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○ INTRODUCTION.

This REVIEW is based on reports for April, 1890, from 2,296 regular and voluntary observers. These reports are classified as follows: 170 reports from Signal Service stations; 124 reports from United States Army post surgeons; 1,423 monthly reports from state weather service and voluntary observers; 23 reports from Canadian stations; 180 reports through the Central Pacific Railway Company; 376 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois,

Indiana, The Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, 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, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

Reports of rainfall observations of the United States Geological Survey in Colorado, New Mexico, and Arizona were not received for April, 1890.

○ CHARACTERISTICS OF THE WEATHER FOR APRIL, 1890.

The great flood in the lower Mississippi valley continued throughout the month. On the 1st the river was rising at Cairo, Ill., and Memphis, Tenn., and was nearly stationary or falling slowly from Memphis to New Orleans. The breaks at Offutt and Skipwith, Miss., had flooded the southern part of Washington, Issaquena, and western Sharkey counties, Miss.; Huntington, Bolivar Co., Miss., was inundated; and the land back of Rolling Fork and Mayersville, Miss., was flooded. In Louisiana water from the Nita crevasse covered the greater portion of Saint James, Saint Charles, Saint John, and Jefferson parishes as early as the 4th of the month, and on the 13th it reached the Illinois Central Railroad, and within twenty-four hours had covered the tracks for twenty miles. A large amount of water from this crevasse found its way into Lake Pontchartrain by means of the Manchac Passes. The Austin, Miss., crevasse, which occurred March 30th, overflowed about 10,000 acres in Mississippi. On the Arkansas side of the river about 10,000 acres were inundated. The following are the more important crevasses reported for April: On the 4th a crevasse occurred at Catfish Point, Miss., which rapidly widened to fifteen hundred feet; several thousand acres of cultivated land were submerged, many houses washed away, and much stock drowned. On the 7th the Opossum Fork levee, seventy-seven miles above Vicksburg, Miss., was cut, and great damage was done to adjacent property. On the 21st the upper end of the old Morganza levee, Pointe Coupee parish, La., gave way, and crevasses occurred in the levees of the Pointe Coupee front from the 22d to the 25th, that of the 25th in the lower Morganza levee being twelve hundred feet wide. The Pointe Coupee levees protected the sugar belt and were the most important in Louisiana, or in the entire Mississippi system. The principal of these was the great Morganza levee, which was the first to go, and it was closely followed by numerous other breaks, and practically the entire parish was flooded. At the close of the month not less than fifteen parishes, or about one-fourth of the state of Louisiana, had been affected by the flood, and the country generally between the Mississippi and Ouachita rivers was under water. On the 3d the water reached 48.7 feet on the gauge at Cairo, Ill., where

it remained nearly stationary until the 6th; this was the highest water reached at that point during the current month. On the 3d the river again reached the danger-point, 35.6 feet, at Memphis, Tenn. On the 22d the highest water of the month, 31.9 feet, was reported at Plaquemine, La. On the 23d the Red River fell below the danger-point, 29.9 feet, at Shreveport, La., and the highest water of the month, 48.55 feet, occurred at Natchez, Miss. On the 24th the highest water of the month, 45.1 feet, occurred at Saint Joseph, La. On the 28th the Red River had again reached the danger-line at Shreveport, La., and at the close of the month had risen to 30.6 feet, the highest point reached this year. At the close of the month the river was 3.8 feet below the danger-line at Cairo, Ill., and rising; 4.4 feet above at Memphis, Tenn., and rising; 4.3 feet below at Helena, Ark., and falling; 8.6 feet above at Vicksburg, Miss., and falling; 1.7 foot above at New Orleans, La., and falling. At Shreveport, La., the Red River was 1.6 foot above the danger-line and rising. The Arkansas River was 2.5 feet above the danger-line at Fort Smith, Ark., and falling, and 1.3 foot above at Little Rock, Ark., and falling. The Ohio River fell below the danger-line at Louisville, Ky., on the 1st.

The highest temperature noted at a regular station of the Signal Service was 98°, at Yuma, Ariz., on the 28th, and temperature rising to 105° on the 30th was reported by the voluntary observer at Gové City, Kans. The lowest temperature reported was -17°, at Pokegama Falls, Minn., on the 1st. The month was warmer than the average April, except in the extreme northeastern and southeastern, the south-central, and extreme northwestern parts of the country, and along the immediate middle and south Pacific coasts. The greatest departures above the average temperature occurred on the North Carolina coast and within an area extending from northwestern Minnesota southwestward over North Dakota, where they were more than 5°, and the most marked departures below the average temperature were noted on the north Pacific coast, where they averaged more than 2° and exceeded 6° at a seven-year record station. At stations in North Carolina, Iowa, and Nebraska, the mean temperature was higher than previously noted for April; at stations in the south Atlantic states, the

Missouri and upper Mississippi valleys, on the northeastern slope of the Rocky Mountains, in the northern plateau region, and along the north Pacific coast the maximum temperature was as high or higher than reported for April of preceding years; and at stations on the eastern slope of the Rocky Mountains, in the southern and northern plateau regions, and on the north Pacific coast the minimum temperature was as low or lower than previously reported for April.

In New Jersey the peach crop was damaged by cold on the 1st, 2d, 19th, and 20th. On the 20th frost damaged young fruit trees and killed tender plants in Virginia. On the 11th and 21st frost injured crops, vegetables, and fruit in South Carolina. On the 10th light frost damaged tender plants at Little Rock, Ark. On the 11th and 12th frost injured the peach crop in Oregon. On the 12th and 13th buds of raisin vines in the neighborhood of Fresno, Cal., were killed by cold.

The heaviest monthly precipitation reported was 16.85, at Columbia, La., and the rainfall exceeded ten inches in areas in the west Gulf states and in Siskiyou county, Cal. In areas in southwestern Arizona, southern California, southwestern Idaho, northeastern Montana, western Nevada, extreme western Texas, and central Utah no precipitation was reported. The precipitation was in excess of the average for the month at several stations on the south New England and middle Atlantic coasts, in the west Gulf states and thence northwestward over southern Missouri, the northern part of the Ohio Valley, and the eastern part of the upper lake region, along the eastern slope of the Rocky Mountains south of the forty-fifth parallel, in southeastern Arizona, and on the extreme north Pacific coast; elsewhere the precipitation was deficient. The greatest excess in precipitation occurred in south-central Indian Territory and thence southward to central Texas, and in south-central

Louisiana, where it was more than six inches, and the most marked deficiency was noted in central Alabama, where it was more than four inches. In the Rio Grande Valley and over the southeastern slope of the Rocky Mountains more than three times the usual amount of rain fell; over the southern plateau region nearly double the usual amount; and in the west Gulf states the precipitation was about one-half greater than the average for April. On the south Pacific coast the monthly precipitation was one-tenth, over the northern plateau region about one-fourth, and in the south Atlantic and east Gulf states, the extreme northwest, the middle plateau region, and the middle Pacific coast about one-half the usual amount for April. The rainfall for the month was the heaviest ever noted for April during the respective periods of observation at stations in Louisiana, Texas, Ohio, Indiana, Wyoming, Colorado, Indian Territory, New Mexico, and Arizona, and was the least ever reported for April at stations in Minnesota, South Dakota, Montana, southern California, and eastern Washington.

On the 8th destructive local storms occurred in Illinois, Ohio, Iowa, and Michigan; well-defined tornadoes occurred in Huron, Medina, and Summit counties, Ohio; wind storms prevailed from the upper Mississippi river to the Rocky Mountains; and heavy gales were reported on the lower lakes. On the 9th severe storms swept over portions of Virginia, western Pennsylvania, the south Atlantic and east Gulf states, and the Lake region. Reports of the 24th to 26th state that large tracts of country from central Texas into Indian Territory were under water as the result of excessively heavy rains. Destructive hail storms were reported at Roberts and Prophetstown, Ill., on the 8th; in the northern part of Champaign county, Ill., on the 13th; at Abilene, Tex., on the 24th; at Memphis, Tenn., on the 26th; and at Baltimore, Md., on the 27th.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for April, 1890, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The departure of the mean pressure for April, 1890, obtained from observations taken twice daily at the hours named from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me.....	+ .013	Saint Louis, Mo.....	+ .001
Boston, Mass.....	+ .013	New Orleans, La.....	+ .002
New York City.....	+ .010	Saint Paul, Minn.....	— .002
Philadelphia, Pa.....	+ .010	Galveston, Tex.....	— .003
Washington City.....	+ .006	Dodge City, Kans.....	— .013
Savannah, Ga.....	+ .004	Santa Fe, N. Mex.....	— .013
Buffalo, N. Y.....	+ .005	Denver, Colo.....	— .010
Detroit, Mich.....	+ .002	Salt Lake City, Utah.....	— .009
Cincinnati, Ohio.....	+ .001	Portland, Oregon.....	— .015
Memphis, Tenn.....	+ .001	San Francisco, Cal.....	— .015
Chicago, Ill.....	+ .005	San Diego, Cal.....	— .016

For April, 1890, the mean pressure was highest from Virginia southward over the south Atlantic states, Georgia, and the Florida Peninsula, where it was above 30.15, the highest mean reading, 30.18, being noted at Augusta and Savannah, Ga., and Titusville, Fla., respectively. The mean pressure was above 30.10 from the Lake region southward over the east Gulf states, and along the immediate Pacific coast north of the fortieth parallel. The mean pressure was lowest over the southwestern and western parts of the southern plateau region, where it fell to or below 29.90, the lowest mean value reported being 29.89, at Keeler, Cal. The mean pressure was below 29.95 over the Gulf of Saint Lawrence, and fell to or below 30.00 over a greater part of the plateau region south of the fortieth parallel, and in central Montana.

A comparison of the pressure chart for April with that of the

preceding month shows that there has been an increase in mean pressure east of the Mississippi River, and from the north Pacific coast eastward over the northern Rocky Mountain regions and thence southeastward to the west Gulf coast; elsewhere the mean pressure was lower than for March. The relative positions of the areas of highest and lowest mean pressure remained about the same, the pressure for each month being highest over the southeastern states and on the Pacific coast, and lowest over the Gulf of Saint Lawrence and the southern plateau region.

The mean pressure was above the normal over the entire country, save at Yuma, Ariz., and Calgary, N. W. T., where it was .01 and .02, respectively, below the normal. The greatest departures above the normal pressure were noted at stations along the Atlantic coast from New Hampshire to Georgia, and along the east shore of Lake Huron, where they equalled or exceeded .15, whence they decreased westward and northwestward to less than .05 on the Pacific coast and over the northern Rocky Mountain region.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In April, 1890, the monthly ranges were greatest in central and eastern New York, lower Michigan, and extreme northwestern Minnesota, where they equalled or exceeded 1.20, whence they decreased eastward to less than 1.00 over eastern Maine, southward to less than .40 over extreme southern Florida and the middle Gulf coast, southwest to less than .30 on the coast of southern California, and westward to less than .80 in the valley of the Columbia River. Along the Atlantic coast the