed to the different stations through the central office. The indications are issued at 1 a. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentage of verification of these indications for March is as follows

(the verification is taken from reports of displaymen furnished this office monthly): temperature, 76.1 per cent; weather, 86.6 per cent.; temperature and weather, 81.3 per cent.

The percentage of verification of weather predictions for March on the D., G. H., and M. R'y, is 90.0 for weather, and 75.0 for temperature; on the C. & G. T. R'y, weather, 88.9, temperature, 86.6; P. H. & N. W. R'y, weather, 90.0, temperature, 87.0; M. C. R'y, weather, 88.0, temperature, 87.0; G. R. & I. R'y, weather, 88.1, temperature, 85.0; C. & W. M. R'y, weather, 86.0, temperature, 80.0; P. O. & P. A. R'y, weather, 90.0, temperature, 87.7.

Cold-wave warnings were issued by the Chief Signal Officer on the 2d at 7 p. m., and were followed by a fall of 35° by the morning of the 3d; on the 16th, at 10.30 a. m., and were followed by a fall of 22° by 7 a. m. of the 17th; on the 20th, at 7 a. m., and were followed by a fall of 23° by 10 p. m. of the same

date; the warning of the 26th was not justified, and one cold wave passed on the 11th, for which no warning was issued.

Minnesota.—The percentage of verification of weather signals was 78 for weather and 81 for temperature.

Nebraska.—The percentages of correct predictions for the state are as follows: temperature, 88.2; weather, 90.0; mean, 89.1.

Nevada.—The verification of the Signal Service indications at Carson City was 89 per cent. for weather and 70 per cent. for temperature.

South Carolina.—The percentages of verifications of the weather and temperature predictions for the state was: for weather, 87.0; for temperature, 79.0.

Tennessee.—The percentage of verification of the daily weather and temperature predictions issued from the Signal Office at Washington to the various stations were, for the state: weather, 86.8 per cent.; temperature, 79.6 per cent.

STATE WEATHER SERVICES.

The following extracts are republished from reports for March, 1888, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The heavy precipitation on the 26th and 27th damaged property throughout the state to a considerable degree. All railroads were more or less injured and the trains on the trunk lines were stopped for several days. Bridges in many localities were swept away, and numerous manufacturing enterprises were forced to stop until the water subsided. The local wind storms accompanying this rain were quite severe in some places, unroofing houses and destroying fences and trees. Some people were injured, but no one was reported killed. This cyclone lasted for two days and the temperature was high during the entire period. Immediately after this storm it turned off quite cool, but a reaction soon set in and the days became warm and pleasant again. Rains were frequent throughout the month, with occasional thunder-storms. The average rainfall was 2.56 inches above the normal.

Frosts were frequent, and toward the latter part of the month quite damaging to the tender buds. At least two-thirds of the fruit crop has been destroyed, and vegetation generally is very backward. The last frost occurred on the 23d.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 53.8; highest monthly mean, 59.8, at Troy; lowest monthly mean, 47.7, at Gadsden; maximum, 88, at Newton, on 4th; minimum, 16, at Gadsden, on the 23d; range for state, 67; greatest monthly range, 60, at Gadsden; least monthly range, 44, at Livingston and Florence.

Precipitation, including melted snow (in inches).—Average for the state, 9.89; greatest, 13.48, at Union Springs; least, 6.50, at Newton.

Wind.—Prevailing direction, southeast.

The "Arkansas Weather Service;" Prof. John C. Branner, Little Rock, director:

Temperature (in degrees Fahr.).—The mean temperature of the month was decidedly below the average, as shown by the reports from the following points with the number of years of comparison: Little Rock, 3.3 lower than an average of eight years; Lead Hill, 2.9 below six years; Washington, 3.6 below twenty years; Fort Smith, 2.4 below five years; Conway, 10.1; Osceola, 10.6; and Russellville 3.4 lower than last year. The highest temperatures were recorded on the 16th and 31st at nearly every station, and the lowest on the 11th and 12th, with but few exceptions. Frosts were of frequent occurrence during the entire month, the latest being reported on the 28th at Dallas and 29th at Fort Smith, Eureka Springs, and Washington.

Precipitation (in inches).—The rainfall was reported generally in excess to the amount of 4.30 at Helena, 3.55 at Washington, 1.58 at Conway, 1.14 at Fort Smith, 1.03 at Russellville, and less than an inch excess at Lead Hill, Eureka Springs, and Little Rock. Snows on the 5th were reported from Lonoke, Alexander, Lead Hill, Russellville, and Little Rock, and on the 10th, 20th, and 22d at Lead Hill and Eureka Springs, and 19th at Dallas.

The "Colorado Weather Service," Prof. F. H. Loud, Colorado Springs, director:

Summary.

Temperature (in degrees Fahr.).—Mean for state (twenty-one stations reporting), 30.6; highest monthly mean, 41.4, at Grand Junction; lowest monthly mean, 15.0, at Climax; maximum, 79.0, at Fort Morgan, on 31st; minimum —17.0, at Alma, on 26th; greatest monthly range, 39.4, at Pandora; least monthly range, 18.0, at Georgetown.

Precipitation, including melted snow (in inches).—Average for state (fifteen stations reporting), 0.62; greatest, 1.49, at ranch near Como; least, 0.14, at Saguash.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, Springfield, director:

The temperature has been considerably below the average. In the northern division it was 4° below; in the central, 3° below, and in the southern, 4° below. In the whole state it was 4° below the average of ten years. Only once in ten years has the monthly mean for March been lower than that of the month just passed, in 1881, when the mean temperature was 34°.

The rainfall in the state during the month was considerably above the average. In the northern division it was 1.11 inches above the average for the previous ten years; in the central division it was 1.06 inches, and in the southern it was 1.29 inches above; while for the whole state it was 1.15 inches above the average for ten years.

The precipitation during January and February of the present year was considerably below the average, but March has supplied the deficiency and brought the rainfall of the three months up to the average.

Heavy rains prevailed through the state on the 25th and 26th, and the following unusually large rainfalls have been reported: 3.13 inches at Jordan's Grove; 2.10 inches at Benton; 2.06 inches at Peoria; 2.00 inches at Pana; 2.00 inches at Wapella; 2.00 inches at Prairieville; 2.00 inches at Flora; 2.00 inches at Mascouta, and 2.00 inches at Three Mile.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

Although the temperature fell less low than in other years, a steady low temperature prevailing caused the mean temperature for the month to be below the normal for March at every station of observation, the deficiency ranging from —0° at Connersville to —6° at Logansport. Abrupt changes in temperature occurred on the 2d, 14th, 15th, 18th, 22d, 26th, 30th, and 31st. The lowest temperature for the month was noted everywhere on the 22d, and the highest at the greatest number of stations on the 19th; except at a few places in the southern portion of the state, the maximum temperature occurred on the 30th or 31st.

Except at Lafayette and Spiceland, the amount of precipitation was at all stations above the normal, the average excess for the state measuring 1.62 inches. It fell mostly in the form of rain, while the amount of snowfall, and the dates on which it fell, were limited.

The general state of the weather during the month has benefited crops and pasturage but little. Vegetation in general at the end of the month, in central and northern portions of the state, is less advanced than usually. Little sunshine, steady cool temperature, thawing during the day and freezing during the night, did not permit vegetation to recover readily.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

Summary.

Temperature (in degrees Fahr.).—Monthly mean for the state, 37° 2; highest monthly mean, 43°, at Independence and Sedan; lowest monthly mean, 32°, at Tribune; absolute maximum, 90°, at Collyer, on the 17th; absolute minimum, —9, at McAllister, on the 5th; range for state, 99°; greatest monthly range, 91°, at McAllister; least monthly range, 58°, at Rome; greatest daily range, 55°, at Collyer, on the 17th; least daily range, 2°, at Independence on the 24th, and at Tribune on the 25th.

Precipitation, including melted snow (in inches).—Average for the state, 2.00; greatest, 5.47, at Lawrence; least, 0.30, at Collyer and Winona.

Wind.—Prevailing direction, south.

The "Louisiana State Weather Service," in charge of R. E. Kerkam, Sergeant, Signal Corps, at New Orleans:

Temperature (in degrees Fahr.).—The highest temperature, 86, occurred at Liberty Hill on 31st; the lowest, 24, at Clinton on the 12th; monthly range of temperature 62.

Precipitation (in inches).—The precipitation for the month was about 1.50 in excess of the normal in all parts of the state. The heaviest rains reported are as follows: Natchitoches, 2.30, on the 9th; Vidalia, 3.25, on the 27th; Clinton, 3.50, on the 10th; Baton Rouge, 2.05, on the 19th; Grand Coteau, 2.74, on the 27th; Donaldsonville, 2.78, on the 19th; Saint Martinsville, 2.04, on the 10th; New Orleans, 2.02, on the 26th; Morgan City, 3.25, on the 27th.

Wind.—The prevailing direction of the wind was from the north.

The "Michigan Weather Service," N. B. Conger, Sergeant, Signal Corps, Lansing, director:

Temperature (in degrees Fahr.).—The temperature was below the normal in all sections during March. The greatest departure from the normal was in the upper peninsula, where it reached 9.1; the least in the central section,