

## ANNUAL SUMMARY FOR 1892.

The following general discussion of the weather over the United States during 1892 is based upon seven charts, published herewith, which show, respectively: I. The annual mean atmospheric pressure and the prevailing winds. II. The annual mean temperature and the departure from the normal temperature. III. The maximum temperature. IV. The minimum temperature. V. The absolute ranges of temperature. VI. The annual precipitation. VII. The departure of the annual precipitation from the normal precipitation. These charts have been prepared from data, published herewith, received from 1,669 regular and voluntary observers of the Weather Bureau.

## ATMOSPHERIC PRESSURE.

The annual mean pressure was highest east of the Mississippi and south of the Ohio rivers, where it was above 30.10, and was lowest over the Canadian Maritime Provinces and the west part of the southern plateau region, where it was below 29.95. Over the greater part of the country east of the 100th meridian and south of a line traced from Lake Superior to New Jersey, and along the immediate middle and north Pacific coasts the mean pressure was above 30.05. In eastern New England, on the northeast slope of the Rocky Mountains, and over the southwestern plateau region and the interior of California the mean values were below 30.00.

## TEMPERATURE.

The annual mean temperature was highest in the lower Colorado and lower Gila valleys, and at Key West, Fla., where it was above 75°. It was above 70° over the southern half of the Florida Peninsula, in extreme southern Texas, and in adjoining parts of western Arizona and southern California, and was above 60° south of a line traced from southern North Carolina westward to southern New Mexico. The mean values were also above 60° over the southwest half of Arizona, and in southern and interior parts of California. The annual mean temperature was lowest on the north shore of Lake Superior, in the Saskatchewan Valley, and at mountain stations in central Colorado, where it was below 35°. The mean readings were below 40° in Quebec, in the Lake Superior region, and in northern Minnesota, North Dakota, and northeastern Montana. Over northern New England and northern New York, and north of a line traced from Lake Ontario to eastern Wyoming, thence to north-central New Mexico, and thence northwestward over the northern plateau region the mean temperature was below 45°. The mean values were generally below 50° over the northern half of the country east of the Rocky Mountains, and over the plateau region, save in southwestern Arizona.

## DEPARTURE FROM NORMAL TEMPERATURE.

The mean temperature was below the normal east of the Mississippi River and south of the Great Lakes, in an area extending from central New York over southern Maine, in the upper Saskatchewan valley, and generally over the middle and southern plateau and the middle Rocky Mountain regions. The most marked departure below the normal temperature was noted at Cincinnati, Ohio, where the mean reading was 2° below the annual normal temperature. In an irregular area extending from the upper Mississippi valley to the west Gulf states and the south Atlantic coast, and at Portland, Me., Oswego, N. Y., and Winnemucca, Nev., the mean values were 1° or more below the normal. In northern Alberta the mean temperature was 1° to 2° lower than usual. The greatest departure above the normal temperature was reported at Chatham, N. B., where it was 4°. The departure above the normal was 2° at Sydney, C. B. I., and Rockliffe,

Ont., and exceeded 1° over eastern and northern Maine, the greater part of Ontario, in the Red River of the North Valley, western South Dakota, east-central Texas, central New Mexico, and western Washington.

## YEARS OF HIGHEST MEAN TEMPERATURE.

Exceptionally high annual mean temperatures were not reported for 1892.

From Colorado and the southeast slope of the Rocky Mountains over the interior of the Gulf States to the south Atlantic coast the highest annual mean temperature occurred in 1890; from the north Pacific coast to the middle Missouri and Red River of the North valleys in 1889; from Kentucky over the middle and upper Ohio valleys, Pennsylvania, Maryland, southern New York, and southern New England in 1881; and from the lower Missouri and upper Mississippi valleys over the Lake region in 1878.

## YEARS OF LOWEST MEAN TEMPERATURE.

At Key West, Fla., 22 years record, the annual mean temperature, 76°.7, was 0°.2 lower than the lowest annual mean temperature previously reported at that station, noted in 1886. Over the Southern States east of the Rocky Mountains the lowest annual mean temperature occurred in 1885 and 1886; from the Missouri Valley over the Ohio Valley, the Lake region, and the middle Atlantic and New England states in 1875 and 1885; from the middle-eastern slope of the Rocky Mountains over the valley of the Red River of the North in 1883; and in the Pacific coast states in 1880.

## MAXIMUM TEMPERATURE.

At Concordia, Kans., the maximum temperature of the year, 104°, noted July 21st, was the highest temperature recorded at that station during the eight-year period of observation. At Eastport, Me., and Block Island, R. I., the maximum temperature, 88°, noted July 26th and July 28th, respectively, was as high as previously reported at those stations. The highest temperature registered at a regular station of the Weather Bureau in 1892 was 116° at Yuma, Ariz., June 20th. At Fresno, Cal., a maximum of 112° was noted August 18th. The maximum values were above 100° in the middle and upper Missouri valleys, generally on the eastern slope of the Rocky Mountains, over the plateau regions, and in the central valleys of California. At Philadelphia, Pa., a reading of 101° was observed July 26th, and the temperature reached 100° at Lynchburg, Va., July 27th. Reports of voluntary observers show maximum temperature above 120° in the Colorado Desert, Cal., in June. At stations on the south and east New England, Carolina, Washington, Oregon, and north and south California coasts the maximum temperature was below 90°. At Key West, Fla., the maximum temperature of the year was 90°, and at Eureka, Cal., the highest temperature, 69°, was reached October 8th.

## MINIMUM TEMPERATURE.

The lowest temperature for the year reported by a regular station of the Weather Bureau was -45° at Miles City, Mont., January 18th. On January 15th the minimum temperature at Saint Vincent, Minn., was -42°. The line of zero temperature is traced from Boston, Mass., to northwestern Ohio. This line describes a loop over West Virginia, western Virginia, and western North Carolina, and is traced from southern Ohio southwestward to northern Texas, thence to central Arizona, and thence irregularly northward over Nevada, eastern Oregon, and eastern Washington. The line of freezing weather crosses the Florida Peninsula just north of Titusville and Tampa, and is traced inside the California coast line south of the 40th parallel. The lowest temperature reached at Key West, Fla., was 53° on March 19th. The coldest weather in the Gulf and

south Atlantic states occurred December 27th and 28th, when the minimum temperature reached 25° at Galveston, Tex., 23° at New Orleans, La., and 20° at Mobile, Ala., on the 27th, and 13° at Atlanta, Ga., and 25° at Savannah, Ga., on the 28th. The lowest temperature was reached in Florida January 4th, March 19th, and December 29th, when the temperature fell below freezing to about the 29th parallel.

#### TEMPERATURE RANGES.

The greatest range of temperature for the year, 150°, was noted at Miles City, Mont. The range for the year exceeded 120° from the middle Missouri valley, western Iowa, and Minnesota to the Rocky Mountains, and was more than 100° from the east part of the middle and northern plateau region to Wisconsin, and at Northfield, Vt. The least yearly range of temperature, 37°, was noted at Key West, Fla., and the range at Eureka, Cal., was 38°. At stations on the immediate south Atlantic and Gulf coasts, over the Florida Peninsula, and in western parts of Washington, Oregon, and California, the yearly range of temperature was less than 70°.

#### PRECIPITATION.

The greatest precipitation for the year, 109.67 inches, was reported at Neah Bay, Wash. The yearly precipitation exceeded 70.00 inches along the Washington coast, on the California coast somewhat south of Eureka, at stations on the Central Pacific Railroad crossing the Sierra Nevada Mountains, in an area in southwestern Arkansas, and at Mobile, Ala. In Nova Scotia, at points on the Florida and south Atlantic coasts, generally over the middle Gulf states, northeastern Texas, Arkansas, and Tennessee, in areas in northern California, and along the Oregon and Washington coasts the yearly amount exceeded 50.00 inches. From the Saint Lawrence River, the Lake region, and the upper Mississippi and lower Missouri valleys to the middle and east Gulf and Florida coasts, the yearly precipitation exceeded 30.00 inches, and over the greater part of that region, save in the Southern States, the amount ranged from 30.00 to 50.00 inches. The least precipitation for the year was noted at stations in the Colorado Desert, Cal., and in the lower Colorado valley, Arizona, where the aggregate amount was less than 5.00 inches. Less than 10.00 inches was reported generally over the middle and southern plateau regions and in southeastern California. The yearly precipitation was generally less than 20.00 inches on the northeast slope of the Rocky Mountains and from the Rocky to the Sierra Nevada Mountain ranges.

#### DEPARTURE FROM NORMAL PRECIPITATION.

The yearly precipitation was deficient in the Atlantic coast states, the Ohio Valley, the northern lake region, along the east and west Gulf coasts, and generally in the Rocky Mountain and plateau regions. On the middle and south Pacific and Washington coasts, in the eastern Saskatchewan valley, and from the upper Missouri and upper Mississippi valleys to the middle Gulf coast more than the usual amount of precipitation was reported. The precipitation was also in excess at Walla Walla, Wash., over southern Ontario, in the upper Saint Lawrence valley, and over western Nova Scotia. The most marked deficiency was noted at Galveston, Tex., where less than one-half the usual amount of rain fell. At Eastport, Me., Key West, Fla., and Portland, Oregon, less than seven-tenths of the usual amount of precipitation was reported. At Valentine, Nebr., the annual precipitation was about one-half greater, and generally in an area extending from the upper Mississippi and middle Missouri valleys and the middle-eastern slope of the Rocky Mountains to northeastern Texas and the middle Gulf states it was one-tenth to three-tenths greater than the normal amount. At San Diego, Cal., the amount for the year, 9.09, was two-tenths greater than the average for that station.

#### YEARS OF GREATEST PRECIPITATION.

At Montgomery, Ala., and Palestine, Tex., the annual precipitation was the greatest ever reported by 5.85 inches, and 1.53 inch, respectively. The heaviest rainfall previously noted at Montgomery occurred in 1873, and the heaviest annual precipitation for preceding years was reported at Palestine in 1888.

The greatest annual precipitation commonly occurs on the extreme north Pacific coast, where it averages about 102 inches at Neah Bay. In 1886 the precipitation at that station was 123.23 inches, and in 1891 it was 121.21 inches. On the middle and south Pacific coasts the greatest yearly precipitation occurred in 1884, when it varied from 34.92 inches at Sacramento, Cal., and 38.82 inches at San Francisco, Cal., to 40.39 inches at Los Angeles, Cal., and 27.59 inches at San Diego, Cal. The heaviest precipitation noted for the southern plateau region also occurred in 1884, when it varied from 5.86 inches at Yuma, Ariz., to 18.30 inches at El Paso, Tex., and 23.50 inches at Fort Stanton, N. Mex. From the Missouri Valley over the extreme upper Mississippi valley and the western lake region the yearly precipitation was greatest in 1881; in the middle and upper Mississippi and Ohio valleys in 1876 and 1882; in the lower lake region, New York, and central New England in 1878; in the middle Atlantic states in 1889; and on the North Carolina coast in 1877.

#### YEARS OF LEAST PRECIPITATION.

At the following-named regular stations of the Weather Bureau the precipitation for 1892 was the least ever reported by the amounts given: Eastport, Me., 32.20 inches, 4.24 inches less than for 1891; New London, Conn., 34.75 inches, 4.60 inches less than for 1878; New Haven, Conn., 37.78 inches, 0.54 inch less than for 1885; Kittyhawk, N. C., 38.39 inches, 4.25 inches less than for 1891; Hatteras, N. C., 52.88 inches, 1.84 inch less than for 1886; Augusta, Ga., 39.27 inches, 0.63 inch less than for 1883; Key West, Fla., 24.91 inches, 5.22 inches less than for 1886; Galveston, Tex., 24.78 inches, 26.20 inches less than for 1879; and Fort Stanton, N. Mex., 11.34 inches, 1.23 inch less than for 1885. From the north Pacific coast over North Dakota, and over Lower Michigan and the interior of the east Gulf states the least precipitation occurred in 1889; in Iowa in 1887; in Arkansas in 1885; and at points on the south Pacific and south Atlantic coasts in 1881.

#### NOTABLE METEOROLOGICAL FEATURES OF 1892.

The principal cold wave of January appeared in the Northwest on the 16th, and reached the Atlantic coast the night of the 19-20th. Attending this cold wave the temperature fell 40° to 45° below zero in eastern Montana and North Dakota, the line of zero temperature reached northern Texas, cold weather caused loss of stock on the ranges from Kansas to Texas, and vegetation on the west Gulf coast was killed by frost. Heavy frost occurred as far south as Jupiter, Fla., the morning of the 3d. Heavy rain the middle part of the month caused high water in the streams of the eastern and southeastern states and in the Ohio River and tributaries. Severe local storms occurred in the east Gulf and south Atlantic states on the 5th and 6th. At Fayetteville, Ga., 3 persons were killed, a number were injured, and property to the value of \$30,000 to \$50,000 was destroyed by a tornado. The upper Mississippi and middle and upper Missouri rivers were frozen throughout the month. The Mississippi River was frozen over at Saint Louis, Mo., and at points thence southward to Cairo, Ill., during a great part of the last half of the month. Navigation on the Ohio River was interrupted by floating ice.

In February the principal cold wave advanced from the Northwest to the Atlantic coast from the 13th to 16th, and frost occurred over the Florida Peninsula as far south as Jupiter. Ice in the Saint Clair River broke up the early

part of the month. An unusually heavy ice gorge in the Allegheny River near Red Bank broke on the 20th. Unusually brilliant auroral displays were observed generally over the United States on the 13th.

In March cold and frost on the 11th and 12th injured vegetation in the Gulf and south Atlantic states. Low temperature and frost from the 17th to 19th seriously injured vegetation in the Southern States. On the 16th and 17th the snowfall in central and southwestern Tennessee was the heaviest on record for that section, the depth of snowfall varying from 7 to 25 inches. On the 31st heavy gales and destructive local storms occurred from Nebraska and Iowa to central Texas. Tornadoes were reported at points in south-central Nebraska, central Kansas, and central Texas. The loss of human life by this group of tornadoes was placed at 34 in Kansas and 2 in Texas, and the estimated value of property destroyed in Kansas was \$150,000, and in Texas \$12,000. Navigation was partially resumed on Lakes Ontario, Erie, and Michigan, and on the upper Mississippi river.

In April cool and wet weather delayed farming operations in the Pacific coast states, the Dakotas, Nebraska, parts of Kansas and Indian Territory, and in Minnesota, Iowa, Missouri, and Louisiana. In Florida oranges and small fruits were injured by drought. A scarcity of water and grass caused a great loss of live stock on the ranges of southern and western Texas and New Mexico. Frost on the 10th and 11th injured tender vegetation from Tennessee to the Carolina coast, and on the 16th frost occurred in the Carolinas and Georgia. Heavy snow the early part of the month caused a great loss of live stock in the Black Hills region of South Dakota and Wyoming. In the early part of the month streams in the lower Ohio valley, Tennessee, Mississippi, Alabama, and New York rose rapidly, and great damage was caused by flood in Tennessee, northern Alabama, and Mississippi. At the close of the month the Mississippi River was above the danger-line from Cairo to the Gulf. The Red River of the North overflowed its banks at Saint Vincent, Minn., on the 10th.

In May cold and wet weather interfered with farming operations from the Mississippi River to the Rocky Mountains. Immense damage to property was caused by flood along the Mississippi River and tributaries. About 60,000 acres of cultivated land in the American Bottom, opposite Saint Louis, Mo., were submerged. The Mississippi River reached high-water mark at New Orleans, La., and plantations were inundated in various parts of Louisiana. The Missouri River flooded low-lying parts of Kansas City and suburbs. Great devastation by flood was reported along the Illinois River. Flood in the Floyd Valley, Iowa, resulted in the loss of about 20 lives, and destruction of property to the estimated value of \$1,000,000. At Fort Smith, Ark., the Arkansas River reached the highest stage on record; about 10,000 acres of cultivated land in that section were overflowed. At Little Rock, Ark., the stage of water was the highest reached since 1844. Destructive floods occurred along the Red River in Texas and Louisiana. At Shreveport, La., the river reached the highest stage ever noted at that point. At the close of the month the Willamette River was over the lower docks at Portland, Oregon.

In June excessive rainfall interfered with farming operations in western Pennsylvania, northern Ohio, and Wisconsin. The warmest weather on record for June was reported at stations in the middle Atlantic and New England states on the 13th and 14th. At stations in western Florida, Louisiana, and the middle Missouri valley the month was the coolest June on record. At stations in the Lake region and northwestern New England the monthly precipitation was the greatest, and in parts of Kansas and Nebraska it was the least on record for June. The Arkansas River reached a maxi-

imum stage at Little Rock, Ark., on the 6th. At New Orleans, La., the Mississippi River reached the highest stage on record, 17.6 feet, on the 11th. At Davenport, Iowa, the Mississippi reached the highest stage on record on the 27th. On the 24th the Missouri River reached the highest stage on record, 18.1 feet, at Fort Buford, N. Dak. Destructive floods occurred during the month in Indiana, Illinois, Missouri, northwestern Pennsylvania, and Vermont.

Exceptionally warm weather prevailed east of the Rocky Mountains during the second and third decades of July. In the east Gulf states excessive rainfall damaged crops. In parts of New England, the Ohio Valley, and the interior of Texas vegetation was damaged by drought. The Mississippi River subsided slowly, and at the close of the month was below the danger-line, save at New Orleans. High water in the Tombigbee, Warrior, Alabama, Coosa, and Pearl rivers resulted in considerable loss of property and crops in Mississippi and Alabama.

Exceptionally warm weather continued over the eastern part of the country during the first decade of August. The month was unusually dry in the middle Atlantic states. In a number of the Western States drought was broken by general rains on the 9th. On the 30th heavy gales caused loss of life and considerable damage to shipping on the upper lakes.

Over a great part of the Rocky Mountain region the month of September, 1892, was the warmest and driest September on record. The month was also very dry in the Missouri Valley, and in parts of Wisconsin and eastern Kentucky. The monthly precipitation was in excess on the south Atlantic, middle Gulf, and extreme north Pacific coasts.

In the Atlantic coast states, and in parts of the Ohio and upper Mississippi valleys and Tennessee October, 1892, was the driest October on record. In Indian Territory excessive rainfall damaged crops. A destructive storm prevailed over the Great Lakes on the 28th and 29th. Many vessels were wrecked or damaged and loss of life was reported.

November was an unusually stormy month. Heavy rains from the 17th to the 23d caused great damage by flood on the north Pacific coast. Unusually severe gales and exceptionally heavy rain prevailed over the greater part of California from the 24th to the 30th. Low temperature from the 9th to the 13th damaged cotton in parts of Arkansas and Louisiana. The first heavy frost of the season occurred at Jacksonville, Fla., on the 12th. The Mississippi River was frozen from Keokuk, Iowa, northward, and the Missouri River was closed by ice in North and South Dakota. On the 1st snow impeded travel in Colorado. A destructive tornado visited Galveston Island, Texas, the early morning of the 6th; one life was lost and property to the estimated value of \$10,000 was destroyed. A tornado occurred in Boone county, Ark., the night of the 16th; 3 persons were reported killed, 50 injured, and the estimated value of property destroyed was \$100,000. The early morning of the 17th a tornado visited Red Bud, Ill., killing 2 persons and injuring 7, and wrecking 82 buildings.

The severest cold wave of December overspread the Southern States from the 26th to the 29th, causing some damage by cold and frost in the Gulf States and Florida. The advance of this cold wave was attended by snow over the east Gulf and south Atlantic states. Over a large part of those districts the snowfall was exceptionally heavy. Heavy rains from the 1st to the 3d flooded streams in California. From the 20th to the 23d a heavy snowstorm prevailed over the north Pacific coast states. Heavy rain from the 21st to the 25th caused destructive floods in the Sacramento and San Joaquin valleys, California. Tornadoes occurred in north-eastern Texas and northeastern Arkansas on the 6th. Navigation on the Great Lakes and in the rivers of the Middle and Northern states was closed by ice.