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INTRODUCTION.

This REVIEW is based on reports for October, 1890, from 2,319 regular and voluntary observers. These reports are classified as follows: 166 reports from Signal Service stations; 118 reports from United States Army post surgeons; 1,512 monthly reports from state weather service and voluntary observers; 32 reports from Canadian stations; 166 reports through the Central Pacific Railway Company; 325 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Ser-

vice;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Mississippi, Missouri, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, North and South Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, and Wisconsin, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR OCTOBER, 1890.

The month was warmer than the average October over the northern part of the country east of the valley of the Columbia River, along the Pacific coast south of the 40th parallel, over the southwest part of the plateau region, on the southeast slope of the Rocky Mountains, in the lower Rio Grande valley, and in southern Florida; elsewhere the month was cooler than usual. The greatest departure above the average temperature for October occurred in Manitoba and on the south Pacific coast, where it exceeded 4°, and the most marked departure below the average was noted over the interior of Alabama and Georgia, and in east Tennessee, where it equalled or exceeded 3°. At Los Angeles, Cal., the mean temperature was 1°.5 higher than previously reported for October. The highest temperature reported by a regular station of the Signal Service was 99° at Los Angeles, Cal., and by a voluntary observer, 118°, at Merced, Cal. At Galveston, Tex., the maximum temperature was 2° higher than previously reported for October. The lowest temperature reported by a regular station of the Signal Service was 14° at Huron, S. Dak., and by a voluntary observer, -10°, at Breckenridge, Colo. At Key West, Fla., the minimum temperature was 1° lower than previously reported for October. Killing frost occurred on the middle Atlantic coast from New Jersey northward, in the interior of the Gulf States, in central New Mexico and southeast Arizona, in eastern California, and along the Oregon and Washington coasts.

The heaviest precipitation ever reported for October occurred at stations in eastern Massachusetts, central and northeastern Pennsylvania, western Maryland, extreme western Florida, south-central Louisiana, east-central lower Michigan, north-western North Dakota, north-central Montana, and south-western Arizona. The least precipitation ever reported for October occurred in north-central Kansas, west-central Texas, east-central Washington, and at San Francisco, Cal. The greatest excess above the average precipitation for October was reported on the southeast New England coast, where it exceeded 6.00 inches; in extreme northwestern Washington and the adjoining part of British Columbia the excess varied from 4.00 to nearly 6.00 inches; in east-central Texas it exceeded 5.00 inches; in extreme western Florida 4.00 inches; and in north-

east Iowa, at Rio Grande City, Tex., and on Prince Edward Island, Gulf of Saint Lawrence, 3.00 inches. The most marked deficiency in monthly precipitation occurred at Key West, Fla., where it was nearly 4.00 inches, and the deficiency was more than 2.00 at Eastport, Me., Quebec, on the North Carolina coast, at Springfield, Ill., and Escanaba, Mich. In the east Gulf states, New England, and the lower lake region the precipitation was two-thirds to three-fourths greater, and in the middle Atlantic states it was about one-half greater than the average. At Key West, Fla., about one-third, at Spokane Falls, Wash., about one-half, and on the middle-eastern slope of the Rocky Mountains, and in the Missouri valley, two-thirds to three-fourths of the usual amount of precipitation was reported. Reports from California indicate some damage to raisin grapes by the rain of the last few days of September. Monthly snowfall exceeding 20.0 inches was reported at elevated stations in central Colorado, and at Virginia City, Mont.; 2.0 to 7.0 inches fell along the line of the Central Pacific Railroad crossing the Sierra Nevada Mountains; 6.0 to 8.0 inches in northeastern lower Idaho; 2.0 to 5.0 inches in central and western Nevada; 5.0 inches in southwestern Nebraska; 8.0 inches in extreme northwestern Minnesota; more than 10.0 inches in north-central upper Michigan; 11.0 inches in extreme western New York; 8.0 to 11.0 inches in south-central Pennsylvania; and 8.0 inches in northeast West Virginia.

On the 16th a tornado moved northeastward from near Hasty, N. C., to northwest of Maxton, and thence passed to a point a few miles northeast of Floral College, N. C., where it disappeared. During the passage of this storm one person was killed and several were injured. The damage to houses was about \$1,000, and to crops about \$1,000. Destructive general storms occurred on the Gulf of Saint Lawrence on the 5th and 6th; on the upper lakes from the 12th to 14th; along the middle Atlantic and New England coasts and on the lower lakes on the 17th; on Lake Michigan on the 18th; in southeast New York and along the south New England coast on the 19th; over Chesapeake Bay and along the middle Atlantic coast on the 23d; on the middle Atlantic and New England coasts, 24th; and on the south New England coast, 24th and 25th.

Widely observed auroral displays were observed on the 17th,