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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS
NILS A. OLSEN, CHIEF

ATLAS
OF
AMERICAN AGRICULTURE

PREPARED UNDER THE SUPERVISION OF O. E. BAKER, SENIOR AGRICULTURAL ECONOMIST

PART II
CLIMATE

SECTION B
TEMPERATURE, SUNSHINE, AND WIND

CONTRIBUTION FROM THE U. S. WEATHER BUREAU, CHARLES F. MARVIN, CHIEF

BY

JOSEPH B. KINCER
SENIOR METEOROLOGIST, U. S. WEATHER BUREAU

UNITED STATES
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WASHINGTON
1928

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Figure A.—This map shows the location and relative density in different sections of the country of the Weather Bureau stations. The location of the 200 stations of the first order (daily telegraphic stations) is shown by a hollow circle. The location of the cooperative stations is shown by a red dot. Temperature observations are not made at all of the stations shown, but 2,300 well-distributed temperature records were used in compiling data for this section of the Atlas. The number of stations used for each of the several charts is indicated thereon. The more important mountain ranges and river valleys are also shown on this map by means of hachuring. These physiographic features exercise an important influence in determining temperature conditions

SELECTED REFERENCES

TEMPERATURE

Abbot, C. G., and Fowle, F. E.: Volcanoes and Climate, Smithsonian Misc. Coll., vol. 60, pp. 24. Washington, 1913.

Baker, O. E., and Stine, O. C.: Climate of the Cotton Belt. Mo. Weather Rev., vol. 47, pp. 487–9. 1919.

Batchelor, L. D., and West, F. L.: Variation in Minimum Temperatures Due to the Topography of a Mountain Valley in Relation to Fruit Growing. Utah Agr. Exp. Sta. Bull. 141. 1915.

Bigelow, Frank Hagar: The Daily Normal Temperature and the Daily Normal Precipitation of the United States. U. S. Weather Bur. Bull. R, 186 pp., tables. 1908.

——— Report on the Temperatures and Vapor Tensions of the United States Reduced to a Homogenous System of 24 Hourly Observations for the 33-Year Interval, 1873–1905. U. S. Weather Bur., Bull. S, 302 pp., incl. tables and charts. Washington, 1909.

Blair, W. R.: Slope and Valley Air Temperatures. Mo. Weather Rev., vol. 44, p. 677. 1916.

Blair, T. A.: Some Temperature Correlations in the United States. Mo. Weather Rev., vol. 45, p. 444. 1917.

Bliss, George S.: Forecasting Minimum Temperatures for the Cranberry Bogs of New Jersey. Mo. Weather Rev., vol. 50, pp. 529–33. 1922.

Bouyoucos, George: Soil Temperature. Mich. Agr. Exp. Sta. Bull. no. 26. 1916.

——— Degree of Temperature to Which Soils May be Cooled Without Freezing. Jour. of Agr. Res., vol. 20, no. 4, pp. 267–9. 1920.

Bradford, F. C.: The Relation of Temperature to Blossoming in the Apple and the Peach. Mo. Agr. Exp. Sta. Res. Bull. no. 53. 1922.

Brooks, Charles F.: The "Old-Fashioned" Winter of 1917–18. Geographic Review, vol. 5, no. 5. 1918.

Burnham, G. H.: The Weather Element in Railroading. Mo. Weather Rev., vol. 50, pp. 1–7. 1922.

Coville, F. V.: The Influence of Cold in Stimulating the Growth of Plants. Jour. of Agr. Res., vol. 20, no. 2, pp. 151–60. 1920.

Cox, H. J.: Thermal Belts and Fruit-Growing in North Carolina. Mo. Weather Rev. Suppl. 19, charts, illustrations. 1922.

——— Differences Between the Readings of Sheltered and Unsheltered Thermometers in Field Work. Mo. Weather Rev., vol. 48, pp. 711–12. 1920.

Day, Preston C.: The Cold Spring of 1917. Mo. Weather Rev., vol. 45, pp. 285–9. 1917.

——— The Cold Winter of 1917–18. Mo. Weather Rev., vol. 46, pp. 57–80. 1918.

Fawcett, H. S.: Relation of Temperature to Growth and Infection in the Citrus Scab Fungus (Cladosporium Citri). Jour. of Agr. Res., vol. 21, no. 4, p. 243. 1921.

Fowle, F. E.: (*See* Abbot and Fowle.)

Gladwin, F. E.: Winter Injury to Grapes. N. Y. Agr. Exp. Sta. Bull. 433. 1917.

Gordon, James H.: Temperature Survey of the Salt River Valley, Arizona. Mo. Weather Rev., vol. 49, pp. 271–4. 1921.

Haines, E. H.: Influence of Varying Soil Conditions on Night Air Temperatures. Mo. Weather Rev., vol. 50, pp. 363–6. 1922.

Hallenbeck, Cleve.: Night Temperature Studies in the Roswell Fruit District. Mo. Weather Rev., vol. 46, pp. 364–73. 1918.

Henry, A. J.: Climatology of the United States. U. S. Weather Bur., Bulletin Q, 1012 p. 1906.

——— Sunspots and Terrestrial Temperature in the United States. Mo. Weather Rev., vol. 51, pp. 243–9. 1923.

Hopkins, A. D.: Periodical Events and Natural Law as Guides to Agricultural Research and Practice. Mo. Weather Rev. Suppl. 9. 1918.

——— Bioclimatic Zones Determined by Meteorological Data. Mo. Weather Rev., vol. 49, pp. 299–300. 1921.

Humphreys, W. J.: Physics of the Air. The Franklin Inst., Phila. 1920.

——— Factors of Climatic Control. Jour. Franklin Inst., Phila., Dec. 1919–Jan. 1920. (*See also* Mo. Weather Rev., vol. 48, pp. 535–7, 1920, for review by Ellsworth Huntington.)

Hutt, W. N.: Thermal Belts from the Horticultural Viewpoint. Mo. Weather Rev. Suppl. 19. 1922.

Keen, B. A., and Russel, E. J.: Factors Determining Soil Temperature. Jour. of Agr. Sci., vol. 11, part 3, 1921. Rothamsted, England.

Kincer, Joseph B.: Relation Between Vegetative and Frostless Periods. Mo. Weather Rev., vol. 47, pp. 106–10. 1919.

——— Temperature Influence on Planting and Harvest Dates. Mo. Weather Rev., vol. 47, pp. 312–23. 1919.

Livingston, Burton E., and Shreve, Forrest: The Distribution of Vegetation in the United States as Related to Climatic Conditions. Carnegie Inst., Washington, 1921.

Marvin, Charles F.: Solar Radiation Intensities and Terrestrial Weather. Mo. Weather Rev., vol. 51, pp. 186–8. 1923.

McAdie, Alexander: Mean Temperatures and Their Corrections in the United States. At head of title: United States of America, War Department. x, 45 pp., tables. 1891.

McGinty, R. A.: Horticulture at High Altitudes. Colo. Agr. Exp. Sta. Bull. no. 256. 1920.

Miller, Edwin C., and Saunders, A. R.: Some Observations on the Temperature of the Leaves of Crop Plants. Jour. of Agr. Res., vol. 26, no. 1. 1923.

Palmer, A. H.: Death Valley, California, the Hottest Known Region. Mo. Weather Rev., vol. 50, pp. 10–13. 1922.

Reeder, George: Ground Temperatures Compared with Air Temperatures in a Shelter. Mo. Weather Rev., vol. 48, pp. 637–9. 1920.

Russel, E. J. (*See* Keen and Russel.)

Salmon, S. C.: The Relation of Winter Temperature to the Distribution of Winter and Spring Grains in the United States. Jour. of Amer. Soc. of Agron., vol. 9, no. 1. 1917.

Saunders, A. R. (*See* Miller and Saunders.)

Schott, Charles A.: Tables, Distribution, and Variations of the Atmospheric Temperature in the United States and Some Adjacent Parts of America. xvi, 345 pp. tables. charts., Smithsonian contributions to knowledge, 277. Washington, 1876.

Seeley, D. A.: Relation between Temperature and Crops. Mo. Weather Rev., vol. 45, pp. 354–9. 1917.

Shreve, Forrest. (*See* Livingston and Shreve.)

Sinclair, John G.: Temperatures of the Soil and Air in a Desert. Mo. Weather Rev., vol. 50, pp. 142–4. 1922.

Smith, J. Warren: Phenological Dates and Meteorological Data recorded by Thomas Mikesell at Wauseon, Ohio. Mo. Weather Rev. Suppl. 2. 1915.

Smith J. Warren, and others: Predicting Minimum Temperatures from Hygrometric Data. Mo. Weather Rev. Suppl. 16. 1920.

Stockman, William B.: Temperature and Relative Humidity Data. U. S. Weather Bur., Bull. O, 29 pp., 2 charts. 1905.

Summers, John N.: Effect of Low Temperature on the Hatching of Gypsy Moth Eggs. U. S. Dept. of Agr. Bull. 1080. 1922.

Taylor, George F. (*See* Wright and Taylor.)

Thiessen, Alfred H.: Story of the Thermometer and Its Uses in Agriculture. Yearbook, Dept. of Agri., pp. 157–66. 1914.

Tottingham, W. R.: Temperature Effects in Plant Metabolism. Jour. of Agr. Res., vol. 25, no. 1. 1923.

U. S. Patent Office: Results of Meteorological Observations Made under the Direction of the United States Patent Office and the Smithsonian Institution from the year 1854 to 1859, inclusive, being a Report of the Commissioner of Patents Made at the First Session of the Thirty-sixth Congress. 2 vol. (36th Cong., 1st sess., House Ex. doc. 55.) 1861–64.

U. S. Signal Office: Charts Showing Maximum and Minimum Temperatures by Decades, for All Years. Cover, title, 37 charts. Washington, 1891.

——— Normal Temperature Charts by Decades for the United States and the Dominion of Canada. Cover, title, 72 charts. At head of title: United States of America, War Department. Washington, 1891.

U. S. Surgeon General's Office: Meteorological Register for the Years 1822, 1823, 1824, and 1825, from Observations Made by the Surgeons of the Army, at the Military Posts of the United States. 63 pp. fold. map. Washington, 1826.

——— Meteorological Register for the years 1826, 1827, 1828, 1829, and 1830. 161 pp. fold. map. Philadelphia, New Orleans, 1840.

——— Meteorological Register for Twelve Years, from 1831 to 1842, Inclusive. 324 pp. Washington, 1851.

——— Army Meteorological Register, for Twelve Years, from 1843 to 1854, Inclusive. xi, 763, 3 pp., 10 charts. Washington, 1855.

——— Statistical Report on the Sickness and Mortality in the Army of the United States, Compiled from Records of the Surgeon General's Office; Embracing a Period of Sixteen Years, from January, 1839, to January, 1855, by Richard H. Coolidge. 703 pp. tables. fold. map. (34th Cong., 1st sess., Senate Ex. doc. no. 96.) 1856.

U. S. Weather Bureau: Report of the Chief of the Weather Bureau, 1896–97. 431 pp. plates. illus. tables. (Normal Variability of Temperature.) Table 5. pp. 284–5. 1897.

——— Summaries of Climatological Data by Sections. Prepared by the Climatological Division. 2 vol. maps. charts. tables. (U. S. Weather Bur., Bull. W.) 1912.

——— Temperature Departures, Monthly and Annual, in the United States, January, 1873, to June, 1909, Inclusive. Bull. U, 584 charts. 1911.

——— Temperature Gradients in Latitude, Longitude, and Altitude. Report of the Chief of the Weather Bureau, 1900–1901, vol. 2, chap. 4, pp. 361–419. charts. tables. 1902.

——— Temperature statistics in extenso for the various parts of the United States are available in the following:

——— State Weather Services. Reports. (*See* Fassig. Statistics of State Weather Services.) W. B. no 81. Washington, 1896.

——— Monthly Reports of the Climate and Crop Service. (Climatological Service.) 1896 to June, 1909, and 1914 to date.

——— Monthly Weather Review, July, 1909–1913.

——— Climatological Data for the United States by Sections. (Monthly with annual summary.)

Ward, Robert DeC.: Some Characteristics of United States Temperature. Mo. Weather Rev., vol. 49, pp. 595–608, 20 charts following p. 610. 1921.

——— Bibliographic Notes on the Temperature Charts of the United States. Mo. Weather Rev., vol. 49, pp. 277–280. 1921.

——— Hot Waves, Hot Winds, and Chinook Winds in the United States. Sci. Monthly, vol. 17, no. 2, pp. 146–67. 1923.

——— Cold Waves, Northers, and Blizzards in the United States. Sci. Monthly, vol. 16, no. 5, pp. 440–70. 1923.

West, F. L. (*See* Batchelor and West.)

Woolard, E. W.: Historical Note on Charts of the Distribution of Temperature, Pressure, and Winds over the Surface of the Earth. Mo. Weather Rev., vol. 48, pp. 408–11. 1920.

Wright, R. C., and Taylor, George F.: The Freezing Temperatures of Some Fruits, Vegetables, and Cut Flowers. U. S. Dept. of Agr. Bul. 1133. 1923.

Young, Floyd D.: Effect of Topography on Temperature Distribution in Southern California. The Calif. Citrograph, vol. 5, no. 7. 1920.

——— Influence of Exposure on Temperature Observations. Mo. Weather Rev., vol. 48, pp. 709–11. 1920.

——— Nocturnal Temperature Inversions in Oregon and California. Mo. Weather Rev., vol. 49, pp. 138–48. 14 figs. tables. 1921.

——— Notes on the January, 1922, Freeze in Southern California. Mo. Weather Rev., vol. 51, pp. 581–85. 1923.

——— Substituting Fruit Temperatures for Air Temperatures in Regulating Orchard Heating for Oranges. Mo. Weather Rev., vol. 52, pp. 381–87. 1924.

SUNSHINE

Allard, H. A. (*See* Garner and Allard.)

Garner, W. W., and Allard, H. A.: Effect of the Relative Length of Day and Night and Other Factors of the Environment on Growth and Reproduction in Plants. Jour. of Agr. Res. March, 1920.

Hand, Irving F. (*See* Kimball and Hand.)

Hearn, George D.: Relation of Sunlight to Plant Development. Mo. Weather Rev., vol. 50, p. 423. 1922.

Kimball, H. H.: Duration and Intensity of Twilight. Mo. Weather Rev., vol. 44, pp. 614–26. 1916.

Kimball, H. H., and Hand, Irving F.: Daylight Illumination on Horizontal, Vertical, and Sloping Surfaces. Mo. Weather Rev., vol. 20, pp. 615–28. 1922.

Kincer, Joseph B.: Sunshine in the United States. Mo. Weather Rev., vol. 48, pp. 12–17. 1920.

Palmer, Andrew H.: The Agricultural Significance of Sunshine as Illustrated in California. Mo. Weather Rev., vol. 48, pp. 151–54. 1920.

Seeley, Dewey A.: The Heating of Plants in Sunlight as a Factor in Growth. Mo. Weather Rev. vol. 47, pp. 327–28. 1919.

Stewart, J. B.: Effect of Shading on Soil Conditions. U. S. Bur. of Soils Bul. no. 39. 1907.

Ward, Robert DeC.: Bibliographic Note on Sunshine in the United States. Mo. Weather Rev., vol. 47, pp. 794–5. 1919.

WIND

Beck, Anne Louise: The Earth's Atmosphere as a Circular Vortex. Mo. Weather Rev., vol. 50, pp. 393–401. 1922.

Bowie, Edward H., and Weightman, R. Hanson: Types of Storms in the United States and Their Average Movement. Mo. Weather Rev. Suppl. 1. 1914.

——— Types of Anticyclones in the United States and Their Average Movement. Mo. Weather Rev. Suppl. 4. 1917.

Day, Preston C.: The Winds of the United States and Their Economic Uses. U. S. Dept. Agr. Yearbook, 1911, pp. 337–50.

Fuller, P. E.: The Use of Windmills in Irrigation in the Semi-arid West. Farmers' Bul. 866, U. S. Dept. Agr. 1917.

Gregg, Willis R.: An Aerological Survey of the United States. (Results of Observations by Means of Kites.) Mo. Weather Rev., vol. 50, pp. 229–42. 1920.

Gregg, Willis R., and Van Zant, J. Parker: The Wind Factor in Flight. (Analysis of One Year's Record of the Air Mail.) Mo. Weather Rev., vol. 51, pp. 111–25. 1920.

Marvin, Charles F.: Air Drainage Explained. (With Reference to Temperature Influence.) Mo. Weather Rev., vol. 42, pp. 583–85. 1914.

——— The Law of the Geoidal Slope and Fallacies in Dynamic Meteorology. Mo. Weather Rev., vol. 48, pp. 565–82. 1920.

Mitchell, Charles L.: West Indian Hurricanes and Other Tropical Cyclones of the North Atlantic Ocean. Mo. Weather Rev. Suppl. 24. 1924.

Samuels, L. T.: Correlations Between Wind Velocities at the Surface and Those in the Free Air. Mo. Weather Rev., vol. 50, pp. 83–89. 1922.

Van Zant, J. Parker. (*See* Gregg and Van Zant.)

Wieghtman, R. Hanson. (*See* Bowie and Weightman.)

TEMPERATURE

Temperature is one of the most important factors that make up the climate of a region. Plant and animal life is constantly under the influence of the temperature of the air near the earth's surface, and it is with this temperature that we are mostly concerned as regards agricultural enterprises and our bodily comfort. For climatological purposes the measure of temperature is obtained from thermometers freely exposed to the air near the surface of the earth and shielded from the direct rays of the sun, but in such a manner as not materially to obstruct the atmospheric circulation.

Source of data.—The records made by cooperative observers of the Weather Bureau have been largely used in preparing the charts and graphs here presented. These stations are in most cases located in the open country and small towns, where the instruments are more or less free from the artificial influences that frequently affect the temperature records made at the first order Weather Bureau stations in the larger cities. The records are made by standard maximum and minimum thermometers, exposed in approved shelters, usually at an elevation of 5 feet above the ground surface. The stations are inspected from time to time by trained officials of the Weather Bureau, with a view to having the instrumental exposure and observational work in general as uniform as possible throughout the country. The records in most cases cover a period of at least 20 years, although some for shorter periods were used, particularly in the far Western States, where fewer long records are available.[1]

SOLAR AND PHYSICAL CLIMATE

The climate that would prevail if the earth had a homogeneous land surface and if there were no atmosphere is termed "solar climate." Under such conditions the amount of insolation received at any place would depend wholly on the declination of the sun, and all places of the same latitude would have similar temperature conditions. "Physical climate," or that actually prevailing, is a modification of "solar climate," produced by the presence of the atmosphere, the unequal distribution of land and water surfaces, differences in altitude, air movement, direction of ocean currents, and other causes. There are three major types of physical climate—marine, continental, and mountain. There are also several minor types, principal among which are those designated as "coast or littoral climate" and "desert climate."

Marine climate.—The marine type of climate is characterized by comparatively uniform temperatures throughout the year, and by small diurnal range in temperatures. Water surfaces under the influence of the sun's rays warm more slowly than land surfaces and cool more slowly in the absence of direct insolation. The temperature of the overlying air likewise changes slowly, and this results in a more uniform temperature condition than is found in other types of climate. The progress of the seasons is also retarded, winter lingering later into spring and summer into fall. Marine climates have, therefore, comparatively pleasant summers, mild winters, cool springs, and warm autumns.

Continental climate.—The continental type of climate is characterized by greater temperature extremes and more rapid changes in temperature. The coldest month in northern latitudes is usually January and the warmest is July, the time of maximum and minimum temperatures occurring earlier than in the marine type. The diurnal and annual ranges, as well as the irregular changes in temperature from day to day are large, and increase, as a rule, with increasing distance from the oceans. In the United States practically all districts east of the Rocky Mountains have this type of climate, even near the Atlantic coast, as the general atmospheric drift is offshore, which prevents the marine influence from being effective to any considerable distance inland. The annual march in temperature is shown for selected stations in Figures 1 and 72, and the diurnal in Figures 85 and 86. The characteristic increase both in the annual and diurnal temperature range with increasing distance inland may be noted in these figures.

Extreme types of continental climate are found in deserts. Here in the absence of vegetal covering, and with clear, dry air, the earth's surface heats very rapidly under direct insolation, and high day temperatures result. At night radiation of heat is rapid from the barren ground, as the dry atmosphere offers little obstruction to the passage of heat into space, and a rapid decrease in temperature results. Although the diurnal range in temperature in deserts is much greater than in other types of climate, the high day temperatures are not so oppressive as the readings of the thermometer would appear to indicate, owing to the extreme dryness of the atmosphere. During the heated hours of the day the difference in the indications of two thermometers, one having the bulb covered with freely evaporating water and the other uncovered, is very great. This difference is known in meteorology as the "depression of the wet-bulb temperature." Its magnitude gives some indication of the degree of physical discomfort experienced during the prevalence of high temperatures which, in general, varies inversely with the depression of the wet-bulb temperature. At Yuma, Ariz., the average daily maximum dry-bulb temperature for the month of July is about 106° F. and the wet-bulb temperature is 75° F., the average depression of the wet-bulb thermometer at the time of maximum temperature being about 31° F., whereas at Chicago the averages for the same period are about 80° and 69°, respectively, the average depression of the wet-bulb temperature being only 11°. So far as bodily comfort is concerned the high temperature at Yuma is greatly mitigated by the increased opportunity for evaporation. Over large areas in the Southwest this desert climate prevails, though not in such degree as at Yuma. The large diurnal temperature range in desert regions is shown in the section marked "Arid Plateau" in Figure 85 and also by the thermograph trace sheet for Yuma, Ariz., in Figure 87.

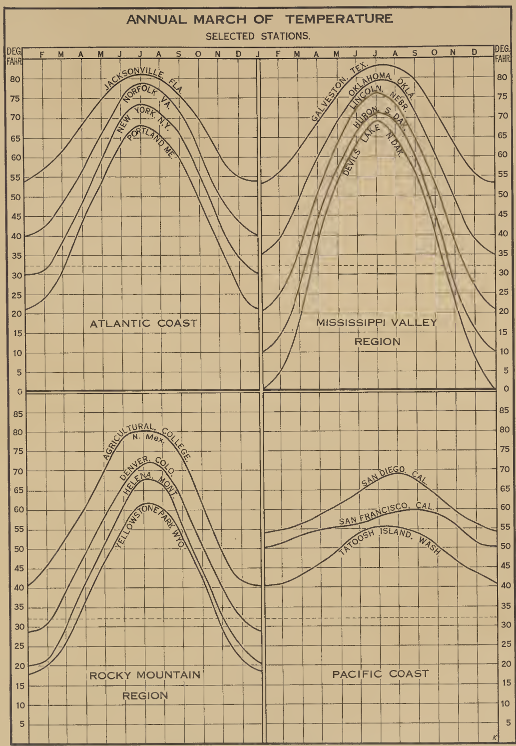


Figure 1.—This graph shows the annual march of temperature at selected stations, arranged in four belts, each extending north and south. It visualizes the monthly changes in temperature for different sections of the country and also the latitudinal gradient for the several seasons. East of the Rocky Mountains the decrease in winter temperature from south to north is large, especially in the Mississippi Valley, whereas in summer the decrease is moderate. The small seasonal changes in temperature characteristic of marine climates and the great seasonal differences in temperature typical of continental climates are graphically contrasted in the belts marked "Pacific coast" and "Mississippi Valley region"

In some cases coasts of large bodies of water have climates closely allied to the continental type and in others the marine characteristics dominate, depending on the surface drift of the atmosphere, whether from the land or the water. When this drift is on-shore the coast has a marine climate, as along the immediate Pacific coast of the United States. When the drift is off shore, a more or less modified form of continental type of climate obtains, which is exemplified along the Atlantic coast of the United States. On the Pacific coast the summers are cool, owing to the prevailing westerly winds, and the winters are mild for the same reason, while extremes in temperature are rare. However, this condition is confined to a narrow belt along the immediate coast, especially as regards cool summers, since mountain barriers prevent the extension of the marine influence to any considerable distance inland. The marine character of climate obtaining on the Pacific coast is shown by the graphs for San Francisco and North Head in Figures 1 and 85. In these graphs the small annual and diurnal temperature ranges may be noted. They show also the temperature ranges along the Atlantic coast, where the characteristics of the continental type predominate, although the marine influence is appreciable as compared with the central section of the country. Figure 1 also visualizes the temperature gradient from north to south in the United States for the several seasons of the year, separately for the Atlantic coast, the Mississippi Valley, the Rocky Mountain region, and the Pacific Coast States.

Mountain climate.—Mountain climate, as compared with that of the adjacent lowland, is characterized by lower temperatures throughout the year, but the diurnal and other variations are generally somewhat less than those experienced at lower elevations. The average decrease in temperature with increase in altitude in the free air is about 1° F. for each 330 feet, but the rate varies with the season of the year and is also much affected by local conditions. It is more rapid in summer than in winter and is greatest during the warmer hours of the day. Temperature inversions, which frequently occur during the colder months and especially at night, sometimes give to mountain slopes a higher temperature than is experienced in the near-by lower valleys. This condition is brought about by the air in contact with the mountain sides through the influence of surface radiation in the absence of direct insolation becoming colder than the free air over the valley and the increased weight, resulting from cooling and contraction, sets up a convectional circulation, or interchange of air between that near the surface of the colder mountain side and the warmer free air above the valley below. This circulation is continuous as long as the difference in air density is maintained. In such cases there is a much larger diurnal temperature range in the valley than on the mountain sides.

Under direct insolation surface soil temperatures in high altitudes become relatively higher than the adjacent air temperatures because the rarefied condition of the atmosphere and the comparatively small amount of aqueous vapor contained in it offer little obstruction to the passage of the sun's rays. These conditions, however, have a reverse effect at night by affording less resistance to radiation, and consequently there is a greater diurnal range in soil temperature on mountains than on lowlands.

IMPORTANT TEMPERATURE DATA

For the presentation of the climatic factors of any place the most important temperature data required are as follows: Average daily temperature; average daily range and average daily variability; average monthly temperature; average monthly range and absolute monthly extremes; seasonal temperature, especially the average summer (June, July, and August) and average winter (December, January, and February) temperature; average annual temperature and average annual range; and the frequency of occurrence and duration of certain significant temperatures.

Average daily temperature.—The true average daily temperature corresponds closely to the average of 24 hourly observations, but as several other combinations of hourly values give averages that differ but little from the true daily average some one of these is generally used to reduce observational work. The combination

$$\frac{(7\text{ a. m.} + 2\text{ p. m.} + 9\text{ p. m.} + 9\text{ p. m.})}{4}$$

gives a value which differs only slightly from the true daily average, and

$$\frac{(\text{sunrise} + 2\text{ p. m.} + 9\text{ p. m.})}{3}$$

also gives fairly accurate results. The formula

$$\frac{(\text{maximum} + \text{minimum})}{2}$$

is easy of application and very satisfactory when dependable maximum and minimum thermometers are used and properly exposed. The mean of the daily extremes is, as a rule, slightly too high, but it usually does not vary more than one-half of a degree from the true daily average. This combination is employed by the Weather Bureau to obtain the average daily temperature, and the data for the accompanying charts and diagrams were compiled by its use.

Daily range and daily variability of temperature.—The normal diurnal march of temperature may be described

[1] The maps and graphs contained in this section of the Atlas were originally completed and ready for publication in 1917, but owing to the exigencies brought about by the World War publication could not be accomplished at that time. The original data embrace the 20-year period from 1895 to 1914, inclusive, corresponding to that covered by Section I, "Frost and the Growing Season," and by Section B, "Precipitation and Humidity," of this Atlas, both of which have already been published.

Since 1914 eight years of additional records have become available. These have been carefully examined and compared with the original data to determine what changes, if any, would be necessary, in order that the several maps and graphs should portray general conditions up to and including the year 1922.

The following maps have been fully revised to satisfy this requirement: Figures 3 6, 15, 16, 20, 25, 26, 30, 31, 36, 40, 41, 45, 46, 50, 51, 55, 56, 60, 61, 65, 66, 70, and 71. The graphs which were intended only to show certain characteristic variations in temperature in different portions of the country, such as Figure 4, were not revised. It was found that all other maps and graphs required practically no changes to represent conditions virtually up to the time of publication.

Figure 2.—This map shows the average summer temperature, June to August, inclusive. East of the semiarid Great Plains the crops grown and the types of farming are determined largely by the temperature of the summer season. In this area there are six more or less distinct agricultural regions, occupying in a general way east and west belts. (1) The Subtropical Crops Belt, extending along the coast of the Gulf of Mexico and up the Atlantic coast as far as Charleston, S. C. In this region the characteristic crops are citrus fruits, winter vegetables, sugar cane, and rice, and the average summer temperature is 80° to 82° F. (2) The Cotton Belt, lying immediately to the northward, which has an average summer temperature decreasing from about 81° at the southern boundary to 77° at the northern. In this region cotton and corn are the dominant crops, constituting about three-fourths of the acreage of all crops. (3) To the northward of the Cotton Belt lies the Corn and Winter Wheat Belt, having an average summer temperature decreasing from 77° along the southern border to about 75° in the northern portion west of the Appalachian Mountains and 70° east of the mountains. In this region corn, wheat, tobacco, and hay are the most important crops, and diverse types of agriculture prevail. (4) The Corn Belt, which lies west of the Appalachian Mountains, and has a summer temperature of about 75° along the southern border and 69° along its northern border. Winter wheat supplements the corn crop in its southern portion and spring oats in its northern portion. Hay, mostly timothy and clover in the east and alfalfa in the west, is also an important crop. (5) The Spring Wheat Region, comprising western Minnesota, the Dakotas, and eastern Montana. The average summer temperature in this region decreases from about 69° at the southern boundary to 63° near the Canadian border, and 59° along its northern margin in Canada. Spring wheat, oats, barley, flax, and hay are the important crops. (6) The Hay and Pasture Region, comprising the northern border States from Minnesota eastward and extending southward along the Appalachians. This region, in which hay and pasture constitute over 50 per cent of the improved land, has an average summer temperature ranging from about 59° to 70°. With reference to temperature conditions the Spring Wheat Region is only a subhumid grass land extention of the originally forested Hay and Pasture Region lying to the east, while the Corn Belt is really a large and extraordinarily fertile portion of the Corn and Winter Wheat Belt

Figure 3 shows the highest temperatures ever observed, based on the records of the regular reporting and of selected cooperative stations up to and including the year 1922. Temperatures over 100° F. have been experienced in all portions of the country, except in the higher altitudes of the Rocky Mountain and Appalachian areas, the central and northern portions of both the Pacific and Atlantic coasts, portions of New England, and in the Florida Peninsula

Figure 4 shows for selected stations the maximum temperature for each of the 20 years from 1895 to 1914, inclusive. Each dot represents the highest temperature recorded for an individual year, there being 20 dots for each station

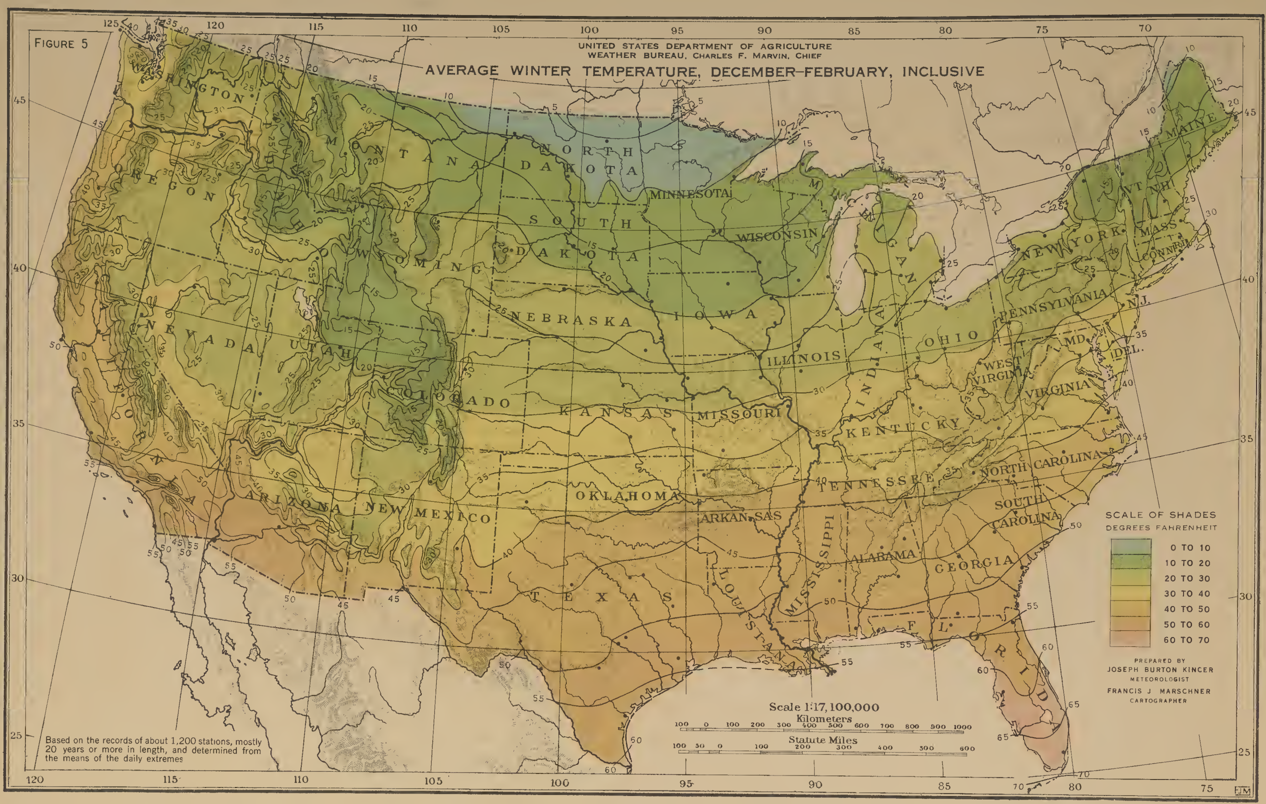


Figure 5.—This map shows the average winter temperature, December to February, inclusive. East of the Rocky Mountains the average winter temperature increases from near zero in northwestern Minnesota and northeastern North Dakota to about 32° F. in central New Jersey, southern Ohio, and the central portions of Missouri and Kansas, and to about 55° along the Gulf coast. To the westward it ranges from somewhat less than 15° at the higher altitudes of the Rocky Mountain region to about 55° in the lower Colorado River Valley and along the coast of southern California. The Subtropical Crops Belt has an average winter temperature ranging from about 50° in the rice district of Louisiana to 70° in extreme southern Florida. In the Cotton Belt it ranges from 40° to 50°, and even 55° in southern Texas; in the Corn and Winter Wheat Belt from about 30° along the northern border of the belt to about 40° in the southern; in the Corn Belt from 15° in southwestern Minnesota to about 30° along the southern margin, and in the Spring Wheat Belt it varies from near zero to about 15°. In the Hay and Pasture province the average winter temperature varies widely. It is about zero in northeastern Minnesota and reaches 35° locally in the central Appalachian valleys

briefly as follows: In continental climates the daily minimum usually occurs about the time of sunrise, and in marine climates somewhat earlier. Beginning at this time there is a gradual increase until the maximum is reached, usually from two to four hours after noon in the continental type of climate and about noon, or shortly after, in the marine type. From the time of the maximum there is a gradual decrease until the next morning when the minimum is again reached. Figure 85 shows for selected stations, representing the Atlantic and Gulf coasts, the Mississippi Valley, the Rocky Mountain region, the Arid Plateau, and the Pacific coast, the diurnal march of temperature for the months of January, April, July, and October. This graph shows the characteristic features of the normal daily temperature curve for the principal climatic divisions of the United States. The significance of the average daily temperature for a locality depends on the amplitude of the periodic daily range and also on the nature of the nonperiodic or accidental changes that occur from day to day, or the daily variability. For example, the average daily temperature for August at San Diego, Calif., and at Bismarck, N. Dak., is about 68° F., but at Bismarck the average daily maximum is 81° as compared with 73° for San Diego, whereas the average daily minimum is 55° at Bismarck and 62° at San Diego. Thus while the average temperature at the two places for this month is the same, Bismarck has an average daily range of 26° and San Diego only 11°, which makes a marked difference in the actual temperature experienced. Again, the average temperature for a given month may be the same at two different places, and one may be subject to large daily variability, as shown by the difference between the mean temperatures for successive days, and the other may have comparatively uniform temperatures from day to day. Under such conditions, although the average monthly temperatures would be similar, the temperature conditions actually experienced would be wholly different. The daily variability of temperature is least in the marine type of climate and greatest in the continental type, increasing, as a rule, toward the center of continents. It is also greater in winter than in summer, owing to the more pronounced cyclonic and anticyclonic action during the winter. Figure 72 shows for each month of the year the average daily temperature range for selected stations in different sections of the United States, and the auxiliary charts accompanying the average monthly temperature charts show the average daily maximum and average daily minimum temperatures each month. Figures 81–84 show the average daily range in temperature throughout the United States for the months of January, April, July, and October; and Figure 86 shows for selected stations, representing the principal types of climate found in this country, the maximum and minimum temperatures each day for the years 1913 and 1914. In this graph the tops of the vertical bars show the daily maxima and the bottoms of the bars the daily minima. The length of the bars indicates the amplitude of the daily range, and their centers show the daily mean values. The relative position of the bars for successive days indicates the daily variability. This graph shows the characteristics of important temperature data for different sections of the country and for the several seasons of the year in such manner as to facilitate comparison of conditions in different localities.

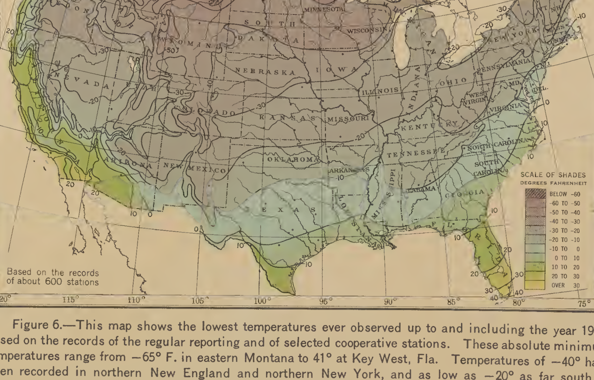


Figure 6.—This map shows the lowest temperatures ever observed up to and including the year 1922, based on the records of the regular reporting and of selected cooperative stations. These absolute minimum temperatures range from −65° F. in eastern Montana to 41° at Key West, Fla. Temperatures of −40° have been recorded in northern New England and northern New York, and as low as −20° as far south as Tennessee, Arkansas, and Oklahoma, and zero temperatures have occurred in the central Gulf coast districts. Along the central and southern California coast the lowest temperatures of record are from 24° to 28°.

Average monthly temperature and monthly extremes.—The average of the daily temperatures of a month is known as the average monthly temperature, and its significance depends on the extent of the periodic variations in the daily values, from which it is derived, and on the frequency and amount of the nonperiodic or accidental fluctuations that are liable to occur from time to time during the month. Figures 12, 17, 22, 27, 32, 37, 42, 47, 52, 57, 62, and 67 show the average temperatures for each month of the year, based on the records of about 1,200 stations, which in most cases cover a period of at least 20 years. Accompanying these are auxiliary charts showing for each month the average daily maximum and the average daily minimum temperatures, and others showing the highest and the lowest mean monthly temperature observed during the 28-year period 1895 to 1922, inclusive.

In addition to the average of the daily maxima and the average of the daily minima it is important to know the average of the monthly extremes, that is, the average of the highest temperatures and the average of the lowest temperatures recorded each month, for a long series of years, and the absolute maximum and absolute minimum for each month. These data are shown for a considerable number of representative stations by the large graph-chart (fig. 72). These graphs show for the stations named, and for each month of the year, (1) the average monthly temperatures, (2) the average of the daily maxima and of the daily minima, (3) the average of the monthly maxima and of the monthly minima, and (4) the absolute maximum and absolute minimum,

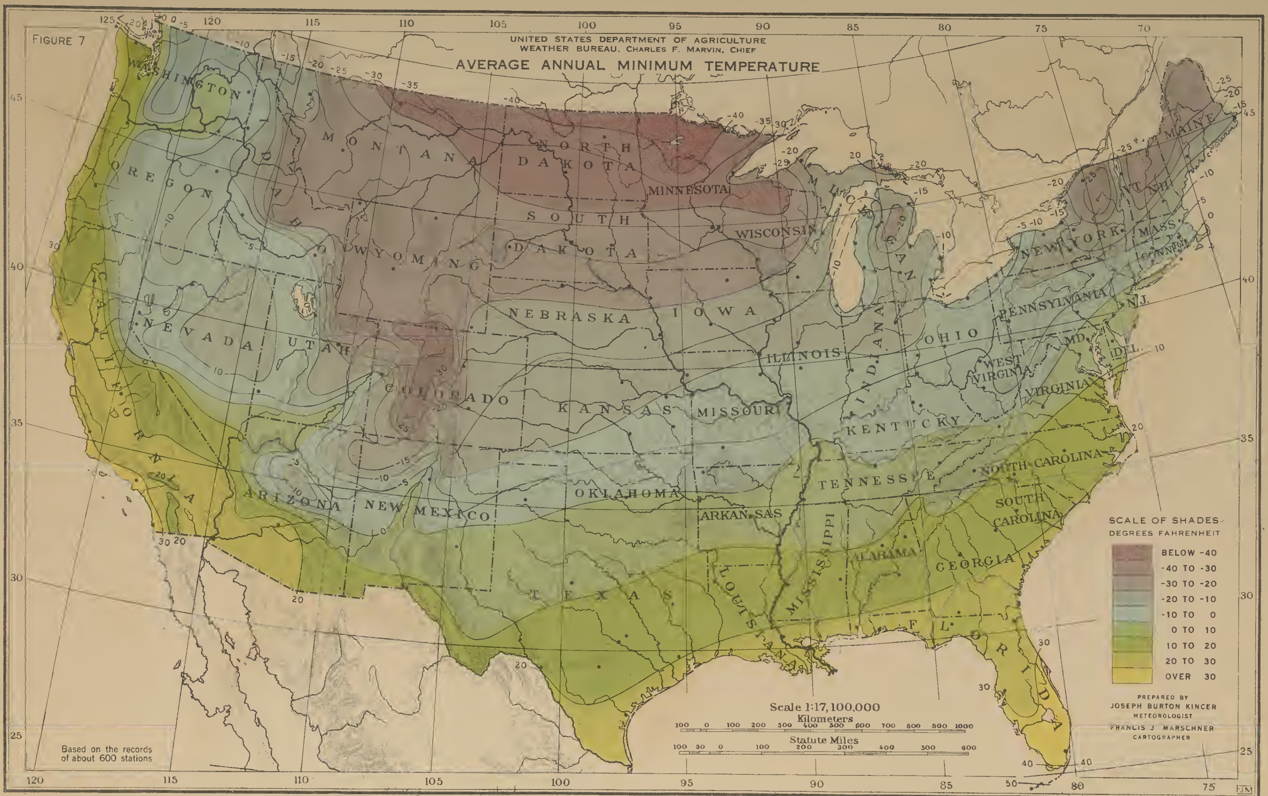
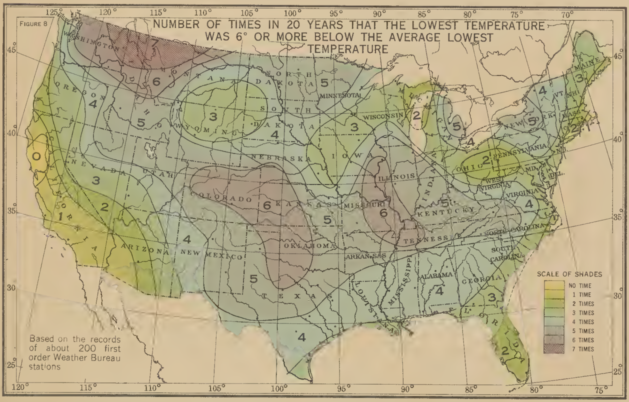
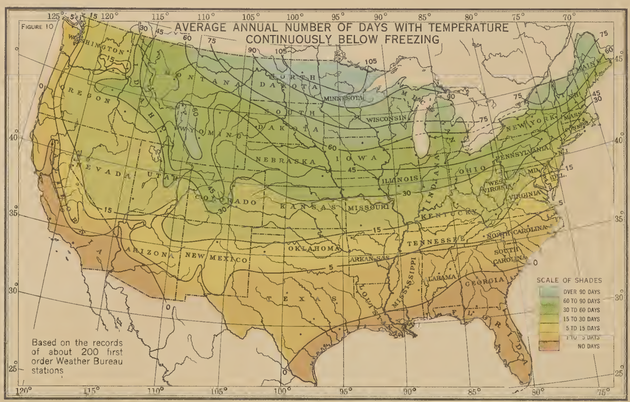
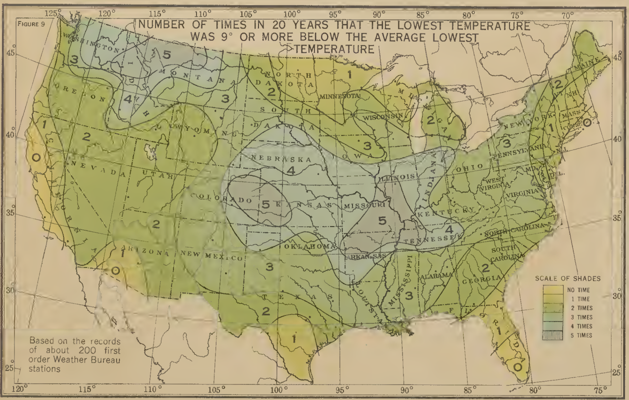
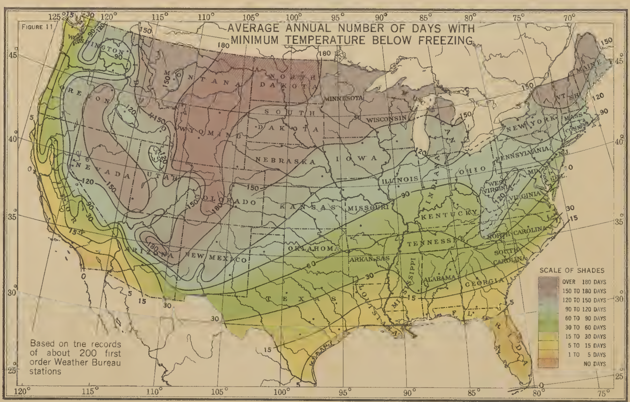


Figure 7.—This map shows the average of the lowest temperatures recorded each winter. As a rule, the lowest temperatures in the United States occur in the northern portions of North Dakota and Minnesota, usually about −40° F. or slightly lower. The other extreme is found at Key West, Fla., where the lowest temperature for the year ordinarily does not go below 50°. Along the immediate Gulf coast the average annual minimum is 22° to 25°, whereas along the immediate Pacific coast it ranges from about 25° at the north to 36° at the south. The marine influence is markedly shown by the north and south trend of the isotherms along the Pacific coast, and is noticeable along the Atlantic coast, where the isothermal lines trend in a northeasterly direction as they approach the ocean and terminate at the coast several hundred miles farther north than the latitude at which they cross the Mississippi Valley. The tempering effect of the Great Lakes is shown by the trend of the isotherms along their leeward shores in Michigan, Ohio, and New York







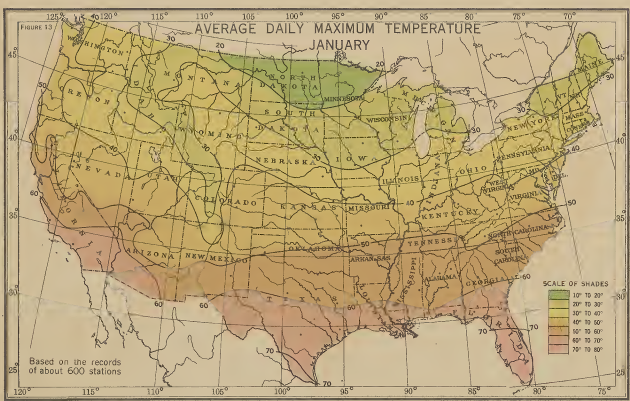


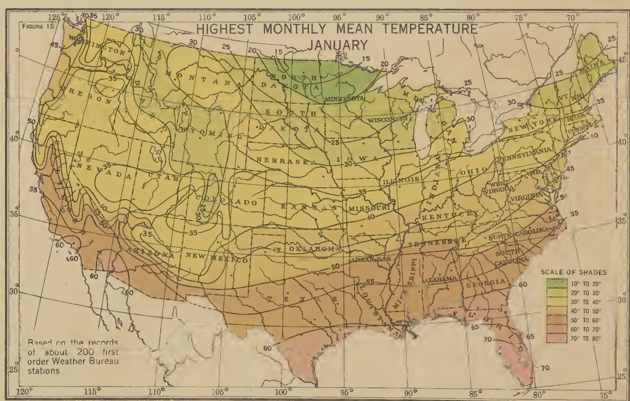
Figures 8 and 9 show the number of years in the 20-year period, 1895–1914, that the minimum temperature was 6° or more, and 9° F. or more, respectively, below the average annual minimum. These maps show the frequency of significant negative departures from the average annual minimum temperature. (Fig. 7)

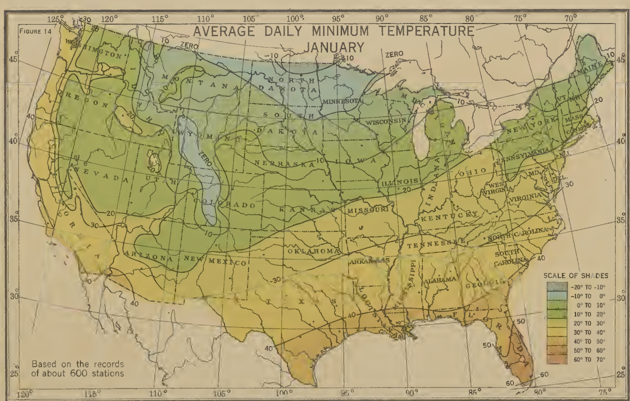
Figure 10 shows the average annual number of days with temperature continuously below freezing during the day. In the northern portions of Minnesota and North Dakota there are, on the average, more than 100 days each year when the temperature does not rise above 32° F., but southward there is a rapid decrease to less than 1 day along the Gulf coast. Along the Pacific coast, except at the extreme north, the average is also less than 1 day

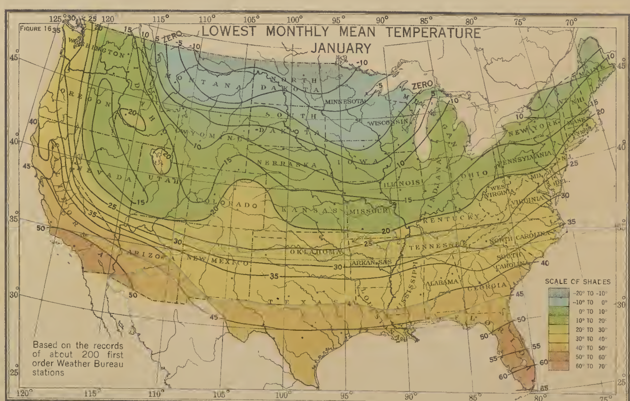
Figure 11 shows the average annual number of days with minimum temperature at freezing, or lower. In portions of the northern Plains States and in the northern Rocky Mountain districts freezing temperatures usually occur on 180 to 200 days of the year, and in northern New York and northern New England on 165 days or more. To the southward there is a rapid decrease in number to about 5 days along the Gulf coast, whereas along the southern Pacific coast the average is less than 1 day annually

Figure 12.—January is, as a rule, the coldest month of the year. The lowest temperatures usually occur in the northern portion of Minnesota and North Dakota, where the average temperature for the month is near zero. The temperature gradient from north to south is much more rapid in winter than in summer, the average January temperature increasing to about 55° F. at the coast of the Gulf of Mexico, an increase on the average of 1° for each 25 miles. In July the average increase in temperature from North Dakota to the Gulf coast is 1° for each 90 miles. (See fig. 42.) Throughout the interior of the continent temperature changes during January are frequent and often abrupt. Very cold weather is sometimes experienced in the northern interior districts in this month, temperatures as low as −40° to −50° being recorded occasionally in northern Minnesota, North Dakota, and eastern Montana, and records of −25° to −35° have been made in northern New York and New England. Along the Gulf coast the lowest recorded temperatures for this month range from 11° to 15°. Freezing temperatures are of infrequent occurrence in southern Florida and also along the coast of southern California









Figures 13 and 14 show for January the average daily maximum and the average daily minimum temperatures. In northern North Dakota the average daily temperature range in January is about 25° F. (see fig. 81), the average daily maximum being somewhat less than 20° and the average daily minimum −5° to −10°. To the southward there is a rather uniform increase in both these values, the average maximum reaching 60° to 70° and the minimum 40° to 50° along the Gulf coast. From the Rocky Mountains westward the average daily maximum for this month varies from 25° and 30° in the central and northern Rocky Mountain districts to about 65° along the southern California coast, and the minimum varies from nearly−10° in the central Rocky Mountain districts to about 45° along the coast of central and southern California

Figures 15 and 16 show the highest and the lowest mean January temperatures that occurred in the 28-year period 1895–1922. The variation in these temperatures is large in most districts, particularly in the north-central border States, where the mean January temperature one year may be as much as 20° or 25° F. warmer than in another year. Along the Pacific coast this variation is less than 10°

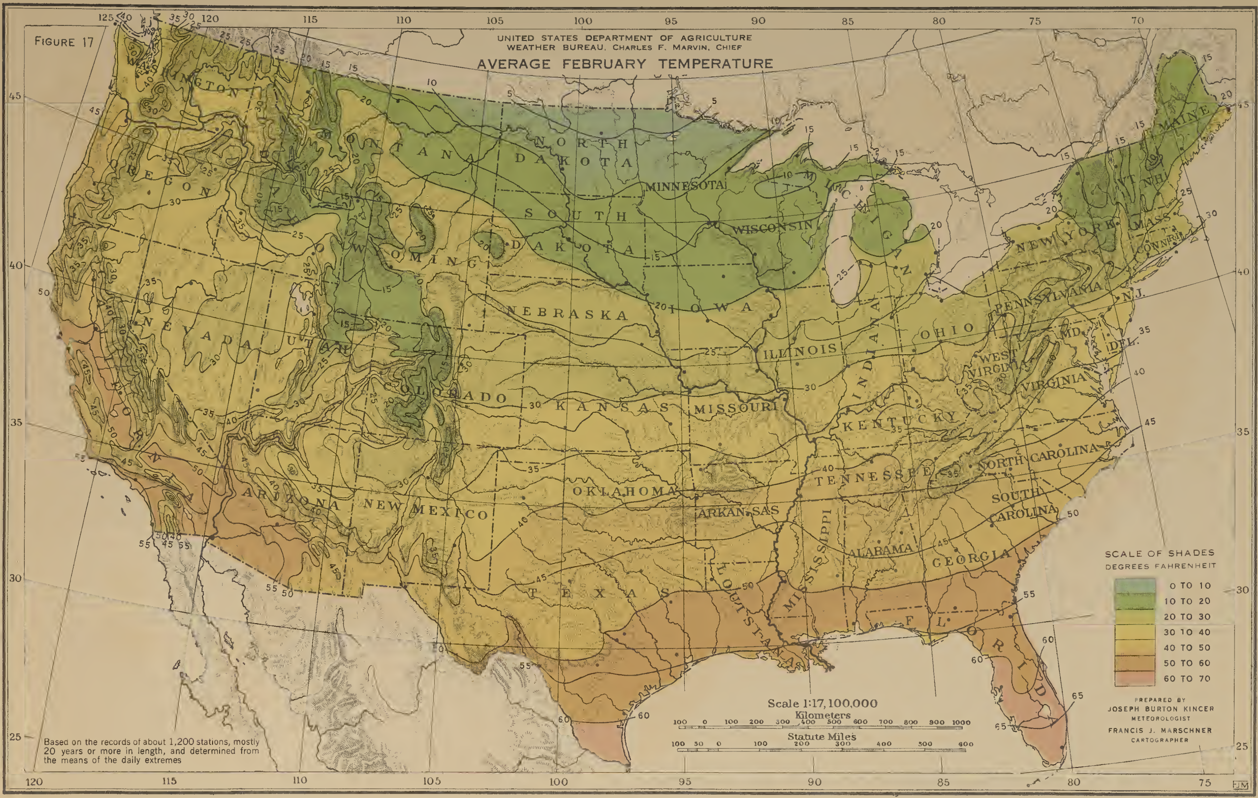
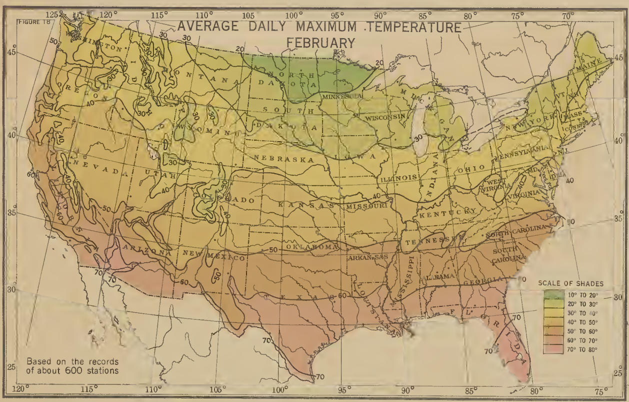
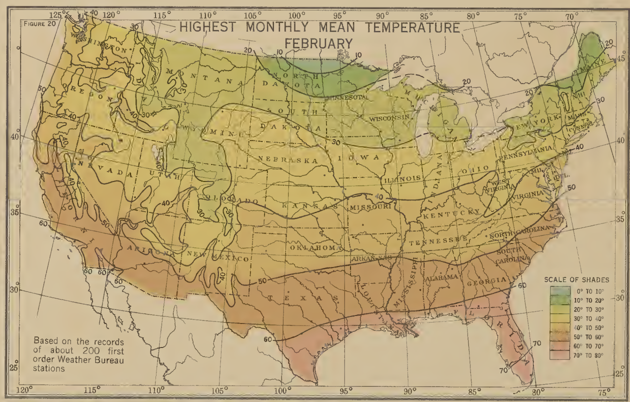
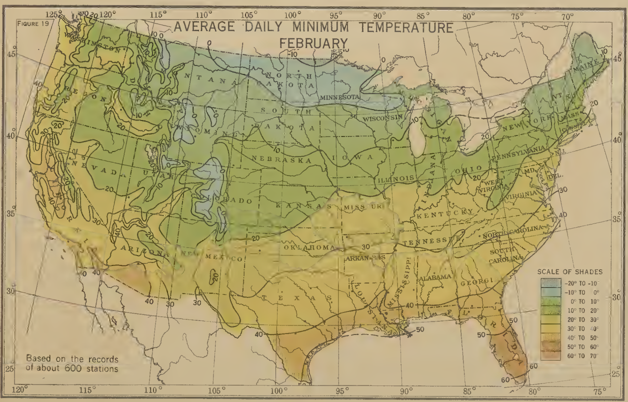
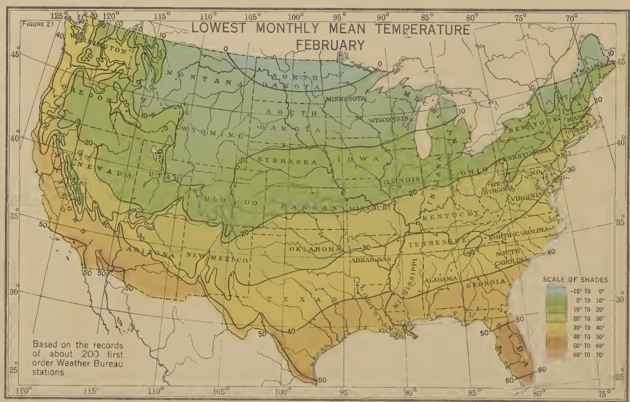


Figure 17.—The average temperature in February does not differ materially from that of January, but as a rule February is slightly the warmer month. The lowest average temperature for this month, about 5° F. is found in the northern portions of Minnesota and North Dakota. Along the Canadian border to the eastward it is about 10° higher. To the southward there is a progressive increase to about 55° along the Gulf coast. Cold waves continue to be of comparatively frequent occurrence in February, usually entering the United States from the Canadian Northwest and sometimes overspreading practically all the country east of the Rocky Mountains. In fact, the coldest weather of the year frequently occurs during the early part of this month. Temperatures as low as −25° have occurred in February as far south as Kansas and Missouri and records as low as 0° have been made in the central Gulf coast. However, there is usually an appreciable increase in temperature in the latter part of February, freezing weather, as a rule, not occurring along the immediate Gulf coast after the 20th of the month









Figures 18 and 19 show for February the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum for this month ranges from about 15° F. on the Canadian border in Minnesota and North Dakota to about 65° along the Gulf coast, increasing to 75° at Key West, Fla. In the West the average daily maximum varies from about 30° in the central Rocky Mountain districts to nearly 75° in the lower Colorado River Valley. The average daily minimum east of the Rockies ranges from −10° at the Canadian boundary in the Red River Valley to 45° or 50° along the Gulf coast. In the West the average minimum varies from about −5° in the central Rocky Mountain districts to about 45° along the central and southern coast of California and in the lower Colorado River Valley

Figures 20 and 21 show the highest and the lowest mean February temperatures in the 28-year period 1895–1922. These mean temperatures do not differ materially, except in the more northern districts, from those for January

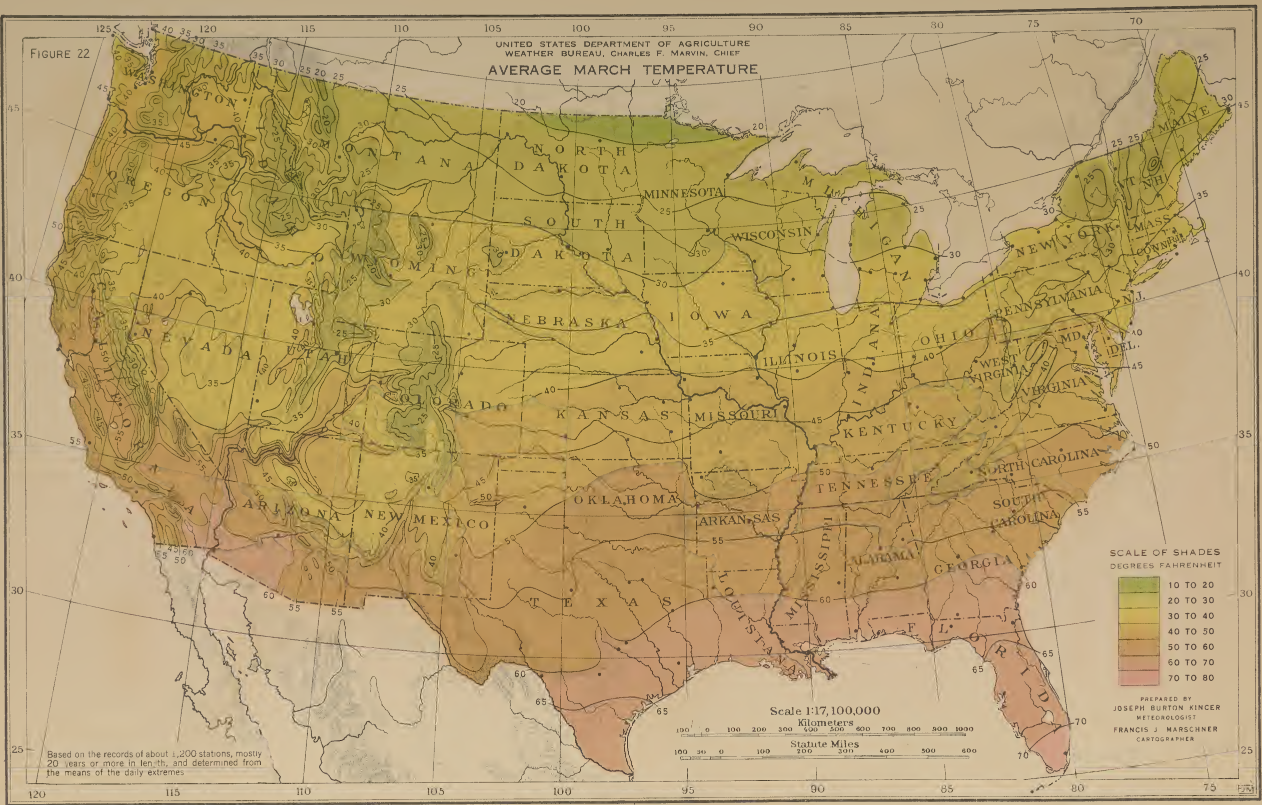
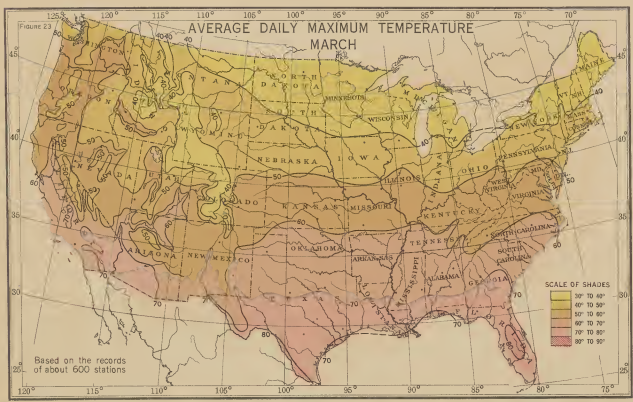
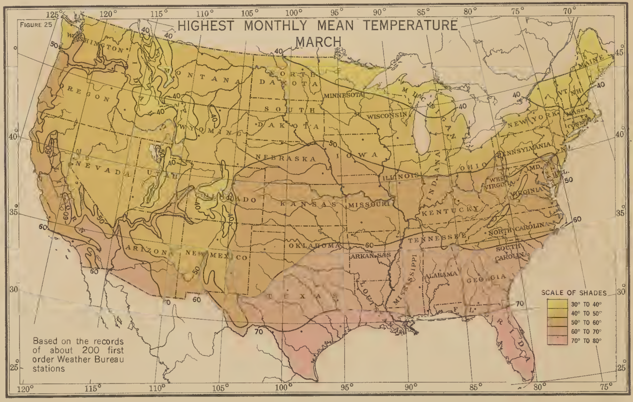
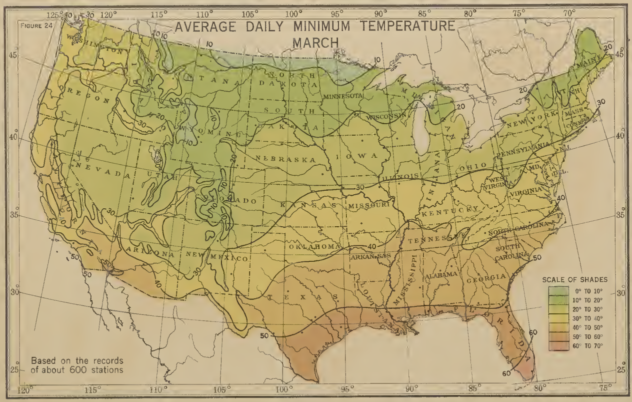
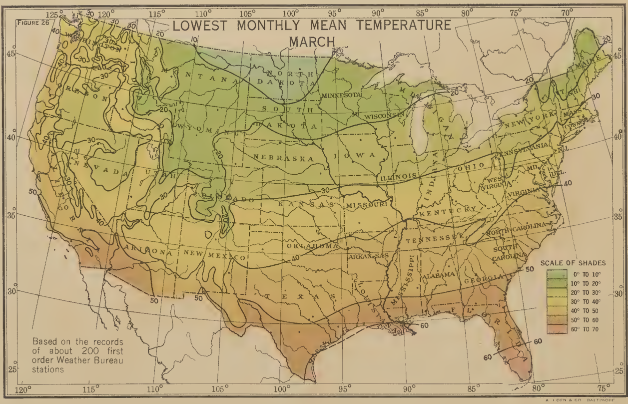


Figure 22.—With the advent of spring there is a rather rapid increase in temperature in most sections of the country. In the northern interior region March is about 15° F. warmer than February, but the increase in temperature from February to March becomes less marked with progress southward, being only about half as great along the Gulf coast as along the northern border of the country. The lowest average temperature for March, about 20°, is found along the northern border in North Dakota and Minnesota, and there is an increase southward to about 60° or 65° along the Gulf coast. In the more northern States extremely cold weather occurs occasionally in this month, from −35° to −40° having been recorded in North Dakota and Montana. But the March cold waves usually lose intensity rapidly in their southward and eastward progress. Temperatures below zero have never been recorded in this month south of the fortieth parallel of latitude, except in the Texas Panhandle, Kansas, and a few localities to the eastward. As a rule freezing weather is not experienced in the Gulf States, except in the extreme northern portions, after March 15









Figures 23 and 24 show for March the average daily maximum and the average daily minimum temperatures. In the northern border States east of the Rocky Mountains the average daily maximum is about 35° F., but this increases southward to about 70° along the Gulf coast and to 80° in portions of the Florida Peninsula and in the lower Rio Grande Valley. In the West the average March maximum varies from somewhat less than 40° in the central and northern Rocky Mountain districts to 80° in the lower Colorado River Valley. The average daily minimum east of the Rockies increases from 10° along the northern border in North Dakota and Minnesota to somewhat more than 50° along the Gulf coast, and to 68° at Key West, Fla. In the West it ranges from about 5° in portions of the Rocky Mountain districts to 50° at San Diego, Calif., and in the lower Colorado River Valley

Figures 25 and 26 show the highest and the lowest mean March temperatures occurring in the 28-year period 1895–1922. The range of variation in the mean temperature for March is much larger than for February, especially in the northern interior States, where the month in one year may be 30° F. warmer than in another year

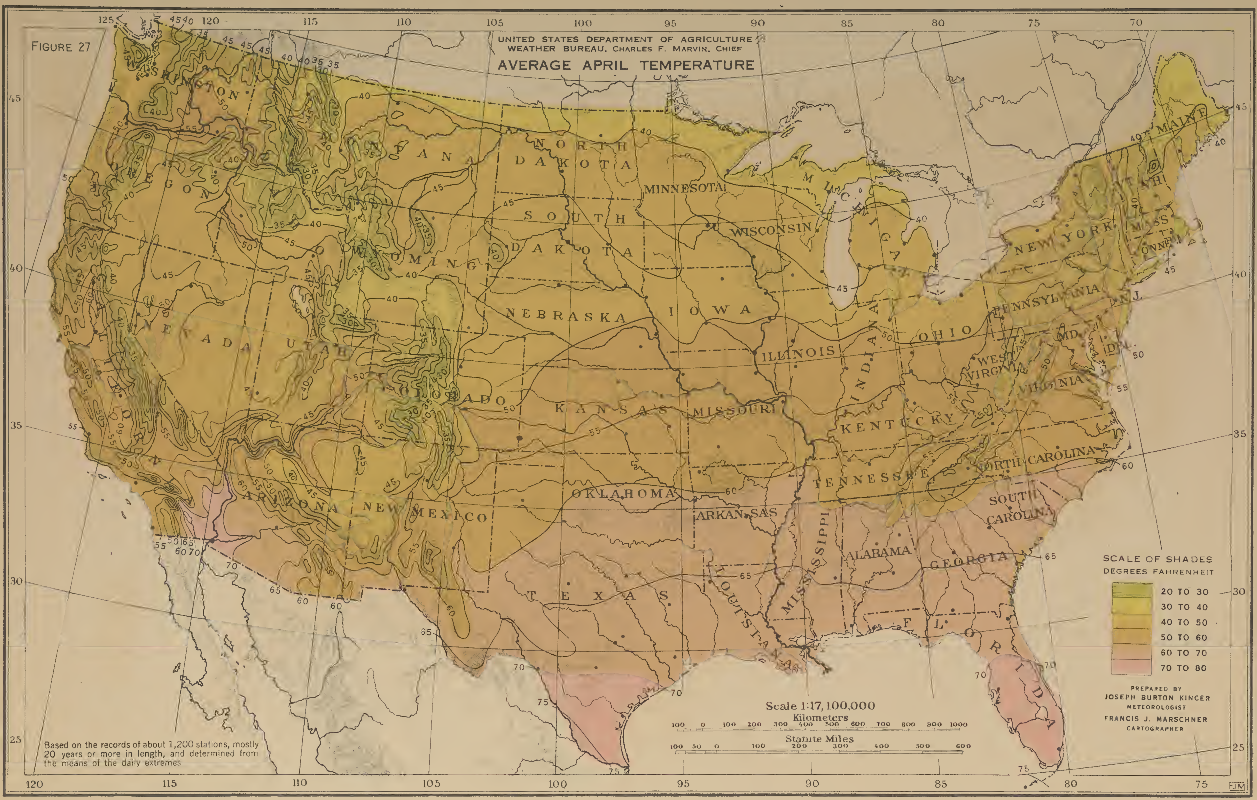
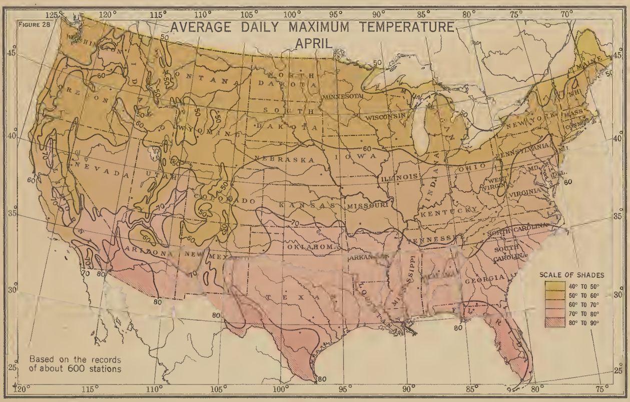
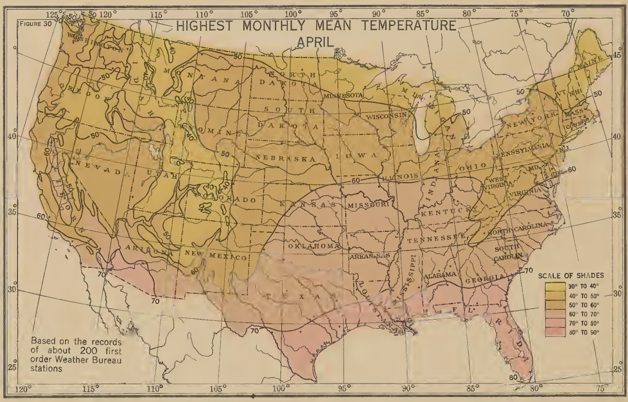
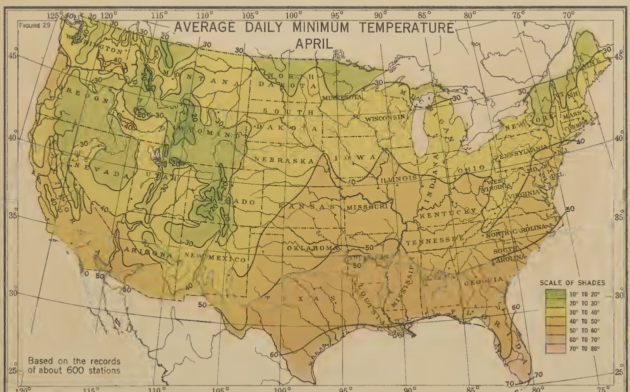
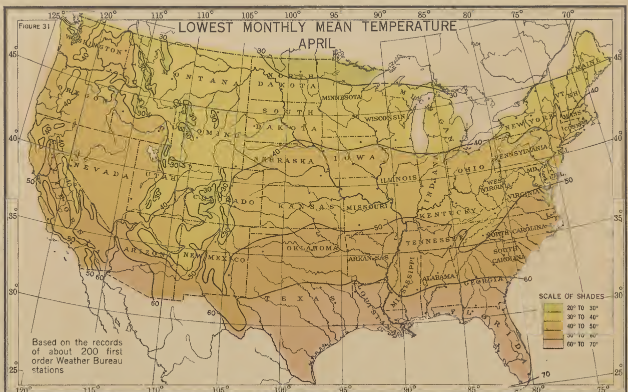


Figure 27.—As spring advances the increase in temperature becomes more pronounced, the average for April in North Dakota and northern Minnesota being nearly 20° F. higher than for March. Southward the increase in temperature becomes progressively less rapid, amounting to about 6° along the Gulf coast. The average temperature for April ranges from about 40° along the Canadian boundary to nearly 70° at the Gulf of Mexico. Along the Pacific coast April is only slightly warmer than March, but in the Interior Plateau and Rocky Mountain districts the increase in temperature during April is rapid. Cold periods occur occasionally during April, the lowest temperature recorded in this month at a regular reporting station of the Weather Bureau located in eastern Montana being −10°. Freezing temperatures have been experienced early in April as far south as Mobile, Ala., but as a rule such temperatures do not occur after the 15th of this month south of a line extending through central Virginia, western North Carolina, and southern Kentucky westward to central Missouri and Kansas









Figures 28 and 29 show for April the average daily maximum and the average daily minimum temperatures. In the principal agricultural districts east of the Rocky Mountains the usual daily temperature range in April varies from about 15° to 27° F., but to the westward, except in the Pacific Coast States, it is considerably larger. (See fig. 82.) East of the Rocky Mountains the average daily maximum for this month ranges from about 45° in northern Maine and the extreme upper Lake region to nearly 80° along the Gulf coast, and the average daily minimum from somewhat less than 30° in the extreme north to about 60° at the Gulf. From the Rocky Mountains westward the average daily maximum varies from somewhat less than 50° at the higher altitudes in the Rocky Mountain region to nearly 90° in southwestern Arizona, and the minimum from about 20° in portions of Colorado and Wyoming to 50° along the coast of southern California and in the lower Colorado River Valley

Figures 30 and 31 show the highest and the lowest mean April temperatures in the 28-year period 1895–1922. The variation in the mean temperature for April in different years is considerably less than for March, but is still large in the northern border States

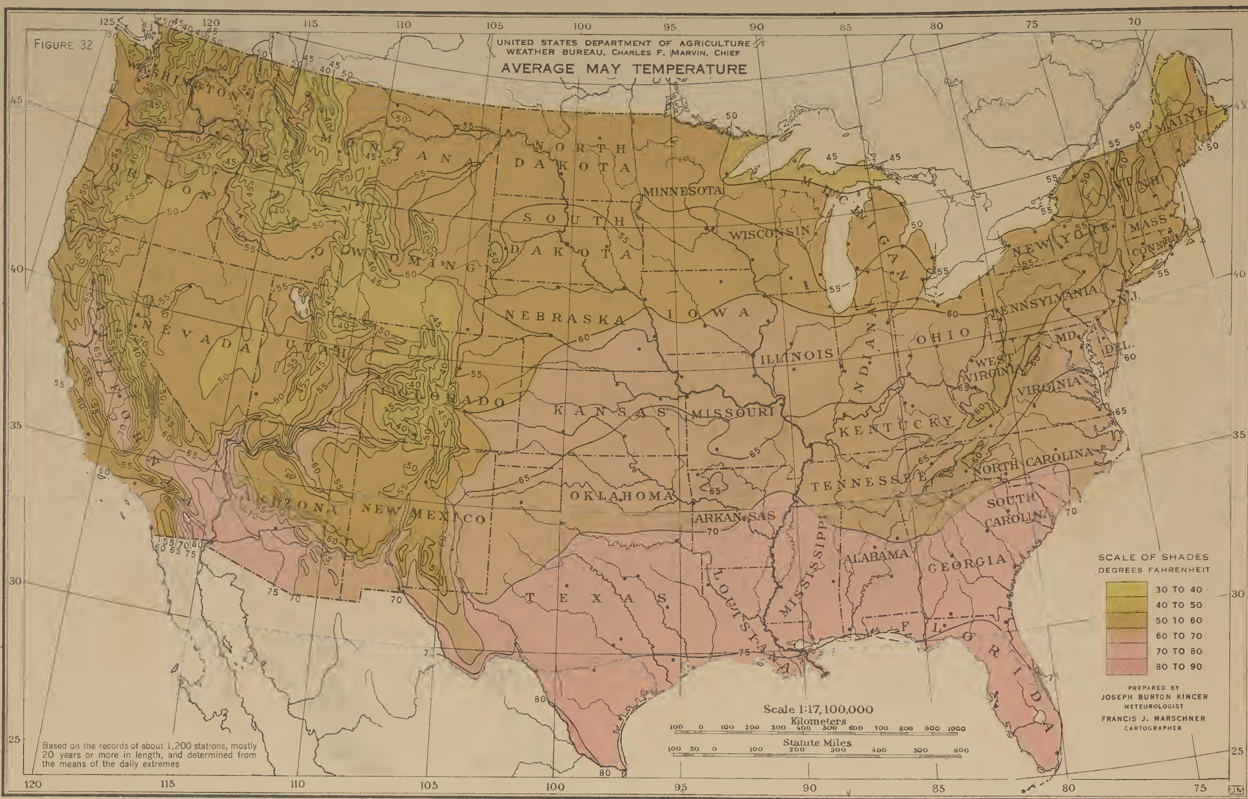
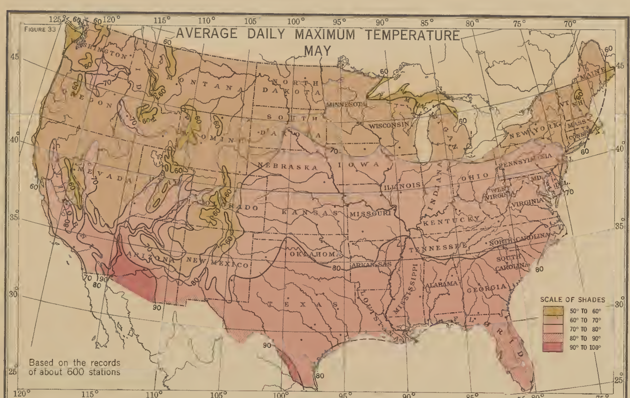
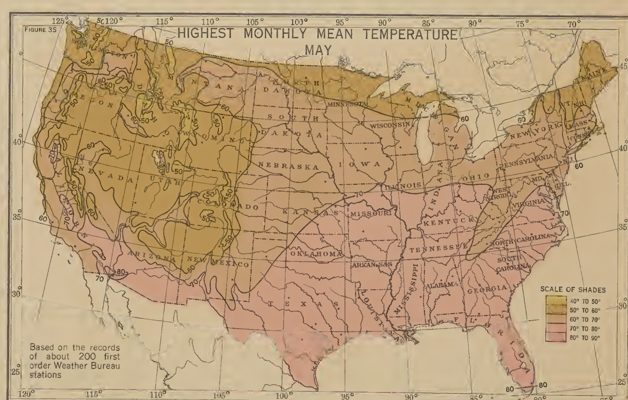
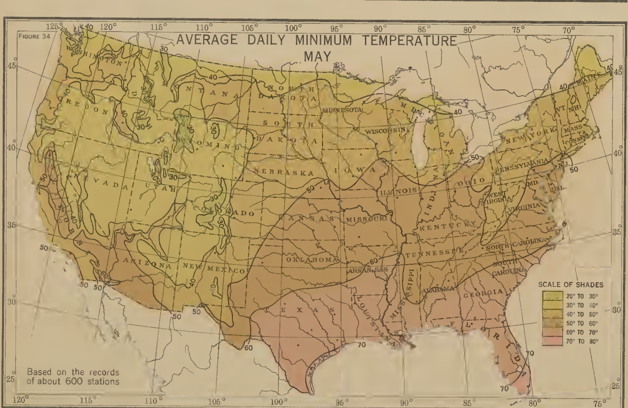
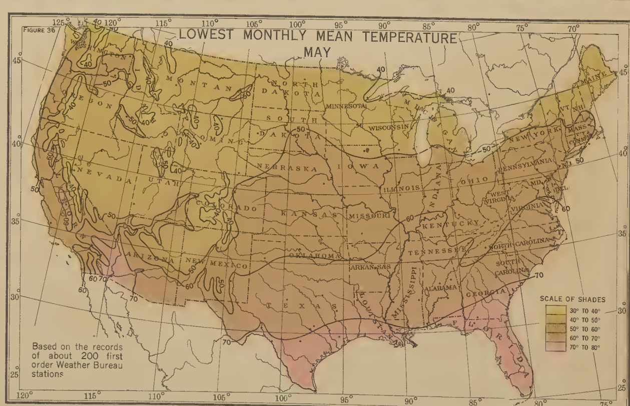


Figure 32.—May throughout most of the United States is usually characterized by the prevalence of mild temperatures. East of the Rocky Mountains the average May temperature ranges from about 50° F. along the northern border of the country to 75° at the Gulf of Mexico, being 5° to 15° higher than for April. Along the immediate Pacific coast it ranges from 50° at the north to 60° at the south. In the lower Rio Grande and Colorado River Valleys the average May temperature is slightly over 80°. The lowest temperature of record in May at a regular reporting station is 6° in northern North Dakota. Freezing temperature has occurred in this month as far south as northern Texas, but east of the Mississippi River freezing weather has never been known south of the Ohio River and southern Pennsylvania, except in elevated districts. As a rule freezing temperatures do not occur after May 10 south of South Dakota, the central portions of Iowa and Wisconsin, and the lower Lakes. High temperatures sometimes occur in May, especially in the Great Valley of California and in the lower Colorado River Valley, 110° having been recorded at Red Bluff and Fresno, Calif., and 120° at Yuma, Ariz.





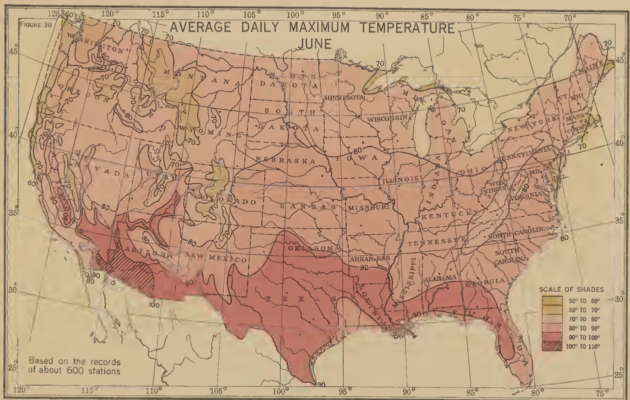


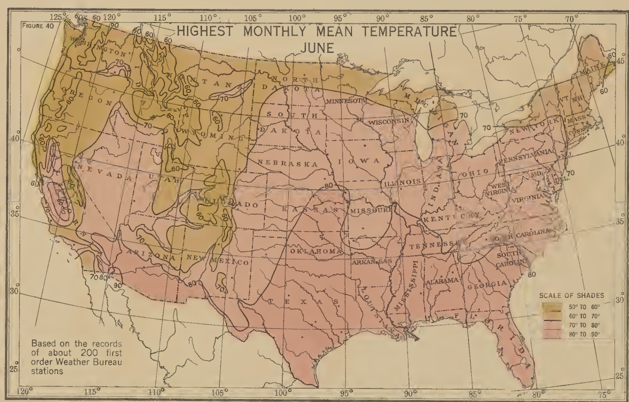


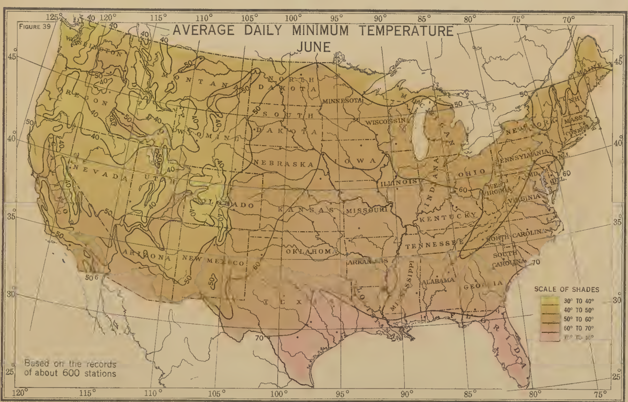
Figures 33 and 34 show for May the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum increases from about 60° F. in the upper Lake region and along the eastern Maine coast to 85° in the southern section of the Cotton Belt, but along the immediate Gulf coast it is only about 80°. In the West the average daily maximum temperature varies from about 60° at the higher altitudes in the Rocky Mountain States and also along the north Pacific coast to 95° in the lower Colorado River Valley. The average daily minimum for May east of the Rocky Mountains ranges from about 40° along the northern border of the country to about 70° along the immediate Gulf coast, and in the West from less than 30° in the central Rocky Mountain districts to 60° in the lower Colorado River Valley

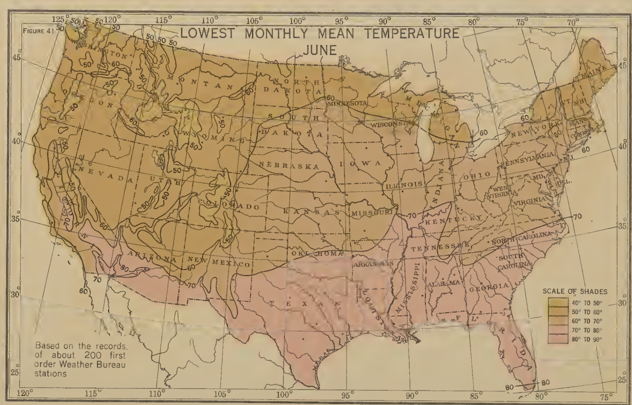
Figures 35 and 36 show the highest and the lowest mean May temperatures in the 28-year period 1895–1922. The lowest mean temperature for May experienced during this 28-year period ranges from about 40° F. in the upper Lake region and in some of the Rocky Mountain districts to 73° along the Gulf coast

Figure 37.—In June the average temperature along the Canadian border east of the Rocky Mountains is about 60° F., or approximately 10° higher than in May. To the southward there is a rather pronounced increase to 70° in central Iowa and Ohio, and thence a less rapid rise to about 80° in the Gulf coast section. At the lower elevations in the West the average June temperature is mostly between 60° and 70°, but in some of the southern districts it is much higher, reaching 90° in the lower Colorado River Valley. Along the immediate Pacific coast it ranges from 55° at the north to 65° at the south. High temperatures occur occasionally during June, the highest of record at a regular reporting station of the Weather Bureau being 117° at Yuma, Ariz. Temperatures of 106° to 110° have been experienced in June in the Great Plains States, and 100° or higher has occurred quite generally throughout the country, except in the Northeastern States, in the Great Lakes region, in the higher altitudes of the Rocky and Appalachian Mountain districts, and along the central and north Pacific coast





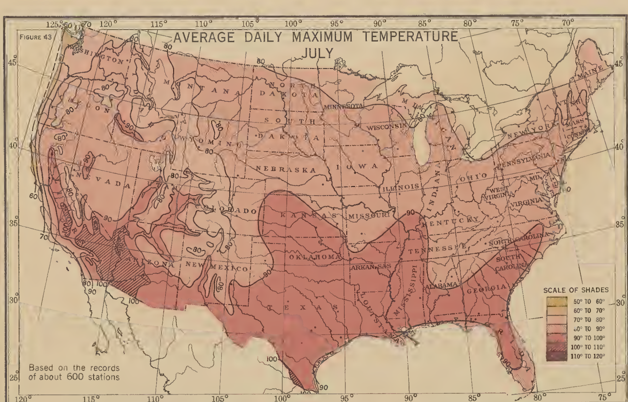


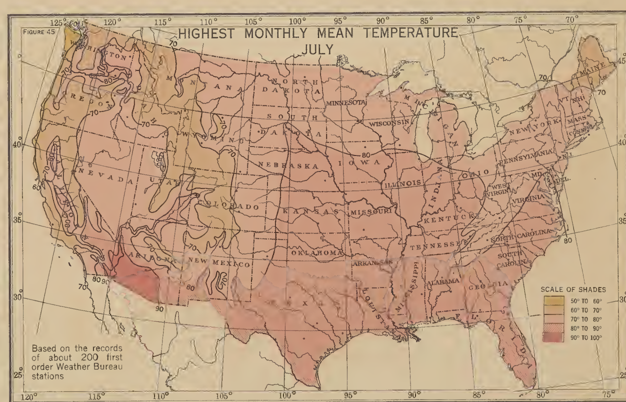


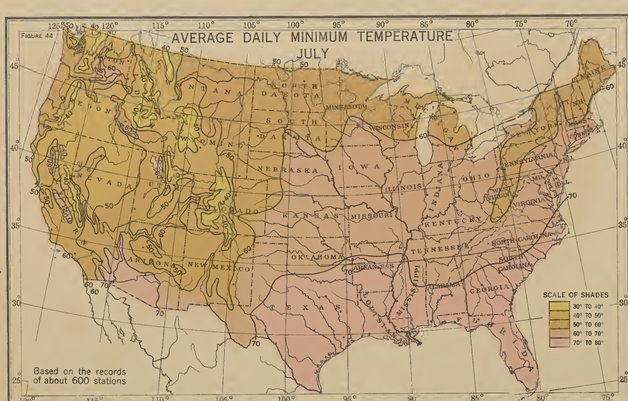
Figures 38 and 39 show for June the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum for June ranges from about 70° F., in the upper Lake region and on the north Atlantic coast to about 90° in the southern portion of the Cotton Belt, increasing to nearly 100° in the lower Rio Grande Valley. In the West the average daily maximum ranges from 60° along the north Pacific coast and less than 70° in the central and northern Rocky Mountain districts to about 105° in the lower Colorado River Valley. The average daily minimum temperature ranges from less than 40° in the central and northern Rocky Mountain districts and 50° along the northern border of the country to about 75° along the immediate Gulf coast

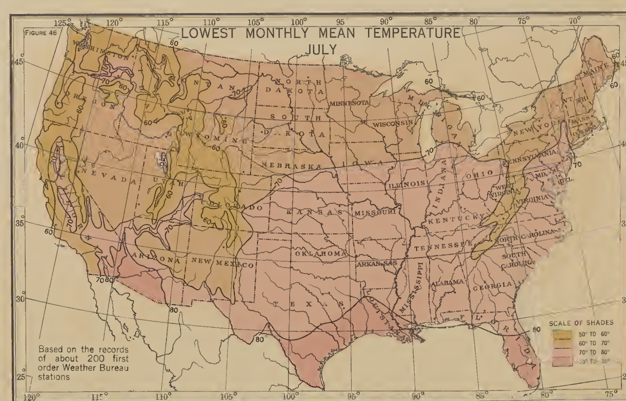
Figures 40 and 41 show the highest and lowest mean June temperatures in the 28-year period 1895–1922. Variation in the mean temperature for June during this period is not pronounced in any section of the country. In the principal agricultural districts it is generally about 10° F. and along the Pacific coast is only 5°

Figure 42.—July is usually the warmest month of the year, except along the Pacific coast, where the marine type of climate prevails. East of the Rocky Mountains the average July temperature ranges from between 55° and 70° F. in the northern border States to about 82° on the Gulf coast. Along the Pacific coast it increases from about 55° at the north to 67° at the south. The highest July temperature usually occurs in southwestern Arizona and southeastern California, where the average for the month varies from 90° to 98°. In July periods of hot weather are comparatively frequent in the interior sections of the country. In some of the important agricultural districts, particularly in the Middle West, the heated periods are occasionally accompanied by hot winds which are injurious to vegetation. July temperatures of from 105° to 110° have been experienced in nearly all localities between the Rocky Mountains and the Mississippi River and at many points to the eastward. However, along the central and north Pacific coast in the higher altitudes of the Rocky and Appalachian Mountains and likewise at points along the north Atlantic coast and in the Florida Peninsula the highest temperatures ever recorded are less than 100°





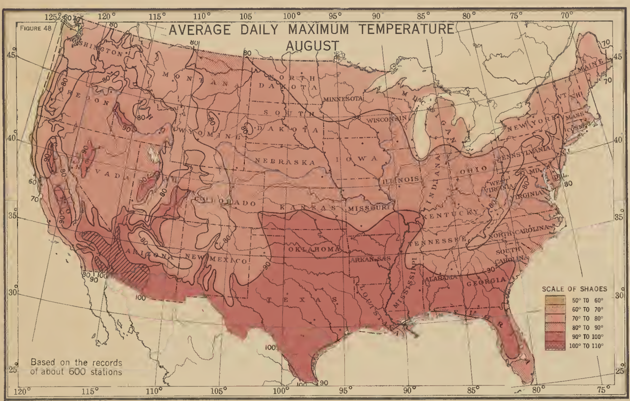


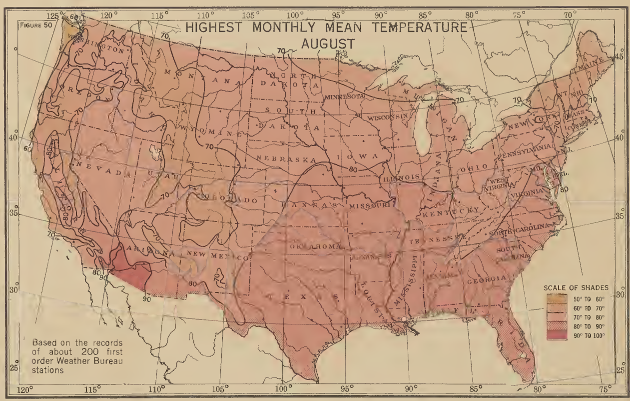


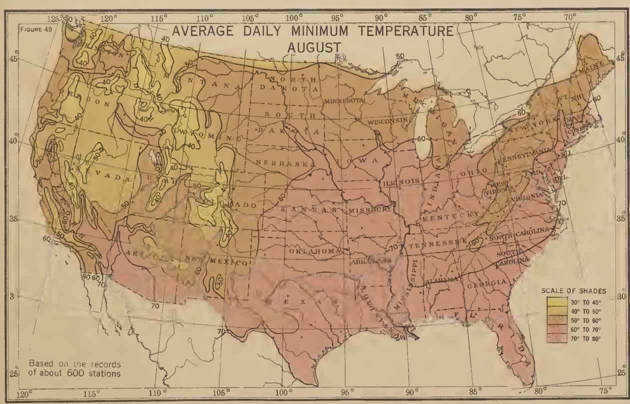
Figures 43 and 44 show for July the average daily maximum and the average daily minimum temperatures. The average daily maximum east of the Rocky Mountains ranges from between 70° and 80° F. along the Canadian Border to about 100° in the lower Rio Grande Valley, and in the far West from about 60° along the north Pacific coast to nearly 110° in the lower Colorado River Valley. The average daily minimum ranges from less than 40° in the higher Rocky Mountain districts and about 50° in northern North Dakota to 75° along the Gulf coast and in the lower Colorado River Valley. The average daily range in temperature in July in the Eastern States is mostly from 20° to 25°, except along the coasts of the Great Lakes and Atlantic Ocean, and in the Western States is from 25° to 45°, except along the immediate Pacific coast. (See fig. 83.) This is 5° to 10° greater than in January

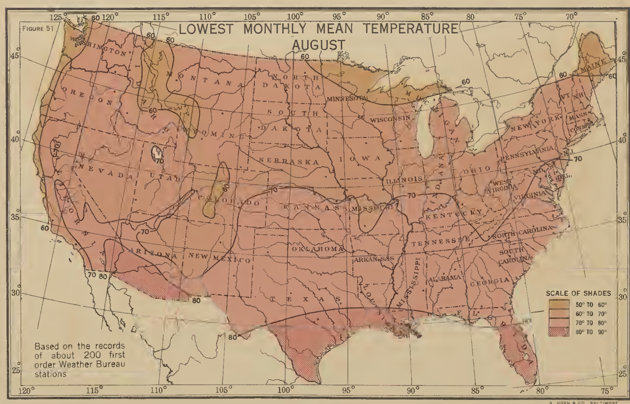
Figures 45 and 46 show the highest and the lowest mean July temperatures in the 28-year period 1895–1922. Variations in the mean July temperature from year to year are, as a rule, not pronounced, the extreme range being in most districts from 5° to 7° F., as compared with 10° to 20° for January

Figure 47.—During August temperature conditions do not, as a rule, differ materially from those in July, but August is usually slightly cooler, except along the Pacific coast. At some points on the Pacific coast September is even warmer than August. East of the Rocky Mountains the coolest August weather usually occurs in northern Michigan and in the highlands of New York and New England, where the average temperature for the month ranges from 60° to 65° F. The temperature gradient from north to south is much smaller in summer than in winter. In July and August the difference between the average temperature along the Canadian boundary and that on the Gulf coast is about 15°, but in midwinter it is about 50°. Along the immediate Pacific coast the characteristic cool summer weather usually continues during August, but in the Great Valley of California and in southwestern Arizona hot weather often prevails, the average temperature in the lower Colorado River Valley reaching 95°. Temperatures as high as 116° have been experienced in August in the lower Colorado River Valley, 113° at points in the Great Valley of California and eastern Washington, 112° in northeastern Texas, and 110° locally in the northern Great Plains region





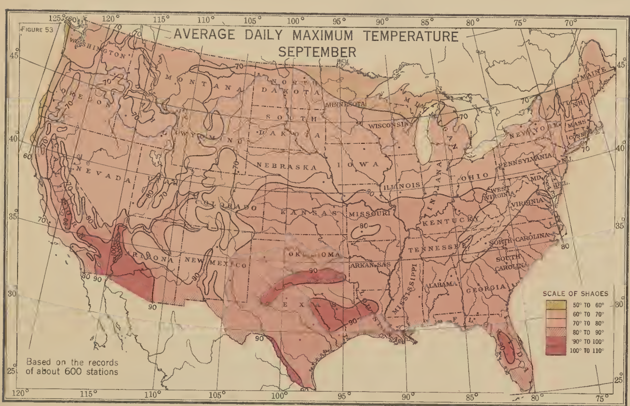


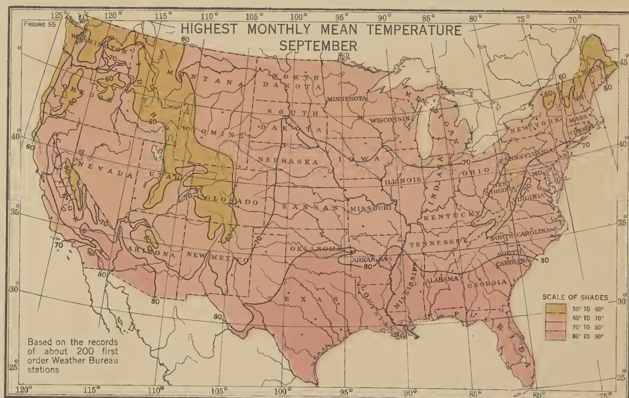


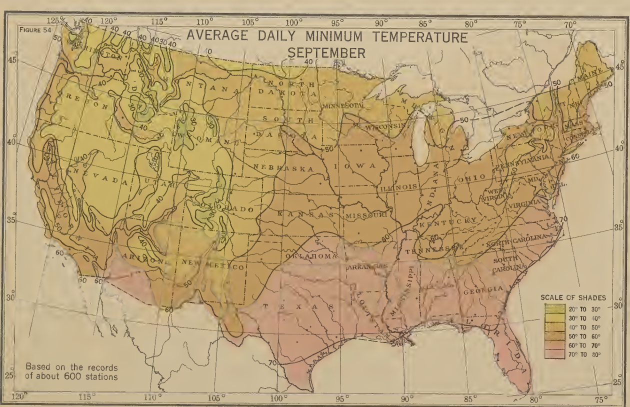
Figures 48 and 49 show for August the average daily maximum and average daily minimum temperatures. Along the immediate Pacific coast the daily maximum temperature during this month is low, ranging from 60° F. at the north to 74° at the south. In the southern portion of the Great Valley of California the average daily maximum temperature is near 100°, and in the lower Colorado River Valley it reaches 108°. East of the Rocky Mountains the average daily maximum temperature ranges from about 72° in northern Michigan and 70° on the eastern Maine coast to 100° in the lower Rio Grande Valley. The average daily minimum for August ranges from about 35° in the higher altitudes of the middle and northern Rocky Mountain districts to about 75° along the Gulf coast and in the lower Colorado River Valley. In practically all the important agricultural sections of the United States it is over 50°

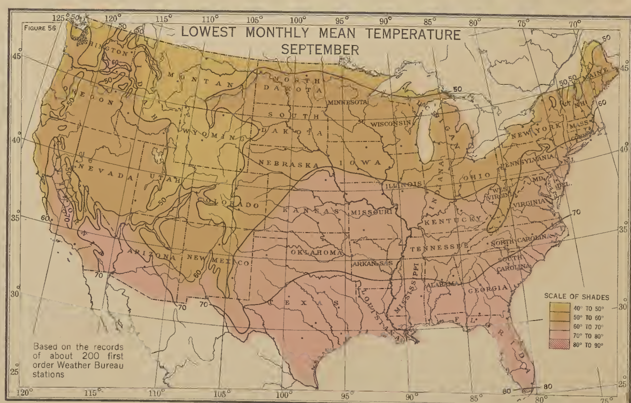
Figures 50 and 51 show the highest and the lowest mean August temperatures in the 28-year period 1895–1922. The range in variation in this mean August temperature does not differ materially from that for July, being mostly about 5° and less than 10° F. throughout practically the entire United States

Figure 52.—The average September temperature east of the Rocky Mountains ranges from about 55° F. along the Canadian boundary, where it is about 8° lower than in August, to about 78° along the Gulf coast, where it is 2° or 3° lower. At the lower elevations of the Rocky Mountain and Interior Plateau regions the average September temperature varies mostly from 50° to 65°, but in the Great Valley of California it is 70° to 75° and in the lower Colorado River Valley 80° to 85°. In some localities along the immediate Pacific coast September is usually the warmest month in the year. High temperatures are experienced occasionally in September, especially between the Rocky Mountains and the Mississippi River, where records of 100° or higher are quite general. Likewise, in the interior valleys of California, high temperatures sometimes occur in this month, the highest being 110° in the southern portion of the Great Valley. Cool weather may also occur in September, freezing temperatures having been recorded as far south as the Ohio River and the southern portions of Kansas and Missouri; but east of the Rocky Mountains frost does not usually occur in September south of the northern border States









Figures 53 and 54 show for September the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum for September ranges from about 65° F. in the extreme northern portion of Michigan and on the eastern Maine coast to about 88° along the Gulf coast and 95° in the lower Rio Grande Valley. West of the Rockies it varies from about 60° along the north Pacific coast to somewhat more than 100° in the lower Colorado River Valley. The average daily minimum east of the Rockies ranges from about 40° in the extreme northern portions of North Dakota and Montana to about 70° along the Gulf coast, and in the West it varies from less than 30° in the higher altitudes of the central and northern Rocky Mountain region to nearly 70° in the lower Colorado River Valley

Figures 55 and 56 show the highest and the lowest mean September temperatures in the 28-year period 1895–1922. The range of variation in mean September temperatures is somewhat larger than for August, being mostly between 8° and 15° F. in the principal agricultural areas

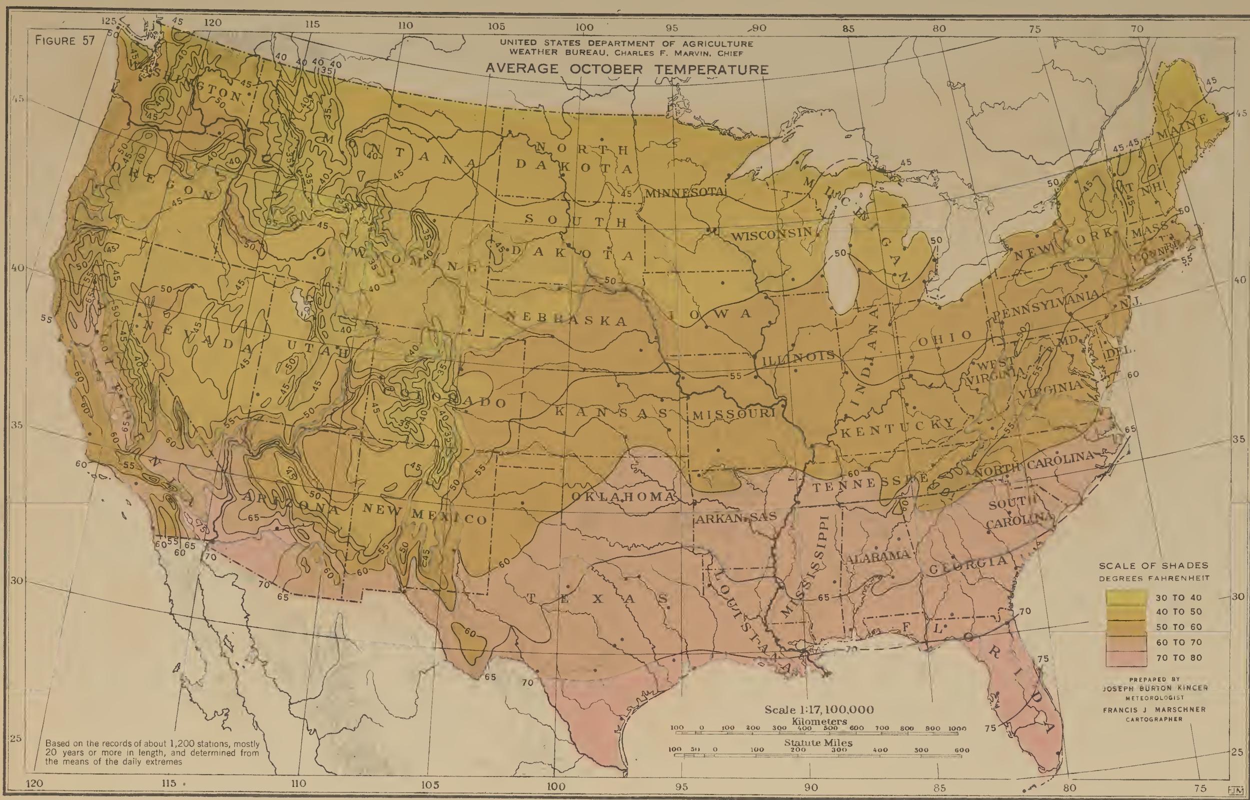
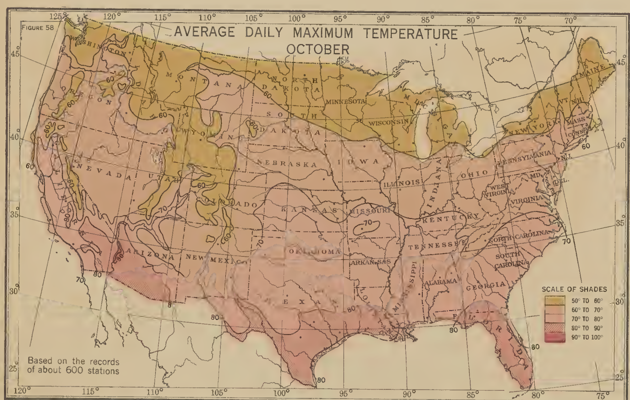
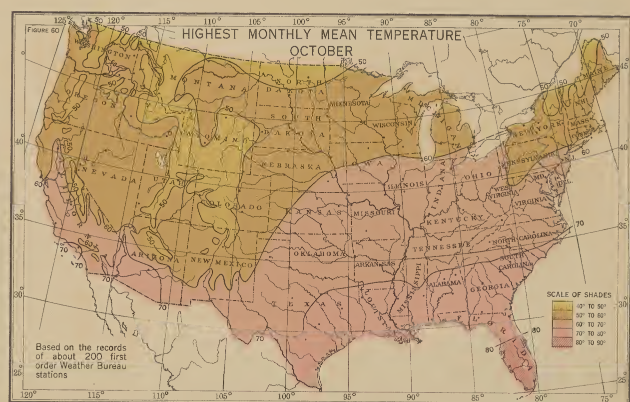
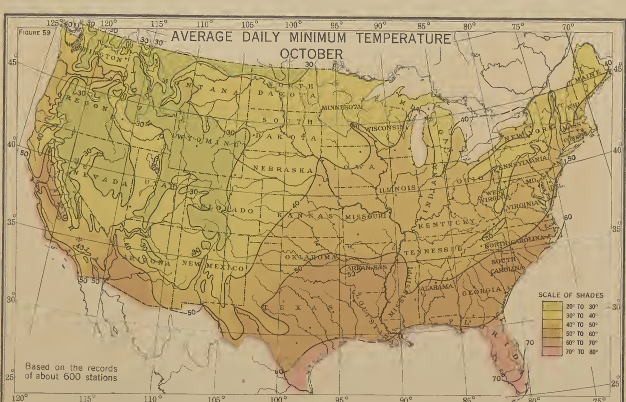
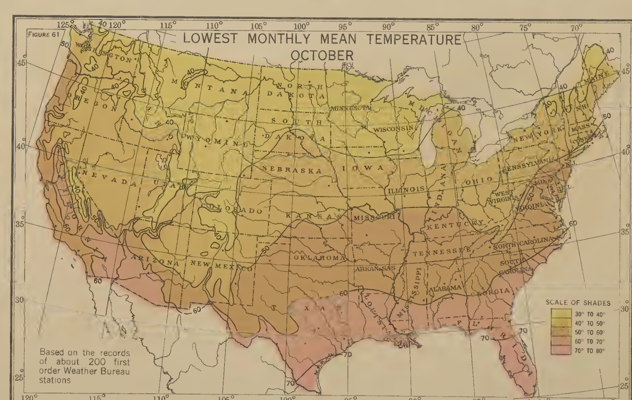


Figure 57.—During October there is a pronounced decrease in temperature, except in southern Florida and along the Pacific coast. The decrease below the average September temperature is in general from 10° to 15° F. East of the Rocky Mountains the average temperature for October ranges from about 45° along the northern border of the country to 70° on the Gulf coast. In the Rocky Mountain and Interior Plateau regions, at the lower elevations mostly, it varies from 40° to 50°, but is 10° to 20° higher in the valleys of New Mexico, Arizona, and California. Along the immediate Pacific coast the average temperature increases from about 50° at the north to 60° at the south. Temperatures below zero have been experienced at a few points in the North Central States in October, the lowest of record at a regular station of the Weather Bureau being −16° in northern Montana. Freezing temperatures have occurred in this month nearly to the Gulf coast. In a normal year freezing weather occurs before the last of October as far south as the northern portions of South Carolina, Georgia, Alabama, and Mississippi and the central portions of Arkansas and Oklahoma. Along the Canadian border freezing temperatures occur, on the average, on about 15 days in October, but to the southward the number decreases rapidly









Figures 58 and 59 show for October the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum ranges from about 55° F. in the northern portions of New England, Michigan, Wisconsin, and Minnesota to nearly 90° in the lower Rio Grande Valley, and in most districts is about 10° lower than for September. In the West it varies from about 55° in the central and northern Rocky Mountain districts to 90° in the lower Colorado River Valley. The average daily minimum ranges from about 20° in the higher altitudes of the Rocky Mountain region to about 60° along the central Gulf coast. In the Corn Belt the average of the daily minima for October ranges from about 40° in the northern portion to 50° in the southern

Figures 60 and 61 show the highest and the lowest mean October temperatures in the 28-year period 1895–1922. In the interior districts the range of variation in mean October temperatures during the 28-year period is mostly from 10° to 15°, but near the Atlantic, Gulf, and Pacific coasts it is smaller

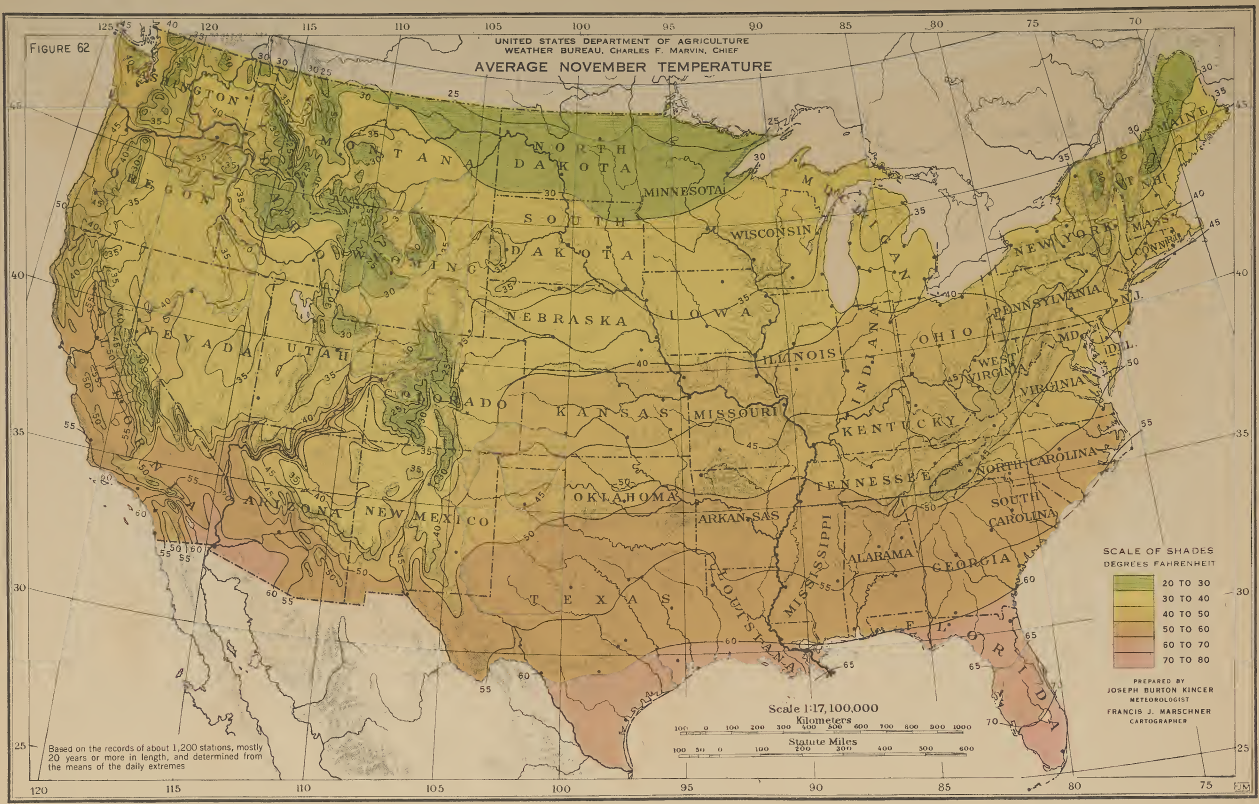
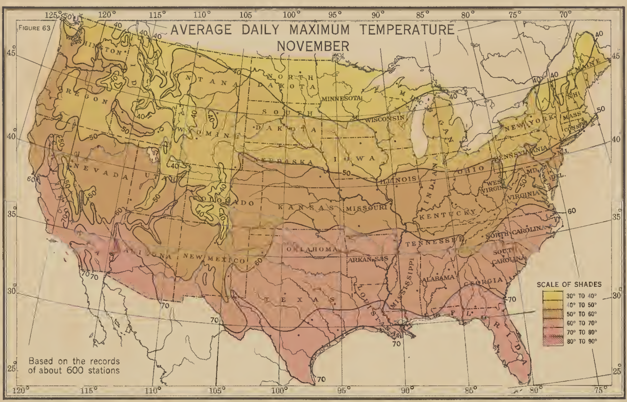
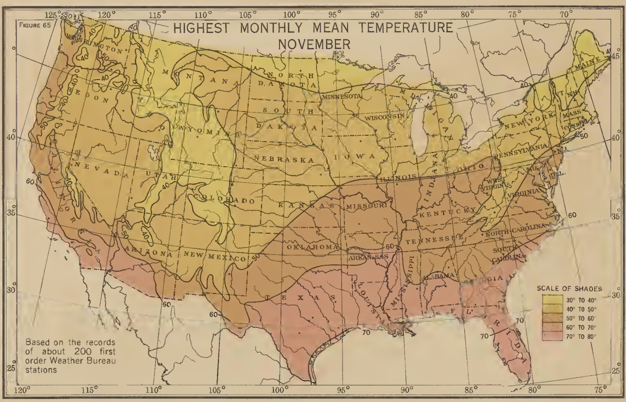
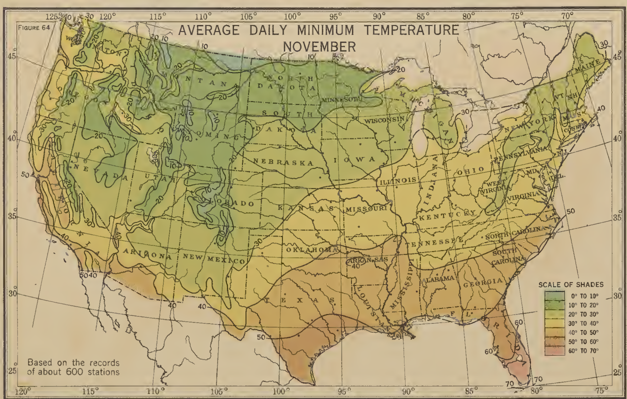
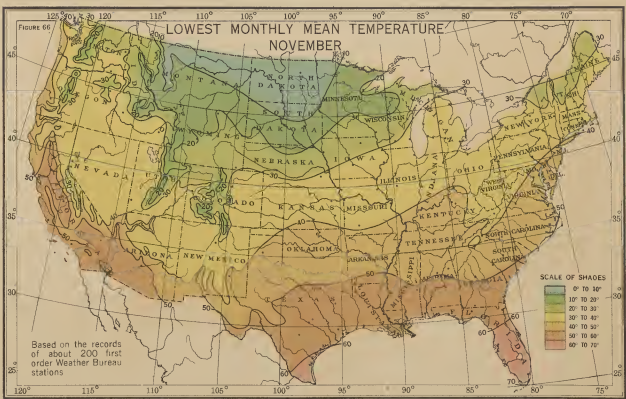


Figure 62.—During November the decrease in temperature, as a rule, is rapid, the average temperature for the month being usually from 10° to 20° F. lower than that for October, except along the Gulf and Pacific coasts. The greatest decrease in temperature is in Minnesota and the Dakotas. East of the Rocky Mountains the average November temperature ranges from about 25° in northern Minnesota and North Dakota to about 60° along the Gulf coast, and 70° in southern Florida. Along the Pacific coast it increases from 45° at the north to about 60° at the south. In November cold waves of considerable severity sometimes advance from the Canadian Northwest and overspread the north Central States, but they usually lose force rapidly after entering the United States and are seldom of long duration. Zero temperature has never been experienced at a regular Weather Bureau station in this month south of the Ohio River, but freezing weather has occurred southward to Tampa, Fla. Freezing temperatures are not ordinarily reached in November, however, along the Texas coast nor south of Gainesville, Fla. The lowest temperature of record for this month at a regular reporting station is —33° in northern Montana









Figures 63 and 64 show for November the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum ranges from about 35° F. along the north-central border of the United States to about 70° along the Gulf coast. Except along the Gulf and south Atlantic coasts it is 10° to 20° lower than for October. In the West the average daily maximum varies from less than 40° in the higher altitudes of the Rocky Mountain region to 80° in the lower Colorado River Valley. The average daily minimum for November ranges from about 10° in northern North Dakota, northeastern Montana, and in the higher altitudes of Colorado and Wyoming to about 50° along the central Gulf and southern California coasts, and nearly 70° in southern Florida

Figures 65 and 66 show the highest and the lowest mean November temperatures in the 28-year period 1895–1922. East of the Rocky Mountains the variation from year to year in mean November temperatures is large, particularly in the North Central States, where the range is as great as 30° F. or more. The coldest November on record occurred in North Dakota and eastern Montana in 1896, when the mean temperature for the month was about 7°

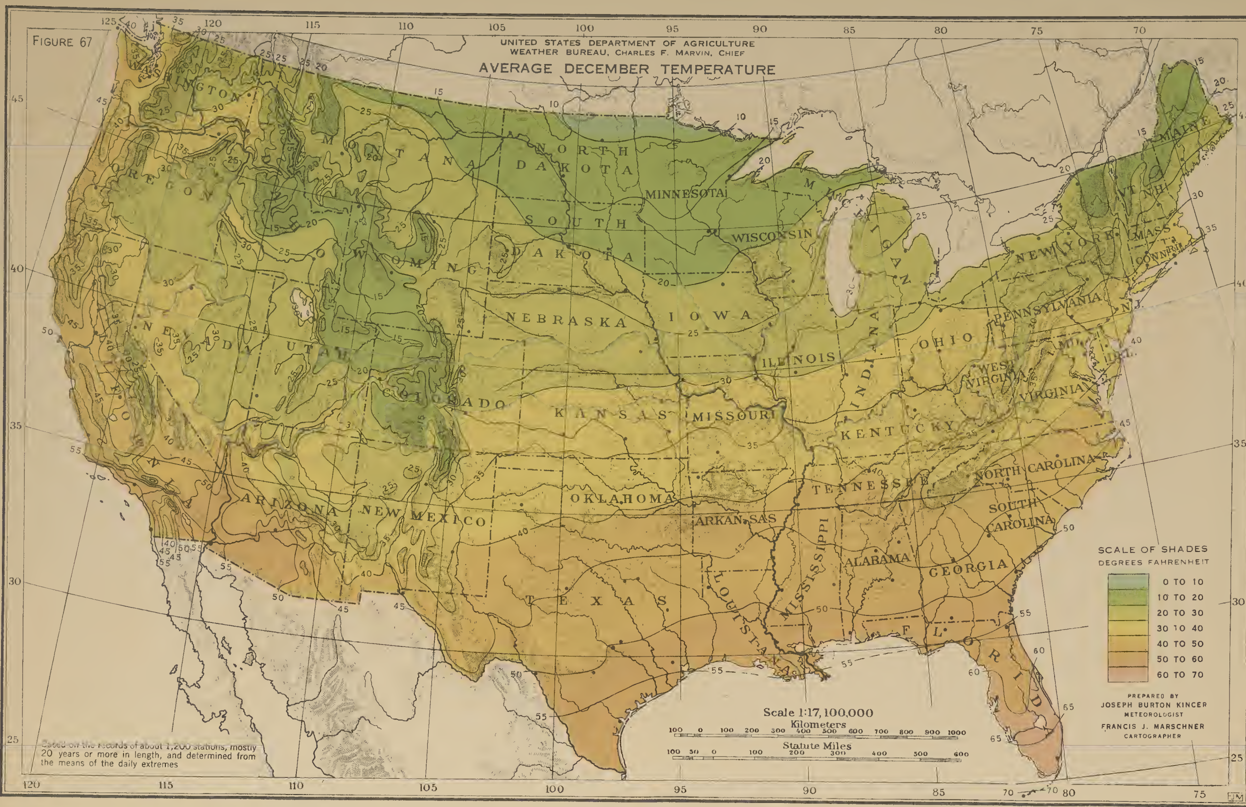
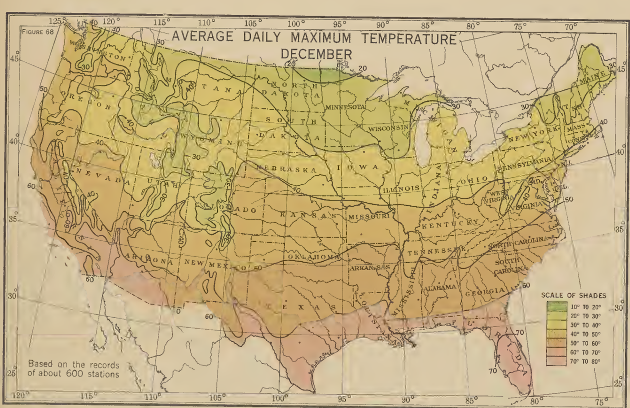
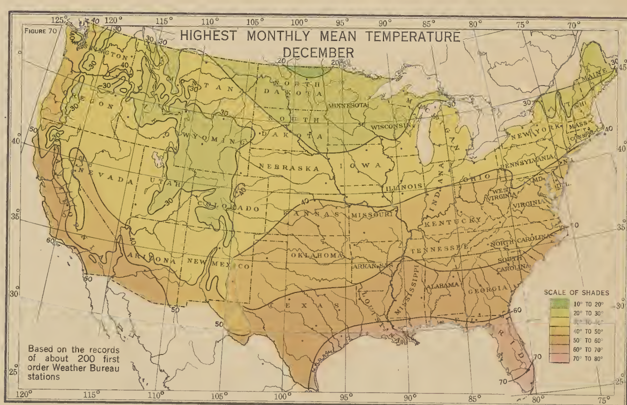
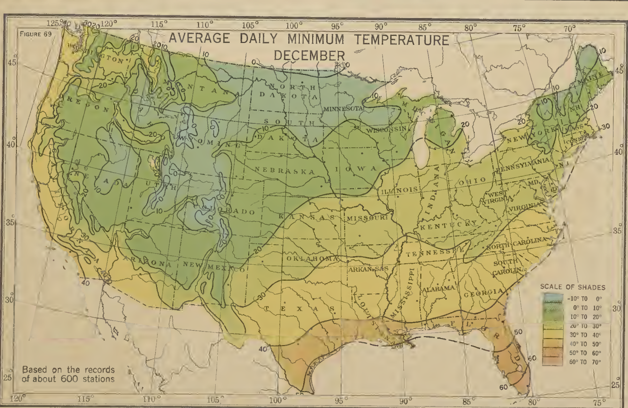
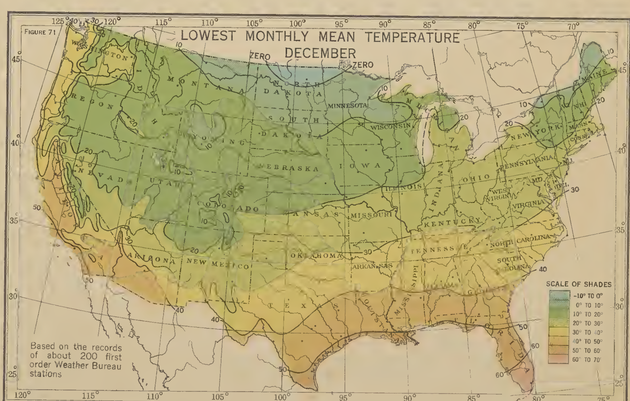


Figure 67.—During December the temperature, as a rule, continues to decrease rapidly. East of the Rocky Mountains the decrease in the average temperature from November to December ranges from about 15° F. in the northern border States to 7° or 8° along the Gulf coast. The average December temperature ranges from about 10° in northwestern Minnesota and northeastern North Dakota to 55° in the Gulf coast region, and 70° in extreme southern Florida. In the valleys of the Rocky Mountain and Interior Plateau regions the average temperature for the month varies from 20° to 35°, except in the Mexican-border States, where it is locally as high as 55°. Along the Pacific coast the average temperature increases from about 44° at the north to 56° at the south. During December cold waves become more frequent and severe, and in the interior portions of the country very low temperatures occasionally occur. The lowest of record for this month at a regular Weather Bureau station is −50° in northern Montana. Temperatures of −10° to −15° have been experienced in December as far south as southern Kansas and Missouri and −5° in portions of Tennessee and North Carolina. Along the central Gulf coast the lowest temperature recorded in December is 14°





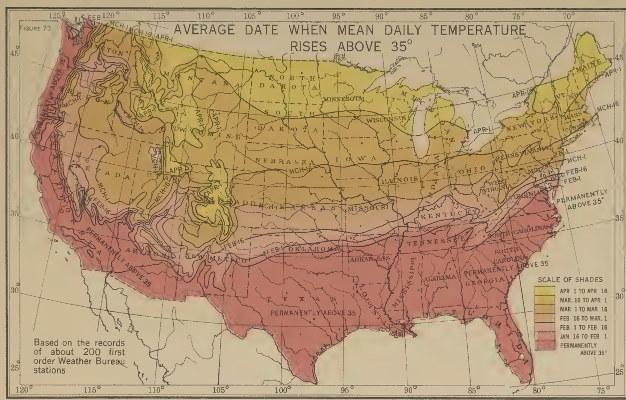


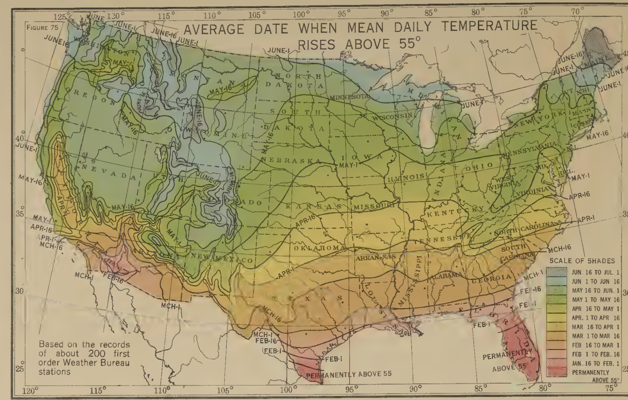


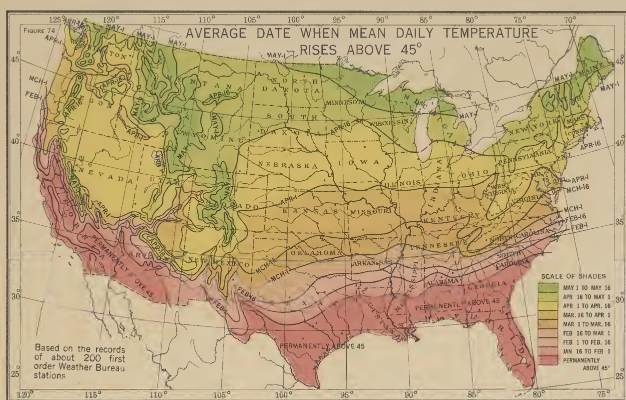
Figures 68 and 69 show for December the average daily maximum and the average daily minimum temperatures. East of the Rocky Mountains the average daily maximum ranges from about 20° F. in northern Minnesota and North Dakota to about 65° along the Gulf coast, and 70° in southern Florida and extreme southern Texas. In the West it varies from less than 30° in the central Rocky Mountain region to nearly 70° in the lower Colorado River Valley. The average of the daily minima for December east of the Rockies ranges from about zero in northern Minnesota and North Dakota to 66° at Key West, Fla. In the West it varies from below zero at the higher altitudes in the Rocky Mountain region to 48° on the coast of southern California, decreasing slowly along the coast northward to 46° at San Francisco and 40° along the Washington coast

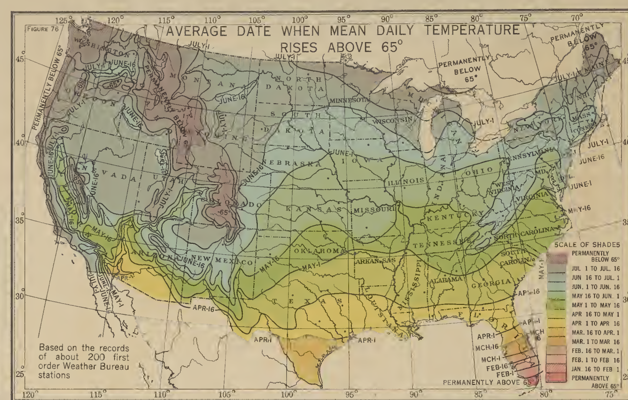
Figures 70 and 71 show for December the highest and the lowest mean temperatures in the 28-year period 1895–1922. The variation from year to year is comparatively large in most districts. The range is 15° to 20° F. in the central and northern Rocky Mountain districts and in the North Central States, about 10° in the Gulf coast region, but only about 5° along the north Pacific coast

Figure 72.—The graphs comprising this figure show for selected representative Weather Bureau stations and for each month of the year (1) the average monthly temperature, indicated by the solid, central line in the graph for each station; (2) the average daily maximum and the average daily minimum temperatures, indicated respectively by the upper and the lower dotted lines; (3) the average monthly maximum and minimum temperatures, that is, the average of the highest and lowest temperatures occurring each month, indicated respectively by the upper and the lower dashed lines; and (4) the absolute monthly maximum and minimum temperatures or the highest and the lowest temperatures ever recorded in each month, indicated respectively by the extreme upper and lower dot and dash lines. The graphs also show (5) the average daily range in temperature for each month, this being represented by the vertical distance between the dotted lines showing the average of the daily maxima and the average of the daily minima; (6) the average monthly range represented by the vertical distances each month between the dashed lines of average monthly maximum and minimum temperature; (7) the range in absolute monthly temperatures represented by the distances each month between the extreme dot and dash lines showing absolute maximum and minimum temperatures; and (8) the distance between the highest point reached by the top line and lowest reached by the bottom line shows the absolute annual range. The graphs are arranged geographically, each being placed directly over the location of the station it represents, the station in most cases being near the center of the graph. These graphs show the annual march of temperature and afford comparisons of important temperature data for the different sections of the country. The large diurnal monthly, and annual ranges in temperature characteristic of continental climates and the small ranges in temperature typical of marine climates will be noted upon comparing the graphs for the interior sections of the United States with those for the Pacific coast. The smaller annual range in temperature in the southern United States will also be noted upon comparing the graphs for the southern portion with those for the northern portion of the country

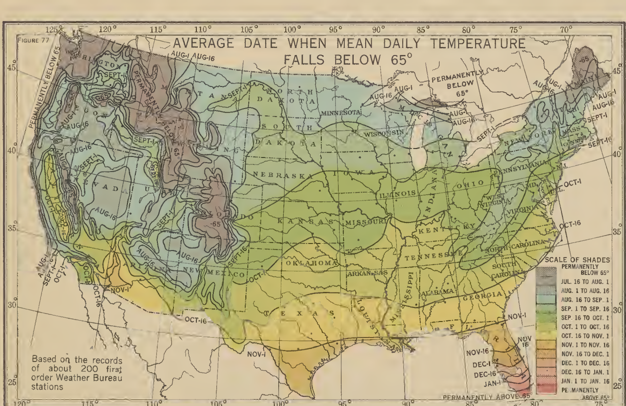


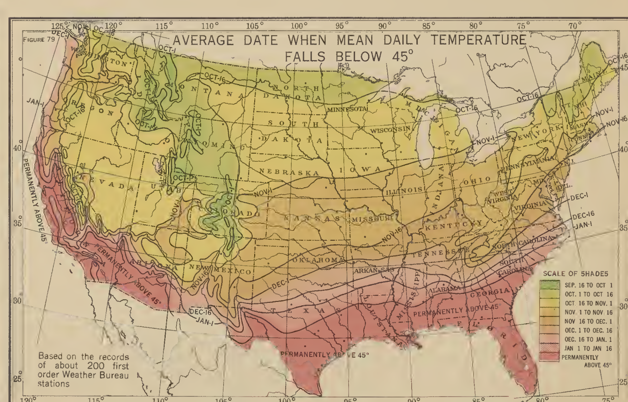


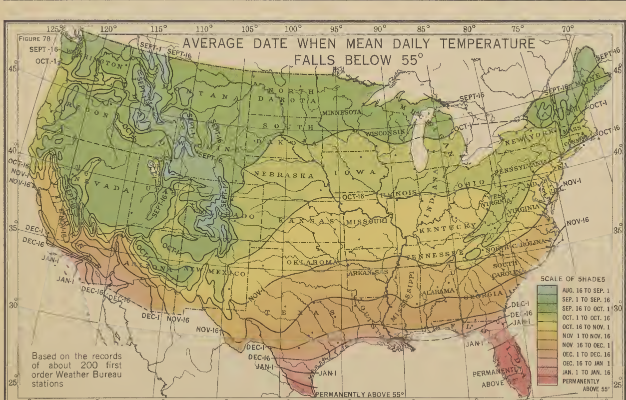


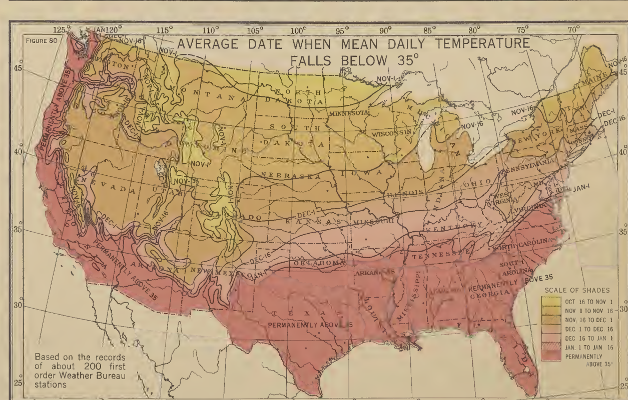


Figures 73, 74, 75, and 76 show the dates on which the average daily temperature in spring rises above 35°, 45°, 55°, and 65° F., respectively. These charts show the progress of the season as indicated by the movement northward of significant isotherms. The hardier cereals germinate and begin growth when the average daily temperature reaches about 35°; consequently the seeding of spring wheat begins in the Spring Wheat Belt about this time, followed by spring oats one or two weeks later. When the average temperature reaches about 45° potato planting begins throughout the Central and Northern States, and when 55° is reached the planting of corn has begun in the eastern United States. By the time 65° is reached corn planting is practically over in the Corn Belt and alfalfa is almost ready for the first cutting. This line of 65° reaches the eastern coast of Maine, the extreme upper Lake region, and the central and northern Rocky Mountain districts about July 20 and then immediately begins its retreat southward. In the regions to the north of or above this extreme limit of 65°, and along the immediate Pacific coast as far south as Point Conception, where also an average temperature of 65° is not attained during the summer, the crops are practically confined to hay, pasture, small grain, potatoes, and the hardier fruits and vegetables. In extreme southern Florida the average daily temperature never falls below 65°, and here limes, pineapples, and subtropical fruits are the important crops

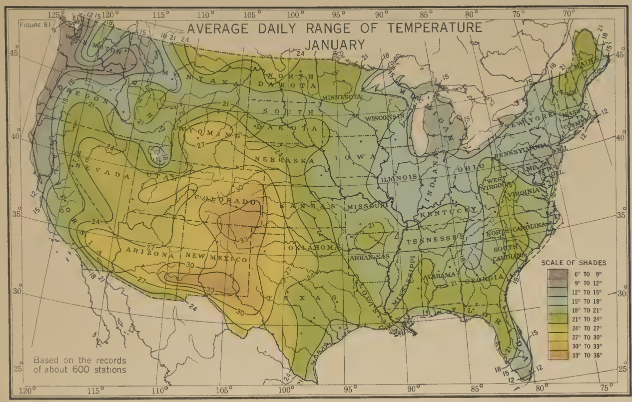


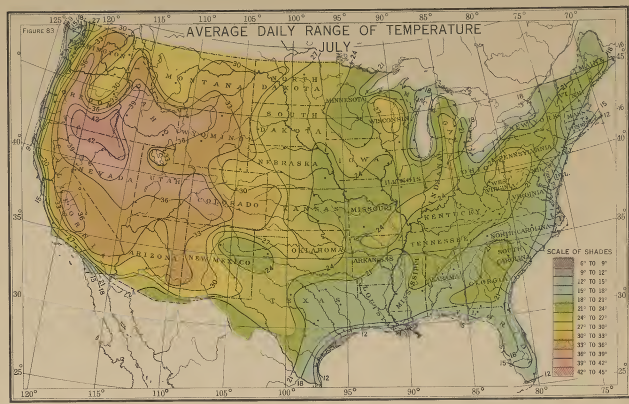


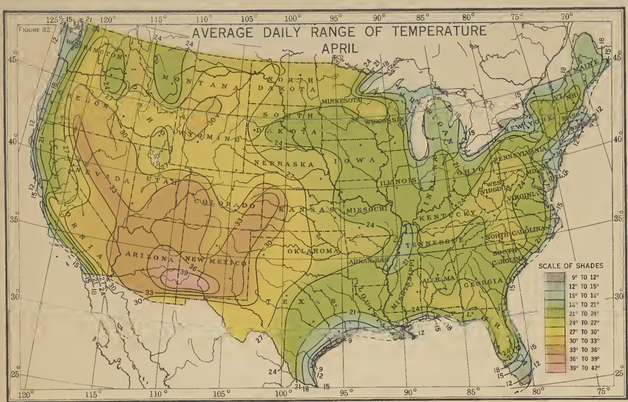


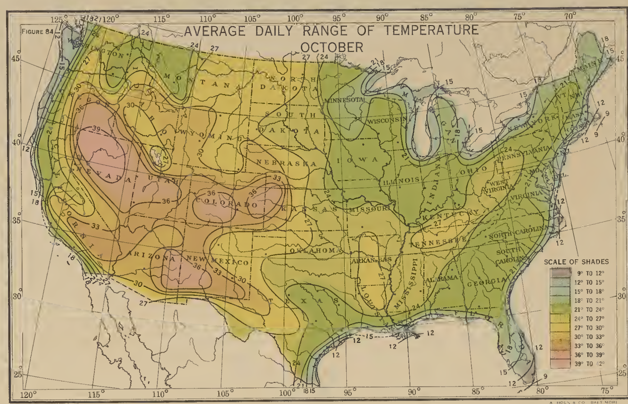


Figures 77, 78, 79, and 80 show the dates on which the average daily temperature in autumn falls below 65°, 55°, 45°, and 35° F., respectively. When the average daily temperature in the fall declines to 65°, the seeding of winter wheat becomes general throughout practically the entire Winter Wheat Belt; when it falls to 55°, the cutting and shocking of corn is in progress in the northern border States and husking or snapping from the standing stalk is beginning in the Corn Belt; when it falls to 45°, corn harvest is still in progress in the Corn Belt, but in the Cotton Belt cotton picking is nearly over. When the average daily temperature falls to 35°, corn harvest is practically over, and the first snow usually has fallen. In most of the Florida Peninsula and in extreme southern Texas the average daily temperature remains throughout the year above 55°; in southern South Carolina and in the Gulf States south of latitude 33°, in southwestern Arizona, and along the California coast as far north as Eureka it remains about 45°, and throughout nearly all the Cotton Belt, in southern New Mexico and Arizona, in the valleys of California, and along the Pacific coast it remains above 35°









Figures 81, 82, 83, and 84 show the average daily range in temperature for the months of January, April, July, and October, respectively. They represent the difference between the average of the maxima and the average of the minima temperatures of each day of the month. In January the least daily range is in the Puget Sound region, where it is less than 9° F., and the greatest daily range is in southern New Mexico and Arizona, where it is over 33°; in April the least daily range, 9° to 12°, is along the western Gulf, southern Florida, northern California, and southern Massachusetts coasts, and the greatest daily range, over 39°, is again in southern New Mexico and Arizona; in July the least daily range is along the north Pacific coast, and the greatest, over 42°, is in southern Oregon and northern Nevada; and in October the least daily range is in southern Florida and along the north Atlantic and north Pacific coasts, and the greatest is in northern Nevada. The equalizing influence of large bodies of water is everywhere evident, especially in July, and conversely the large daily range in temperature in arid climates is very apparent. In general the daily range in the interior of the country east of the Rocky Mountains ranges mostly between 20° and 30°, except around the Great Lakes, being smallest in winter and largest in late summer and fall, when the weather is driest

or the highest and the lowest temperatures ever recorded in the respective months.

Seasonal temperatures.—Of these the most important are the average summer and average winter temperatures. The average summer temperature is especially significant because in the more northern portions of the United States and at higher altitudes in the West the three summer months coincide more or less with the growing season of potatoes and of corn, whereas the average winter temperature shows many interesting correlations with the northern limits of winter wheat and several tree fruits. Figure 2 shows the average summer and Figure 5 the average winter temperature.

Average annual temperature.—The true average annual temperature is the average of the 365 successive average daily temperatures (24-hourly observations), but it is customary to compute it from the 12 monthly averages, based on the mean of the daily maximum and minimum. The difference between the results obtained by these two methods, due principally to the inequalities in the lengths of the months, is negligible, amounting generally to a very small fraction of a degree only.

The average annual temperature has relatively little value as an index to the actual temperature conditions in any locality, because of the great difference in seasonal variations in different sections of the country. For example, the mean annual temperatures at San Francisco, Calif., and at Wichita, Kans., having practically the same latitude, are nearly the same—about 55° F. The average daily minimum temperature at Wichita, however, for the three winter months is 24° as compared with 46° at San Francisco, and the average daily maximum for the three summer months at the former is 88° and only 65° at the latter. The average January temperature at San Francisco is 50° and at Wichita 30°, whereas the average July temperature is 57° at San Francisco and 79° at Wichita. There is obviously little similarity in the general temperature conditions at these two points, yet their annual averages are the same. For these reasons no chart showing the average annual temperature is included in the Atlas.

Average annual range.—The average annual range in temperature is defined as the difference between the average temperature of the coldest month and that of the warmest month. It affords an excellent expression of the rise in temperature that takes place from midwinter to midsummer. At Bismarck, N. Dak., the average

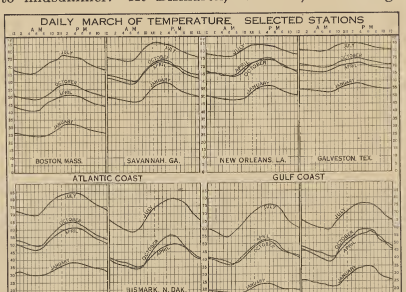


Figure 85.—This graph shows for selected stations, representing marine, continental, arid, and mountain types of climate, the average daily march of temperature. The amplitude of the daily march of temperature thus represented is considerably less than the average daily range in temperature, shown in Figures 81 to 84, particularly during the winter months, since the daily march represents the average temperature for each hour of the day, whereas the daily range is based on the daily extremes in temperature regardless of the hour of occurrence. The small daily variations in temperature in marine climates are shown by the graphs for San Francisco, North Head, Galveston, and to a less extent by that for New Orleans, the larger daily march in continental climates by the graphs for Cincinnati and Bismarck, and in mountain climates by the graphs for Helena and Santa Fe, and the still greater difference between day and night temperatures in arid climates by the graph for El Paso. The graph for Salt Lake City shows the marked influence of so small a body of water as Salt Lake in moderating the daily march of temperature

temperature of the coldest month, January, is 7° F. and that of the warmest month, July, is 70°, making an average annual range of 63°, whereas at San Francisco the average annual range is only 10°.

The greatest average annual range in temperature occurs in the northern interior districts of the United States and the least near the coasts, especially along the Pacific coast. In the Gulf and South Atlantic States it is about 30° F.; in the Middle Atlantic States, central Mississippi Valley, and the Rocky Mountain region it is from 40° to 50°, and from Montana eastward to the Lake region it is between 55° and 65°. The average annual range in temperature is shown graphically for different sections of the country in Figure 72.

ANNUAL MARCH OF TEMPERATURE

This is represented by the successive average daily temperatures. The change in the angle of inclination of the sun's rays and consequently in the length of the day is very slight for successive days and the resulting normal change in temperature from one day to another in the progress of the season is correspondingly small. In individual years the temperature fluctuations occasioned by the passage of cyclonic storms so disguise this gradual change that its occurrence can be realized only after the lapse of a number of days. (See fig. 86.)

As in the daily temperature march, there exists in the annual march of temperature, outside the equatorial region, a single maximum and a single minimum. In the United States the warmest month is July, except along the immediate Pacific coast where, because of the marine influence, it is often August or September, and the coldest month is January. The occurrence of these maximum and minimum temperatures is in general about a month later than the time when the sun reaches its highest and lowest altitude, respectively.

The progress of the seasons may be briefly summarized by months as follows:

January.—The average January temperature is shown for the different sections of the country in Figure 12. It varies greatly in different localities and the gradient from north to south is much steeper than in the warmer seasons of the year. The coldest weather occurs, as a rule, in the northern portions of Minnesota and North Dakota, where the average January temperature is near 0° F. Southward the temperature increases rapidly, the monthly average rising to the freezing point at approximately the latitude of the lower Ohio River, central Missouri, and southern Kansas, and to about 55° along

DAILY MAXIMUM AND MINIMUM TEMPERATURES AT SELECTED STATIONS

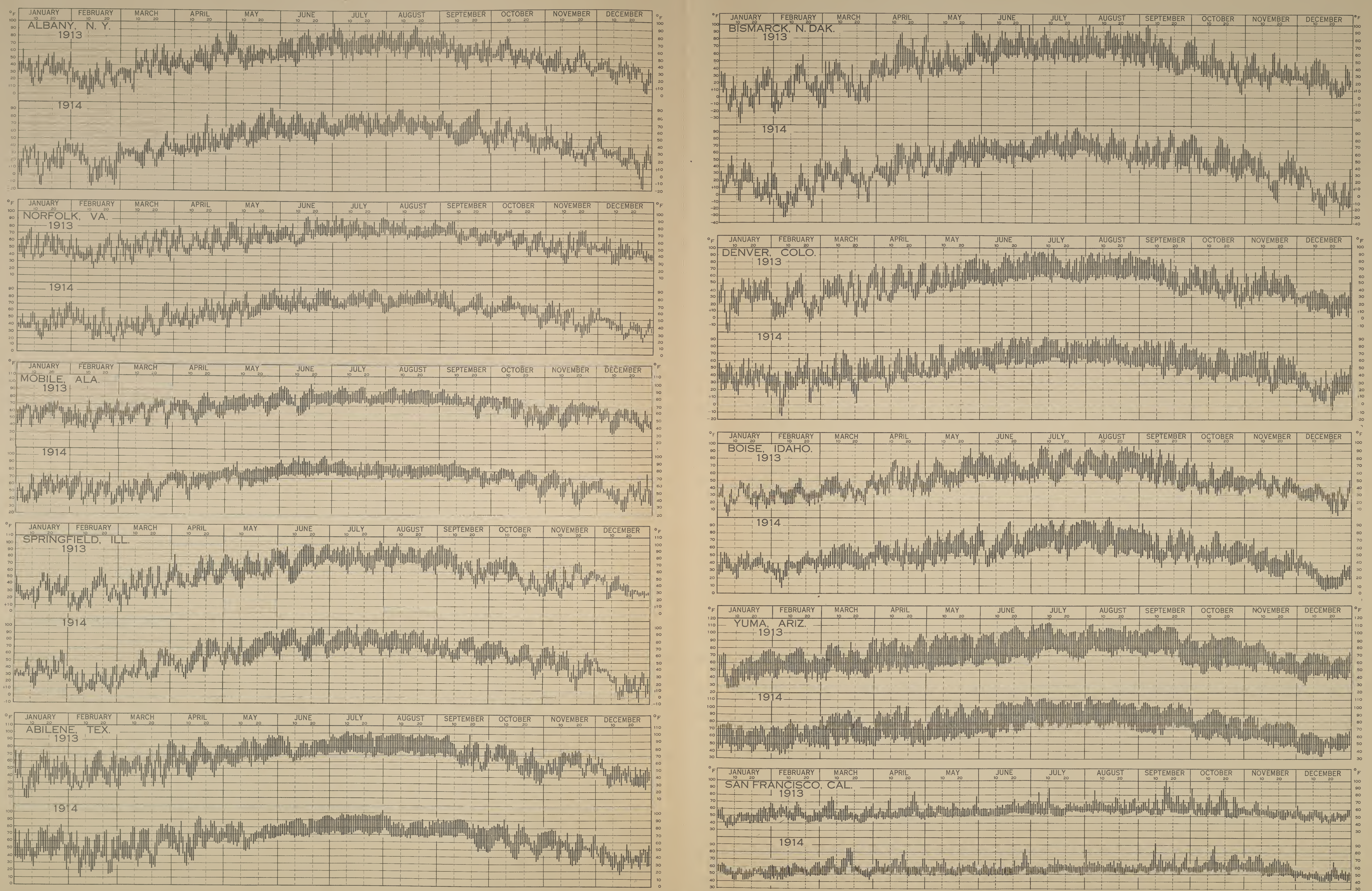


Figure 86.—This graph shows for selected stations, representing the principal types of climate in the United States, the daily maximum and the daily minimum temperature for the years 1913 and 1914. In this graph the tops of the vertical bars show the daily maxima and the bottoms of the bars the daily minima. The lengths of the bars indicate the amplitude of the daily range, and the centers show the daily mean temperatures. The relative position of the bars for successive days indicates the daily variability. The graph shows the characteristics of temperature conditions for different sections of the country and for the several seasons of the year in a manner to facilitate comparison, and brings out important features not shown in maps or graphs based on average values. It visualizes, for instance, the abrupt temperature changes from day to day that may be expected to occur in the interior section of the country, especially during certain seasons of the year, and the more uniform conditions from day to day found in marine climates. For example, in the graph for Bismarck it will be noted that the maximum temperature rose above 60° F. for 11 successive days in mid-April, 1913, reaching 87° on the 14th and 89° on the 15th, and then on the 25th the minimum temperature fell to 24° and on the 26th to 20°. Such a long spell of warm weather would cause the blossoming of almost all kinds of fruit, and the cold wave following would kill the blossoms and forming fruit. A similar spell of warm followed by cold weather may be noted in April, 1914. Such wide fluctuations in temperature in the spring are characteristic of the climate of the Spring Wheat Belt; consequently very little fruit is grown in the region. At Bismarck changes in temperature of 40° in one day frequently occur, and on March 3, 1913, a rise in temperature from −15° to nearly 50° occurred. The graph for San Francisco affords a striking contrast to that for Bismarck. Changes in temperature of 30° in one day are rare, and the average daily range is only 12°. There is also very little difference in temperature between summer and winter; in fact, the difference between the average January and the average July temperature is only 9°. In 1914 the minimum temperature at San Francisco did not fall below 40° during the year, and the maximum rose above 70° on only 47 days. The continuous high summer temperatures in the far Southwest are shown by the graph for Yuma, Ariz. It will be seen that in 1914 the daily maximum temperature in that locality was 100°, or higher, on each day from June 10 to August 29, except for 1 day, a period of practically 80 consecutive days

the Gulf coast. From the Rocky Mountains westward to the Sierra Nevada and Cascade Ranges temperature conditions are determined largely by altitude, rather than by latitude as in the East. At the lower altitudes the average January temperature ranges generally from 20° to 35°, but is higher in portions of Arizona and New Mexico. High temperatures for the latitudes obtain along the Pacific coast, the January average ranging from about 40° on the extreme north coast to about 55° in southern California.

Throughout the interior of the continent January is characterized by frequent and abrupt temperature changes, resulting from the passage of cyclonic storms and accompanying anticyclones. The difference in temperature at the front and at the rear of a pronounced cyclone may be as great as 60° F. or more, and with rapid forward movement of the storm the temperature at a given place may fall 40° or 50° within a few hours. During this month very low temperatures are sometimes experienced in the northern interior portions of the country. In Minnesota, the Dakotas, and Montana temperatures of −40° to −50°, or lower, have been recorded in January and from −25° to −35° have occurred in the interior portions of New York and New England. The lowest temperature ever recorded at a Weather Bureau station in the United States was −65° in the eastern Montana in January, 1888. Along the central and southern California coast the lowest temperatures on record range from 27° to 29° and along the Gulf of Mexico coast from 11° to 15°. Freezing temperatures are of infrequent occurrence along the coast of southern California and likewise in extreme southern Florida.

February.—Figure 17 shows the average February temperature. This differs only slightly, as a rule, from that of January, February usually being slightly warmer. The lowest average temperature for this month, about 5° F., is found in the northern portions of Minnesota and North Dakota, whereas to the eastward over the upper Lake region and the northern portions of New York and New England the average February temperature is about 15°. To the southward there is a progressive increase to about 32° in central New Jersey, southern Ohio, central Missouri, and Kansas and to about 55° along the Gulf coast.

As in January, cold waves frequently sweep down from the Canadian Northwest during February and overspread all districts east of the Rocky Mountains, sometimes bringing extremely cold weather. In fact, the coldest weather of the year east of the Rocky Mountains occurs frequently during the early part of this month. A memorable cold wave occurred in February, 1899, which carried the line of zero temperature to the east-central Gulf coast and a temperature of 10° F. was recorded at Jacksonville, Fla. The coldest February temperature of record at a first-order Weather Bureau station in the United States is −55°, occurring in Montana in 1887. Temperatures as low as −25° have occurred in this month as far south as Kansas and Missouri. Toward the latter part of the month, however, the increase in temperature usually becomes noticeable, and along the immediate Gulf coast freezing weather does not occur, as a rule, after February 20.

March.—Figure 22 shows the average March temperature. With the advent of spring there is usually a rapid warming up in nearly all portions of the United States, although in the Pacific Coast States the increase in temperature is not pronounced, especially along the immediate coast. In the northern interior districts the increase in average temperature from February to March is about 15° F., but it diminishes to the southward, being only about half as great near the Gulf of Mexico. The average temperature for March on the northern border between Montana and Lake Superior is about 20°; along the Gulf coast it ranges from 60° to 65°.

In the northern States extremely cold weather occasionally occurs during March, temperatures of −35° to −40° F. having been recorded in this month in portions of North Dakota and eastern Montana. The March cold waves, however, usually lose intensity rapidly, and the Central and Southern States seldom experience severely cold weather in this month. Temperatures below zero have never been recorded in March south of the fortieth parallel, except in the Texas panhandle, Kansas, and a few localities to the eastward. In the Gulf States after March 15 freezing temperatures do not occur, as a rule, except in the extreme northern portions.

April.—Figure 27 shows the average temperature for April. As spring advances the increase in temperature becomes more rapid and consequently the warming up during April is greater than during March. Along the northern interior border of the United States the average temperature for April is about 20° F. higher than for March, but with progress southward the increase becomes less pronounced, amounting to about 10° along the Gulf coast. The average April temperature ranges from about 40° in the extreme North to about 70° at the Gulf. Along the immediate Pacific coast there is little change in temperature from the preceding month.

Cold periods prevail occasionally during April, especially in the more northern districts. The lowest temperatures on record for this month are slightly less than −10° F. near the Canadian border in North Dakota, and freezing temperatures have occurred early in the month as far south as Mobile, Ala., and northern Florida. Cold waves, however, are not of frequent occurrence during April and are of comparatively short duration. As a rule, freezing temperature is not experienced after April 15 south of a line extending from central Virginia, through western North Carolina, and the southern portions of Kentucky, westward to Missouri and Kansas.

May.—This month is characterized by the prevalence of mild temperatures, as shown in Figure 32. The average temperature in May ranges from about 50° F. along the northern border of the country to 75° at the Gulf, being from 7° to 10° higher than for April. Along the immediate Pacific coast the average temperature ranges from 50° at the extreme north to 60° in southern California. The highest average temperature, slightly over 80°, is found in extreme southern Texas and in portions of the far Southwest.

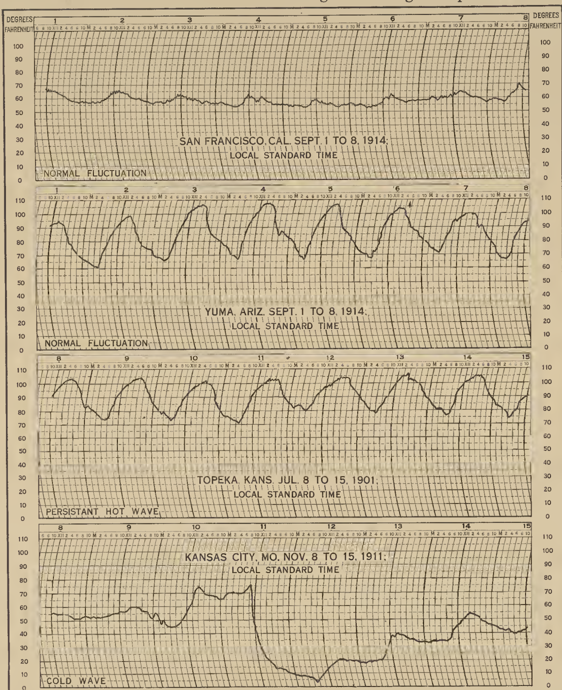


Figure 87.—This graph shows for selected stations and periods thermograph trace sheets, or continuous daily records of temperature. The trace sheets for San Francisco and Yuma are presented to contrast the daily march of temperature in the two extreme types of climate—marine and arid continental. In arid continental climates the fall in temperature is rapid after sundown and the rise pronounced during the morning hours, resulting in relatively cool nights and hot days. The marine type of climate, on the other hand, is characterized by comparatively uniform temperatures throughout the day. The trace sheet for Topeka, Kans., from July 8 to 14, 1901, was selected to show the temperature curve during a hot wave in midsummer, and that for Kansas City, Mo., from November 8 to November 14, 1911, to show the temperature curve during a severe cold wave in the late fall

The lowest temperature of record for May at a first-order Weather Bureau station is 6° F. in the northern portion of North Dakota. Freezing weather has been known to occur in this month as far south as northern Texas, and a temperature as low as 26° is on record in the panhandle of that State. East of the Mississippi River freezing temperature has never been experienced in May south of the Ohio River and southern Pennsylvania, except in some of the more elevated sections. As a rule, freezing temperature does not occur after May 10 south of South Dakota, the central portions of Iowa and Wisconsin, and the lower Lake region.

June.—Figure 37 shows the average June temperature. Along the northern border of the United States the average temperature for this month is about 60° F., or approximately 10° higher than for May. East of the Rocky Mountains there is a rather rapid increase in temperature from the northern border to about 70° at the latitude of central Iowa, and thence a less rapid rise to about 80° in the Gulf coast section. The average June temperature at the lower altitudes in most of the central and northern portion of the Rocky Mountain and interior Plateau regions ranges from about 60° to 70°, but in the extreme southern portion it is much higher. In the lower Colorado River Valley, in the extreme Southwest, the average June temperature is over 90°, whereas along the Pacific coast it ranges from 55° at the extreme north to 65° at the south.

High temperatures occur occasionally during June. The highest of record at a first-order Weather Bureau station is 117° F. at Yuma, Ariz., and records of 106° to 110°, have been made in the Plains States and in Montana. Temperatures of 100°, or higher, have occurred in June rather generally throughout the country, except in the Northeastern States, the vicinity of the Great Lakes, in the higher altitudes of the Rocky Mountain and interior Plateau regions, and along the north Pacific coast. The average date of the last freezing temperature in spring in the extreme northern portions of Minnesota and North Dakota is about June 1, but it is later than this in some of the elevated districts of the West.

July.—Figure 42 shows the average July temperature. This is, as a rule, the warmest month of the year, except in localities having the marine type of climate. East of the Rocky Mountains the average July temperature ranges from a little less than 70° F. in the northern border States to about 82° along the Gulf coast. The temperature gradient from north to south in the summer season is much smaller than in the winter. The difference between the average July temperature along the northern border of the United States east of the Rockies and that on the Gulf coast is about 15°, but for January it is about 50°. The highest July temperature in the United States is found usually in southwestern Arizona and the interior valleys of southern California, where the average for the month ranges from 90° to 98°. Along the Pacific coast the summers are cool, the average July temperature ranging from about 55° in western Washington to 67° in southwestern California.

In July periods of hot weather are comparatively frequent in most sections of the country, and very high temperatures are sometimes experienced. Occasionally the hot waves are of unusually long duration, particularly in the sections east of the Rocky Mountains, and at such times suffering, especially in the congested districts of the large cities, is intense. In some of the important agricultural districts, particularly in the Middle West, the heated periods are occasionally accompanied by "hot winds," which prove disastrous to growing crops. The highest temperature of record for July at a first-order Weather Bureau station is 118° F. at Yuma, Ariz., and in the Great Valley of California temperatures of 110° to 115° have occurred. A maximum temperature of 134° has been recorded at a cooperative station in Death Valley, Calif., which is the highest official temperature ever recorded in the United States and probably in the world. In the Plains States and Mississippi Valley temperatures of 105° to 110° have been experienced, and records of 100° or higher have been made generally throughout the country, except in some restricted areas. Although the average summer temperature in the Southern States is considerably higher than in the Northern, extremely hot weather occurs occasionally in practically all northern sections of the country. In fact, higher temperatures are on record in the Dakotas and Montana than have ever occurred in Mississippi, Alabama, or Florida.

August.—Figure 47 shows the average August temperature. This differs little from that for July, but as a rule August is slightly cooler, except on the Pacific coast. At some points on the Pacific coast September is the warmest month of the year. East of the Rocky Mountains the coolest August weather occurs in northern Michigan and in the interior of New York and New England, where the average temperature for the month ranges from about 62° to 65° F. At points in the far Southwest it is as high as 95° or more. The remarks as to July temperature conditions in general apply also to those of August.

September.—Figure 52 shows the average temperature for September. The average September temperature ranges from about 55° F. in the northern border States, where it is about 8° lower than for August, to about 78° along the Gulf coast, where it is 2° or 3° lower. At the lower elevations of the Rocky Mountain and interior Plateau regions it is mostly from 50° to 65°. In the Great Valley of California the average September temperature is 70° to 75°, and in southwestern Arizona it is 80° to 85°.

High temperatures sometimes occur in September, especially between the Rocky Mountains and Mississippi River. The highest of record for this month at a first-order Weather Bureau station in this region is 106° F., in eastern South Dakota, and temperatures of

100° or higher have been quite generally experienced. East of the Mississippi River only a few stations have temperature records for September as high as 100°. In portions of California high temperatures are reported occasionally in this month, the highest of record at a first-order station of the Weather Bureau being 111° at Fresno, Calif. Cool weather also occasionally obtains in September, freezing temperatures having occurred as far south as the southern portions of Kansas and Missouri and the Ohio River Valley. The average date of the first freezing temperature in fall in most of the Dakotas and Minnesota, in northern Wisconsin, and at the higher elevations of New York and New England ranges from September 15 to 30.

October.—Figure 57 shows the average temperature for October. During October there is a considerable decrease in temperature, except in extreme southern Florida and along the Pacific coast, the decrease being generally as much as 10° to 15° F. Along the extreme northern border of the country the average October temperature is about 45°, increasing with progress southward to about 70° along the Gulf coast. West of the Rocky Mountains at the lower altitudes the average for the month ranges from somewhat less than 40° to about 50°, except that it is higher in the far southwestern region. On the Pacific coast the average temperature ranges from 50° at the north to 60° at the south.

Temperatures below zero have been experienced at a few points in the north Central States in October, the lowest of record at a first-order station of the Weather Bureau being −16° F. in northern Montana, and freezing temperatures have occurred nearly to the Gulf coast. On the average freezing weather occurs by the last of October as far south as the northern portions of South Carolina, Georgia, Alabama, and Mississippi and the central portions of Arkansas, and Oklahoma.

November.—Figure 62 shows the average temperature for November. During November the decrease in temperature as a rule is rather pronounced, the average for the month being mostly from 10° to 15° F., or more, lower than for October, except along the Gulf and Pacific coasts. East of the Rocky Mountains the average November temperature ranges from about 25° in the north-central border States to somewhat more than 60° along the Gulf, but in southern Florida it is 70° or higher. Along the Pacific coast the average temperature is 45° at the north and about 60° at the south.

During November cold waves of considerable severity sometimes advance from Canadian Northwest and overspread the north Central States (see Kansas City thermograph record in Figure 87), but they usually lose energy rapidly in their eastward and southward progress and seldom are of long duration. Zero temperatures have never been recorded at a first-order Weather Bureau station in November south of the Ohio River, but freezing has occurred as far south as Tampa, Fla. The lowest temperature of record for this month is −33° in northern Montana.

December.—Figure 67 shows the average temperature for December. Temperatures, as a rule, continue to decrease rapidly during December. East of the Rocky Mountains the decrease in the monthly averages from November to December range from about 15° F., in the extreme northern portion of the country to 7° or 8° along the Gulf coast, but along the Pacific coast December is only 3° or 4° cooler than November. The average December temperature is about 10° in the north Central States, about 55° along the Gulf coast, and 70° in extreme southern Florida. In the lower altitudes of the Rocky Mountains and interior Plateau regions the average December temperature is mostly between 20° and 30°, except in New Mexico and Arizona, where it is locally as high as 55°. Along the Pacific coast it ranges from 44° to 56°.

During December cold waves usually become more frequent and severe, and very low temperatures are occasionally experienced in much of the interior portion of the country. The lowest temperature of record at a first-order Weather Bureau station for this month is −50° in northern Montana, while temperatures of −10° to −15° have been experienced as far south as the southern portions of Kansas and Missouri, and −5° in portions of Tennessee and North Carolina. The lowest recorded temperature along the Gulf coast in this month is 14°, occuring at Mobile, Ala., and also at Pensacola, Fla. Along the central and eastern Gulf coasts the average date of the first freezing temperature in fall is about December 1.

SIGNIFICANT TEMPERATURES

Figures 73 to 80 show the progress of the season with reference to certain significant temperatures. The averages dates in spring on which the daily mean temperatures rises above 35°, 45°, 55°, and 65°, F. in different portions of the country are shown by Figures 73 to 76, respectively, whereas Figures 77 to 80 show the average dates in fall when the daily means fall below these values.

Figures 3 and 6 show for the different sections of the United States the highest and lowest temperatures ever recorded, and Figure 4 shows for selected stations the highest temperatures recorded each year for the 20-year period—1895–1914.

Figure 7 shows the average of the lowest temperatures recorded each year, and Figures 8 and 9 show the number of times in the 20-year period—1895–1914—that the minimum temperature each year was 6° and 9° F., respectively, below this average minimum.

Figure 10 shows the average annual number of days on which the minimum temperature falls to freezing and Figure 11 the average annual number of days with temperature continuously below freezing for the entire day.

AVERAGE MONTHLY TEMPERATURES AT SELECTED STATIONS

[Monthly mean temperatures]

ALABAMA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Anniston	43.7	44.7	54.1	60.8	68.9	76.0	78.0	77.8	73.2	62.8	51.6	44.0	29
Birmingham	46.0	46.4	56.6	62.7	71.8	78.0	80.0	79.8	75.3	65.2	54.4	45.8	33
Decatur	41.8	42.8	53.2	61.6	69.9	77.5	79.8	78.7	73.1	61.6	50.5	42.5	39
Fort Deposit	47.2	48.7	58.1	64.9	73.3	79.4	81.2	80.2	76.1	65.5	55.3	47.4	37
Goodwater	44.6	44.9	55.8	62.1	71.2	77.8	79.7	79.4	75.2	64.0	53.6	44.5	26
Greensboro	46.0	48.4	56.2	63.6	71.6	78.6	80.1	79.5	75.3	64.7	55.1	48.1	39
Hamilton	43.0	43.5	54.0	60.5	69.5	76.6	79.0	79.7	74.9	62.5	52.5	44.0	22
Mobile	51.2	53.9	60.1	66.6	73.9	79.9	81.4	81.0	77.6	68.4	58.8	52.3	50
Montgomery	48.4	51.0	58.3	65.2	73.2	79.9	81.6	80.7	76.3	66.2	55.9	49.0	49
Opelika	46.0	47.5	56.6	63.6	71.9	78.5	80.1	79.1	74.6	64.1	54.5	46.2	39
Ozark	49.5	50.4	60.6	65.3	73.5	79.6	80.7	80.8	77.1	67.1	56.9	49.9	19
Scottsboro	41.9	42.4	52.5	60.1	68.1	75.1	77.9	77.2	71.9	61.0	50.2	42.4	36
Thomasville	47.6	49.1	58.3	64.4	72.7	79.4	80.8	80.4	76.0	65.0	55.4	48.1	29
Tuscaloosa	44.4	45.4	[illegible]	63.0	71.9	79.0	81.3	80.6	75.7	64.2	52.8	45.9	39
Tuscumbia	41.0	42.4	52.4	60.9	69.3	77.3	79.9	78.7	72.9	61.2	50.4	42.4	39

ARIZONA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Dudleyville	48.2	51.4	56.3	62.4	69.1	78.6	83.0	81.4	76.1	65.3	55.0	47.5	28
Flagstaff	27.8	30.4	36.1	43.2	50.0	59.3	65.2	63.7	56.6	46.4	37.0	28.6	27
Fort Apache	34.6	36.9	43.6	51.8	57.7	66.3	71.2	70.1	63.9	53.8	43.4	36.6	40
Fort Grant	45.1	48.0	52.5	58.8	66.9	76.0	78.9	75.2	72.3	63.4	54.0	47.0	24
Fort Huachuca	46.2	48.3	55.0	60.0	66.6	76.4	76.6	74.8	71.2	63.3	52.6	45.8	32
Fort Mohave	49.8	56.2	62.6	70.2	78.1	87.2	93.8	91.6	84.2	71.6	59.8	50.6	21
Gila Bend	53.9	56.5	63.2	68.0	75.2	86.3	92.0	91.0	85.2	72.9	62.0	52.1	22
Grand Canyon	28.5	32.0	36.2	43.7	49.4	61.6	76.6	65.4	57.9	47.9	38.6	29.6	15
Holbrook	33.1	39.7	45.7	52.6	60.4	70.2	75.6	74.7	67.2	63.8	43.2	34.2	24
Jerome	42.2	45.6	50.6	58.0	64.6	76.2	78.8	76.7	72.4	61.6	51.8	43.0	22
Parker	49.8	55.4	61.4	68.6	75.4	84.8	90.9	90.4	82.9	70.3	58.2	49.5	25
Phoenix	51.8	55.6	60.1	67.0	73.9	84.6	89.2	88.0	82.4	70.4	59.8	51.3	27
Salome	47.0	50.5	56.0	62.4	69.2	81.2	86.6	85.6	78.8	66.6	56.4	46.8	13
Tucson [1]	50.0	52.6	57.8	63.5	71.9	81.3	85.6	83.6	79.3	67.9	57.6	49.9	35
Yuma	54.4	58.6	64.1	69.5	76.2	84.7	90.8	90.4	83.7	73.3	62.4	55.2	40

ARKANSAS

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Bee Branch	41.3	42.1	52.6	60.9	68.6	76.8	80.0	79.4	74.4	62.6	51.3	42.2	29
Brinkley	41.8	43.0	52.4	60.7	70.0	77.7	80.8	80.2	74.6	62.1	51.8	43.4	35
Camden	44.9	47.0	56.0	63.7	71.2	78.2	81.0	80.2	75.4	63.7	52.2	45.1	31
Dodd City	37.6	37.8	47.6	58.7	66.9	74.6	78.1	77.5	71.8	60.0	48.9	39.2	28
Fayetteville	38.0	39.3	49.9	58.0	66.2	74.2	78.0	77.6	72.4	60.9	49.8	39.9	31
Fort Smith	39.5	42.8	51.3	61.7	69.7	78.0	81.0	79.4	72.7	61.7	49.9	41.7	41
Helena	43.0	43.6	53.8	62.4	70.8	78.2	81.3	80.6	74.8	62.5	53.2	44.8	30
Hot Springs	43.2	46.8	53.9	62.9	69.8	77.6	81.3	80.0	75.2	64.0	52.7	44.6	25
Jonesboro	40.4	41.5	52.8	61.2	69.8	77.6	79.9	79.9	74.3	62.5	51.4	41.0	26
Junction	45.6	47.1	57.2	65.6	71.8	79.4	81.9	80.8	75.6	64.2	53.9	46.1	28
Little Rock	41.8	44.2	53.6	62.4	70.0	77.6	80.8	79.7	74.2	63.5	52.3	44.0	43
Mena	41.3	43.5	52.6	61.4	68.9	76.4	79.8	79.4	73.8	62.8	53.1	42.6	30
Newport	39.2	40.5	52.6	61.8	70.0	77.8	81.0	79.8	73.8	61.4	51.0	41.9	34
Pine Bluff	43.1	45.4	54.8	64.4	72.0	79.0	82.2	81.4	73.1	62.6	52.8	44.4	34
Pocahontas	38.0	40.4	51.6	60.0	68.6	78.0	81.7	81.0	74.8	62.9	51.2	40.8	28
Portland	46.3	48.5	58.8	63.7	71.3	79.2	81.5	81.1	76.4	64.8	53.9	47.4	16
Texarkana	46.2	47.8	56.8	63.8	71.6	79.0	82.3	81.9	76.8	64.6	55.4	46.8	36

CALIFORNIA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Bagdad	52.8	57.1	63.8	72.8	79.1	89.1	95.2	93.8	84.2	65.9	61.1	52.5	17
Bakersfield	47.4	52.2	56.3	62.6	69.7	77.8	84.0	81.8	74.1	65.4	55.7	47.9	34
Barstow	46.3	50.4	56.4	61.8	67.4	77.8	83.6	82.4	74.2	64.0	54.2	45.9	17
Bishop	37.0	41.6	46.2	52.9	59.0	66.9	72.8	71.4	63.9	55.0	45.6	38.0	22
Branscomb	42.6	44.2	45.9	49.8	53.4	59.2	66.4	66.1	61.9	57.0	49.0	43.6	18
Cedarville	29.7	33.0	38.6	46.5	52.6	61.4	70.3	69.0	60.0	49.6	39.5	30.6	27
Colusa	45.6	49.4	53.5	58.2	64.7	71.8	76.8	75.2	69.7	61.8	52.3	44.9	20
Crescent City	46.2	47.0	48.0	50.0	52.2	55.7	57.8	58.1	57.8	54.9	50.5	46.6	22
Escondido	50.0	52.1	55.1	58.5	62.5	68.4	72.5	72.4	68.9	62.3	56.1	50.4	26
Eureka	46.8	47.1	48.2	49.8	52.0	54.4	55.6	56.2	55.6	53.5	51.0	47.8	37
Fresno	46.2	51.1	54.8	60.5	66.6	75.2	81.9	80.5	73.5	64.4	54.5	46.4	35
Georgetown	42.4	44.4	47.1	52.6	56.6	66.1	74.4	73.6	67.5	58.9	50.1	44.5	20
Greenland Ranch	52.9	58.2	65.5	75.3	82.6	94.5	101.2	99.0	89.7	74.8	60.9	52.1	9
Hollister	48.1	51.2	53.6	56.8	60.2	64.4	66.1	65.8	65.0	60.4	53.9	48.9	49
Indio	53.4	58.7	65.0	72.4	79.0	88.0	93.6	92.4	85.9	75.2	62.8	55.5	42
King City	49.1	50.7	54.2	57.5	61.2	65.1	68.2	68.7	67.7	61.8	55.4	50.5	35
Lodi	46.2	50.1	54.7	58.3	63.4	69.1	73.7	73.0	69.7	62.3	53.6	47.3	30
Los Angeles	54.5	55.5	57.3	59.7	62.1	65.2	70.2	71.1	69.4	65.1	60.9	55.3	42
McCloud	34.0	36.6	40.4	45.8	51.9	59.0	63.9	64.0	57.4	50.0	42.2	35.0	13
Merced	46.3	49.5	53.2	59.4	66.1	74.4	80.6	78.8	72.7	63.6	54.0	47.2	49
Mojave	46.0	49.0	52.2	59.5	68.0	77.4	85.5	83.7	76.3	65.7	54.6	47.2	37
Napa	46.8	50.1	52.2	55.8	59.2	64.9	66.8	66.2	65.6	61.0	53.4	47.8	25
Orleans	44.8	48.4	53.6	59.0	62.8	67.5	76.3	75.8	69.0	60.4	51.4	45.0	18
Red Bluff	45.4	49.5	53.8	59.3	66.2	74.8	81.3	80.0	73.2	63.6	54.0	46.2	46
Redlands	50.9	52.7	55.8	60.1	63.6	71.4	76.8	76.6	72.2	65.4	58.2	52.2	27
Sacramento	45.2	49.8	53.5	58.1	63.3	70.2	73.9	73.3	70.3	62.7	53.3	46.5	46
San Diego	54.3	55.0	56.9	59.2	61.3	64.8	68.1	69.7	67.9	63.9	59.5	55.7	68
San Francisco	50.0	52.3	53.6	55.2	56.5	58.5	58.5	59.0	61.2	60.3	56.3	51.2	52
San Luis Obispo	51.9	53.5	54.6	56.2	57.4	61.9	64.2	64.7	64.4	62.1	57.5	53.0	28
Santa Barbara	53.4	54.4	55.6	57.7	59.1	62.3	65.5	66.7	65.7	62.7	58.8	55.1	38
Sterling	54.2	58.8	64.8	73.8	80.4	90.0	97.8	94.8	88.4	74.4	64.0	55.1	42
Susanville	30.3	34.6	40.0	47.6	52.7	61.2	68.2	67.4	59.0	49.9	40.4	31.6	20
Ukiah	44.5	47.8	50.2	55.1	59.2	65.8	71.7	70.9	65.9	60.0	50.2	44.6	27
Yosemite	32.6	38.4	43.6	50.6	54.7	63.0	69.4	68.4	62.0	53.3	41.6	33.8	16

[1] University of Arizona.

COLORADO

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Breckenridge	15.4	15.6	22.4	30.0	39.0	48.6	53.4	53.0	46.6	35.9	25.6	15.2	22
Burlington	27.8	31.4	40.2	47.6	57.5	68.4	73.6	72.5	64.8	52.0	40.6	29.0	18
Canon City	35.3	35.2	42.9	50.0	57.0	66.7	72.9	72.3	64.3	53.1	43.4	35.9	29
Cheyenne Wells	28.0	30.0	39.4	48.6	58.1	68.4	73.7	72.8	64.8	52.4	39.5	28.0	26
Colorado Springs	30.0	29.6	37.5	44.6	53.1	62.0	67.0	66.2	59.6	48.8	38.7	30.6	29
Delta	24.5	31.6	41.8	50.5	59.0	68.0	74.0	71.5	62.6	50.4	38.4	25.6	28
Denver	30.2	32.2	39.2	47.2	56.4	66.6	72.0	70.9	62.6	51.2	39.7	32.2	51
Durango	25.5	30.0	37.6	45.2	52.7	61.4	67.2	66.2	58.9	48.1	38.6	26.9	28
Fort Collins	26.2	27.4	36.0	44.8	53.8	63.1	68.0	67.5	59.2	48.0	36.1	27.2	28
Grand Junction	25.5	32.8	43.5	52.2	61.0	71.6	77.4	75.4	66.4	53.1	40.2	27.6	31
Greeley	26.0	27.8	38.0	47.4	56.8	66.6	70.9	70.0	61.2	49.1	36.6	26.0	28
Gunnison	7.2	12.4	25.6	39.2	47.6	57.6	61.4	59.8	52.0	41.4	27.6	10.8	29
Hamps	27.0	27.3	36.0	44.9	53.4	62.4	67.6	66.8	58.8	47.4	36.3	27.0	27
Hoehne	32.2	33.2	40.8	48.4	56.7	66.8	71.4	70.2	63.2	52.3	42.1	31.1	21
Holyoke	28.6	28.7	37.2	47.2	57.2	66.9	73.1	71.8	62.8	50.0	39.0	28.5	14
Las Animas	27.0	29.2	42.1	51.4	61.0	71.8	76.0	72.8	66.1	53.2	40.2	29.7	36
Lay	18.4	20.8	32.1	41.4	49.8	59.4	66.6	65.0	55.6	44.1	32.3	20.6	25
Meeker	20.5	24.0	34.2	43.0	51.1	59.2	64.8	63.4	55.2	44.1	33.2	20.9	29
Pueblo	30.8	32.3	41.4	49.8	59.0	69.0	74.0	73.3	64.8	52.5	40.3	31.8	34
Saguache	21.0	25.0	34.4	44.3	52.0	60.8	65.5	63.9	57.0	46.8	34.8	22.4	27
San Luis	21.0	25.8	34.2	41.4	49.3	57.8	62.4	61.4	54.8	44.4	33.2	22.0	29
Two Buttes	31.4	32.6	42.5	51.4	61.1	71.2	76.2	75.2	67.6	55.1	42.8	32.2	29
Wray	29.2	30.4	39.8	48.5	59.0	69.4	74.4	73.1	64.4	51.8	39.4	29.5	25

CONNECTICUT

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Cream Hill	23.1	21.6	32.7	43.0	55.2	63.8	69.2	66.4	60.9	50.9	36.9	25.7	20
Hartford	27.6	25.7	36.4	47.3	58.5	66.7	72.8	70.2	63.4	53.9	41.5	30.8	16
New Haven	29.2	28.9	36.0	46.9	57.8	66.5	71.9	70.0	63.7	53.4	41.9	32.2	48
Grosvenor Dale	24.3	23.0	34.6	45.4	56.6	64.4	70.6	68.2	58.4	51.2	39.0	28.0	18

FLORIDA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Avon Park	62.6	63.2	68.8	71.9	77.0	80.0	81.4	81.6	80.2	75.2	68.1	62.6	21
Clermont	60.9	62.5	68.8	72.3	78.2	81.6	83.0	83.0	80.8	75.2	67.9	61.4	28
Fort Meyers	63.0	64.2	68.6	71.8	76.8	79.4	80.6	81.0	79.8	75.4	69.0	63.7	29
Fort Pierce	64.0	64.4	68.5	71.4	75.9	79.3	80.8	81.4	80.2	76.4	69.4	64.1	19
Jacksonville	55.5	57.6	63.6	68.7	74.8	80.0	81.9	81.9	78.4	70.8	62.5	56.4	50
Key West	70.0	70.6	72.8	75.7	79.0	81.9	83.5	83.6	82.2	79.0	74.5	70.8	50
Lake City	55.6	56.9	64.4	68.8	75.7	79.7	81.0	81.1	78.6	70.6	62.0	56.0	31
Miami	67.0	67.6	71.1	73.6	77.8	80.2	81.7	82.0	81.0	77.8	72.8	68.6	25
Ocala	58.0	58.9	65.4	69.3	75.8	79.9	81.0	81.2	79.0	72.1	63.4	57.5	25
Pensacola	53.6	55.0	60.6	66.8	73.6	79.4	81.0	80.8	77.3	69.6	60.4	54.4	44
St. Augustine	57.6	58.0	63.6	68.4	74.0	79.4	80.8	80.6	78.7	73.2	64.3	58.0	34
Tallahassee	53.7	54.5	62.2	67.2	74.6	79.4	80.2	80.1	77.4	69.4	60.2	53.6	25
Tampa	60.0	61.8	66.2	70.7	76.6	80.0	81.1	81.2	79.8	75.2	67.2	61.7	66
Titusville	60.4	61.9	65.1	69.4	75.0	78.8	81.0	81.3	79.4	74.0	66.4	61.3	28

GEORGIA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Alapaha	50.4	52.0	59.8	66.2	74.1	79.7	81.3	80.9	76.9	67.4	57.5	50.7	35
Albany	49.9	51.5	60.3	66.7	74.7	80.8	82.2	81.6	77.6	67.9	57.8	50.8	34
Americus	48.3	50.3	58.5	65.1	73.6	79.9	81.4	80.8	76.5	66.7	56.1	49.0	37
Athens	42.5	44.4	52.3	60.8	70.0	76.7	79.0	78.0	72.7	62.0	51.5	43.6	38
Atlanta	43.0	45.1	52.5	60.6	69.2	75.8	78.4	77.2	72.2	61.9	51.8	44.4	55
Augusta	47.1	49.9	56.2	64.2	72.5	78.8	81.3	79.8	74.8	64.5	54.3	47.3	75
Eastman	49.6	50.1	59.5	65.9	74.0	80.0	81.8	80.9	76.7	66.7	56.7	48.5	30
Fort Gaines	49.0	50.4	59.3	65.7	73.9	80.0	81.4	80.8	76.7	66.8	56.7	49.8	34
Gainesville	41.2	42.4	51.5	59.5	68.1	74.9	77.7	76.2	71.0	60.8	50.6	42.0	39
Griffin	44.7	45.9	55.8	62.8	71.2	77.8	79.8	78.8	74.3	63.8	53.7	45.1	32
Louisville	47.2	48.7	57.0	63.9	73.0	78.7	80.5	80.0	75.4	65.1	54.7	47.5	31
Macon	47.4	48.5	56.6	63.9	72.3	78.8	81.1	80.0	75.3	64.8	54.2	46.7	40
Newnan	44.1	44.8	54.8	61.4	70.9	77.7	79.6	78.7	73.6	63.4	53.1	44.4	33
Rome	41.5	43.8	52.4	60.7	69.7	76.5	79.2	78.4	72.9	62.2	50.3	42.5	39
Savannah	51.8	53.7	59.6	66.3	73.8	79.2	81.5	80.7	76.4	67.3	58.3	52.2	70
Thomasville	52.5	53.8	61.1	66.8	74.6	79.9	81.4	81.1	77.4	68.4	58.8	52.4	39
Waycross	52.0	52.8	61.2	67.0	74.6	80.1	81.9	81.4	77.5	68.7	58.7	51.5	2

IDAHO

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Ashton	18.6	21.4	29.0	41.0	48.6	57.0	64.4	63.4	54.4	43.3	32.2	20.5	24
Boise	29.6	34.7	44.0	50.5	57.4	65.1	73.1	71.9	61.6	51.0	40.4	32.4	58
Buhl	28.4	32.9	40.7	49.2	55.4	64.0	73.2	70.6	60.8	49.0	39.4	29.4	15
Cambridge	21.9	27.6	37.8	49.2	55.6	64.0	72.4	71.0	59.8	48.9	37.8	25.5	26
Idaho Falls	21.0	25.6	35.4	45.1	52.4	60.4	68.1	65.8	56.8	45.7	34.2	23.0	16
Kooskia	26.8	33.5	42.6	50.0	55.8	63.6	71.4	69.6	60.6	49.0	39.2	29.8	12
Lakeview	27.2	30.0	36.2	45.1	51.8	58.5	64.2	63.6	55.0	45.8	36.6	30.8	20
Lewiston	33.1	37.4	45.4	52.6	59.6	66.2	74.7	73.4	63.4	52.6	42.4	35.4	20
Mackay	17.0	20.1	30.5	41.9	49.5	57.8	66.4	66.1	56.4	45.1	32.1	19.4	13
Oakley	28.6	31.3	38.6	46.7	53.4	62.2	70.4	69.4	59.4	48.9	38.4	29.2	28
Payette	28.6	34.2	42.6	51.2	58.2	65.8	73.8	72.0	61.0	50.3	39.9	30.2	28
Pocatello	26.5	29.4	37.9	46.2	53.6	62.2	70.9	69.3	59.4	48.4	38.0	27.5	21
Pollock	34.6	38.0	42.7	50.4	56.3	61.9	70.8	69.6	60.2	52.0	42.0	35.6	15
Porthill	23.4	28.8	35.0	45.4	53.0	59.0	65.0	63.6	53.9	44.8	33.7	27.5	28
St. Maries	27.7	32.4	39.2	47.8	53.6	60.0	66.0	64.6	57.0	48.2	37.9	31.2	22
Salmon	17.8	24.1	35.0	45.1	52.7	52.3	67.0	64.4	56.0	44.4	32.5	19.9	14

ILLINOIS

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Cairo	35.7	37.8	47.6	58.3	67.6	75.5	79.1	77.6	71.0	59.9	47.7	38.5	49
Carlinville	28.6	29.8	42.7	53.9	64.0	73.0	76.8	75.7	69.0	56.5	43.3	32.0	30
Charleston	28.2	29.6	41.2	52.9	63.4	72.6	76.5	74.3	68.3	55.7	42.6	32.0	35
Chicago	24.3	25.9	35.6	46.7	57.0	66.9	72.7	71.6	64.9	53.6	39.8	29.1	50
Dixon	20.0	21.5	35.2	48.6	59.6	69.1	73.9	71.8	64.2	51.7	37.4	25.0	30
Flora	31.2	31.0	43.2	54.3	63.9	72.8	77.0	75.0	68.2	56.3	43.4	34.0	33
Galva	21.8	22.6	37.3	49.2	60.8	70.0	74.8	72.7	65.3	53.4	38.7	25.9	28
Griggsville	27.0	28.9	41.5	53.7	63.9	72.7	76.9	75.2	67.9	56.2	42.8	31.3	34
McLeansboro	31.6	34.0	44.7	55.4	65.2	74.2	77.9	76.1	69.8	57.8	45.3	35.5	38
Marengo	18.8	21.1	31.8	45.9	57.4	67.1	71.8	69.6	61.9	49.4	35.0	23.5	60
Peoria	23.6	26.9	37.2	49.9	61.1	70.2	74.3	72.4	64.9	52.7	38.7	27.9	65
Pontiac	25.3	26.6	39.0	50.7	61.6	70.7	75.8	73.6	66.4	54.0	41.5	29.4	22
Sparta	32.4	33.5	45.1	55.8	65.4	74.1	77.8	76.1	69.7	57.9	45.5	35.5	34
Springfield	26.9	29.0	40.5	52.8	63.2	72.3	76.6	74.5	67.3	55.9	42.3	31.5	41
Urbana	25.6	26.8	40.0	49.6	61.1	69.7	74.5	72.9	65.8	54.2	41.7	28.8	18

INDIANA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Cambridge City	27.2	27.2	39.9	49.8	60.6	69.2	73.6	71.4	65.1	53.0	40.6	30.0	30
Elliston	29.5	31.7	43.4	54.0	63.7	74.3	75.7	73.9	67.7	56.0	43.7	33.3	39
Evansville	34.4	34.5	45.0	55.8	66.8	75.4	79.1	77.6	71.7	60.0	47.4	37.2	26
Fort Wayne	26.5	25.8	38.6	49.2	60.8	68.9	73.9	71.3	65.2	53.8	40.8	28.3	25
Indianapolis	28.6	30.4	40.6	52.2	63.1	72.1	76.1	73.9	67.1	55.4	42.1	32.2	52
Lafayette	25.6	27.1	38.6	50.5	61.7	70.9	74.9	72.8	66.2	53.9	40.4	29.6	43
Logansport	25.2	29.3	37.8	50.8	62.2	71.2	75.4	72.8	65.9	53.2	40.6	29.2	34
Marengo	32.3	34.4	45.0	55.0	64.4	75.4	76.1	74.5	68.6	56.7	45.0	35.1	39
Scottsburg	33.0	33.0	45.3	54.8	65.5	74.0	78.4	75.9	69.7	57.3	45.1	34.8	28
South Bend	24.4	23.6	36.7	48.3	60.0	68.9	73.5	71.6	65.4	53.4	40.0	27.8	29
Terre Haute	30.5	30.5	43.6	53.9	65.0	73.5	77.5	75.7	69.4	57.5	44.5	33.0	30
Valparaiso	23.8	23.7	36.4	48.4	58.2	64.6	72.7	70.8	65.1	53.4	38.8	27.5	23
Vevay	32.7	34.0	42.7	53.8	65.3	73.8	77.5	75.5	69.6	57.5	45.6	36.1	40

IOWA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Algona	15.7	17.5	32.1	47.5	58.8	68.6	73.1	70.8	62.5	50.2	34.1	21.0	29
Charles City	14.2	16.4	31.8	46.4	57.9	67.2	72.3	69.9	62.0	49.7	33.8	21.0	29
Clarinda	21.9	23.5	37.1	50.3	61.0	71.0	75.9	74.2	65.9	53.6	38.7	25.8	31
Corydon	23.2	24.1	38.3	50.6	61.1	70.2	75.3	74.1	64.8	54.8	40.1	26.4	27
Cresco	10.6	14.7	27.1	44.4	56.5	65.7	70.6	69.0	59.9	47.1	29.7	18.2	33
Davenport	21.4	24.3	36.2	49.9	61.2	70.6	75.5	73.2	65.3	53.3	38.5	27.1	49
Denison	19.8	20.5	35.1	48.6	59.3	68.5	73.4	71.8	63.7	52.2	36.8	23.8	25
Des Moines	20.1	23.1	36.3	50.3	61.2	70.5	75.4	73.3	65.1	53.5	38.4	25.8	42
Dubuque	18.5	21.5	34.1	48.7	60.2	69.1	74.1	71.7	63.8	51.8	36.8	24.9	47
Greenfield	20.8	21.8	35.8	49.6	60.4	70.0	74.4	72.8	65.0	53.0	37.8	25.5	28
Independence	16.7	18.6	34.0	47.5	58.8	67.4	72.6	70.5	62.9	51.1	35.8	22.0	27
Keokuk	24.2	27.2	38.8	52.7	63.0	72.6	77.0	75.4	67.2	57.0	41.8	30.2	49
Logan	21.0	22.8	36.5	50.6	61.0	70.3	74.9	73.2	65.1	52.7	37.7	25.7	31
Marshalltown	18.6	19.9	34.7	48.5	60.0	69.0	74.1	72.2	64.1	52.1	37.1	23.1	26
Rockwell City	18.4	19.5	34.6	47.4	59.2	69.0	73.8	71.7	63.4	51.7	36.4	22.4	24
Sibley	13.9	15.2	30.6	45.8	56.7	66.0	70.3	68.9	60.3	48.7	32.7	19.2	25
Sioux City	18.7	20.0	33.8	48.7	59.7	69.4	74.4	72.1	63.9	51.6	36.0	24.2	31
Washington	21.4	22.9	37.3	50.2	61.1	70.1	74.7	72.9	65.1	53.4	38.7	25.7	28

KANSAS

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Colby	28.8	30.4	40.1	50.2	59.7	70.1	75.7	75.0	66.3	53.7	41.1	29.5	25
Concordia	24.4	28.8	40.7	53.6	63.7	72.7	78.1	76.5	68.1	55.4	39.9	29.7	25
Dodge City	29.0	33.2	42.8	53.6	63.5	72.5	78.4	77.7	69.4	56.1	42.6	32.6	25
Ellenwood	30.5	32.5	44.4	54.2	63.7	73.5	78.7	78.3	70.1	57.7	44.1	31.8	25
Emporia	31.0	32.5	45.3	54.5	64.4	73.3	78.2	77.4	69.7	58.2	45.8	32.8	25
Hanover	27.4	30.1	43.0	52.8	63.0	73.0	79.0	77.0	68.7	57.3	43.1	29.7	25
Hays	29.8	31.0	42.3	51.8	61.6	71.9	77.9	77.2	68.3	56.0	42.2	30.6	25
Healy	28.9	32.2	42.5	51.8	61.5	71.4	76.5	76.3	68.2	55.5	42.7	30.4	25
Horton	27.2	28.3	41.6	52.2	62.6	72.1	76.9	76.0	67.8	56.7	43.1	29.4	25
Independence	34.6	35.9	48.5	57.4	67.0	75.8	80.1	80.0	72.5	60.6	48.4	36.2	25
Iola	27.6	32.0	42.4	54.2	64.5	73.4	78.1	76.3	68.6	56.9	43.0	32.5	25
Medicine Lodge	33.0	35.4	47.4	56.9	66.5	75.6	80.5	79.9	72.0	59.8	47.0	34.1	25
Phillipsburg	27.8	30.3	42.4	51.9	61.9	72.8	77.9	77.6	68.7	56.2	44.4	29.6	25
Salina	29.1	31.0	44.0	54.3	64.2	73.8	79.3	78.8	70.5	57.8	44.0	31.0	25
Topeka	25.6	30.0	40.9	53.7	65.0	73.5	77.6	76.0	68.3	56.3	41.7	31.1	25
Ulysses	31.0	32.8	43.9	53.0	62.6	73.1	77.7	77.6	69.5	56.8	42.9	31.2	25
Wichita	29.7	33.0	44.1	56.6	65.9	74.3	79.0	77.5	69.8	58.8	43.8	34.2	25

KENTUCKY

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Alpha	40.0	39.5	50.1	58.0	66.4	72.2	75.8	75.3	70.0	59.7	49.7	40.6	21
Beattyville	34.6	35.7	45.8	54.5	64.4	72.6	75.8	75.0	69.7	57.8	45.2	35.8	18
Blandville	35.8	36.2	48.4	57.2	66.8	74.8	78.1	76.8	71.0	59.6	48.2	37.6	28
Bowling Green	37.1	37.6	49.0	57.7	68.0	75.9	79.2	77.8	72.2	59.8	48.0	38.0	27
Earlington	35.4	35.6	48.0	57.0	67.4	75.6	78.6	76.8	71.4	59.4	47.8	37.6	28
Eubank	34.8	34.8	46.2	54.4	64.0	71.5	74.9	73.8	68.4	57.0	45.1	36.1	28
Irvington	35.7	35.2	47.9	55.4	66.4	74.1	77.4	76.0	70.6	59.2	46.7	36.6	25
Lexington	33.6	34.0	44.1	53.6	64.2	72.6	75.9	74.4	69.0	57.1	44.6	35.8	39
Loretto	36.4	34.6	47.2	55.2	65.6	72.6	76.2	75.6	69.9	58.2	46.5	35.7	20
Louisville	34.7	36.4	46.0	56.2	66.6	74.9	78.8	76.9	70.6	59.0	46.6	37.6	50
Maysville	32.7	32.3	44.9	53.4	64.6	72.9	77.1	75.6	69.6	57.6	44.8	34.1	24
Middlesboro	37.8	39.0	49.0	56.8	64.7	72.4	75.3	74.4	69.5	58.0	46.4	40.6	23
Scott	32.4	31.7	44.2	53.0	64.0	71.7	76.2	74.9	69.2	57.8	44.9	33.4	25

AVERAGE MONTHLY TEMPERATURES AT SELECTED STATIONS—Continued.

[Monthly mean temperatures]

LOUISIANA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Alexandria	49.2	51.1	59.9	66.8	73.6	80.1	82.1	81.9	77.1	66.3	57.3	49.6	31
Amite	51.4	53.2	61.2	66.9	73.5	79.8	81.2	81.2	77.1	66.6	58.1	51.6	31
Calhoun	47.0	48.4	56.8	64.1	71.7	79.0	81.3	80.8	75.3	64.7	54.9	47.2	31
Cheneyville	50.2	52.0	60.7	67.0	73.6	79.9	81.7	81.4	76.8	66.4	58.1	50.5	31
Grand Coteau	53.2	54.9	62.3	68.4	74.2	79.9	81.7	81.3	77.6	67.6	59.5	53.9	34
Lake Charles	51.8	53.7	60.9	67.2	73.6	80.0	81.5	81.5	77.7	68.3	59.6	52.8	31
New Orleans	54.3	56.8	63.1	68.7	75.2	80.8	82.3	82.2	79.0	70.5	61.6	55.8	46
Shreveport	47.1	50.3	58.5	66.0	73.3	80.4	82.9	82.2	76.6	66.3	56.0	48.9	47

MAINE

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Eastport	20.5	21.0	29.2	38.8	47.5	55.0	60.4	60.6	55.8	47.5	36.9	25.4	47
Greenville	12.8	12.4	23.5	36.4	49.5	58.9	65.4	62.5	55.0	45.6	30.7	18.0	15
Portland	22.4	23.3	32.2	43.6	54.4	63.7	69.8	67.8	61.0	[illegible]	[illegible]	[illegible]	46
Presque Isle	10.5	11.0	24.5	40.2	51.4	57.3	64.2	64.6	53.6	45.8	28.2	16.4	11

MARYLAND

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Baltimore	34.2	34.9	42.4	53.4	64.3	72.7	77.4	75.3	68.6	57.8	46.1	36.8	50
Cumberland	31.0	32.7	39.5	51.8	62.8	70.3	73.9	72.0	65.0	54.3	42.3	35.2	37
Frederick	32.1	32.6	41.9	52.6	63.5	71.7	76.2	73.9	67.1	55.7	43.9	34.5	46
Princess Anne	37.0	36.7	45.5	54.4	63.2	71.1	76.2	74.7	68.7	57.8	47.3	38.8	45
Washington, D. C.	33.7	34.7	42.6	53.4	64.2	72.4	76.8	74.7	68.0	56.9	45.2	36.1	50

MASSACHUSETTS

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Boston	27.9	27.8	35.7	46.0	57.1	66.3	72.0	69.9	63.4	53.3	41.9	31.9	49
Nantucket	31.9	30.2	36.3	43.2	52.6	60.9	67.7	67.7	62.6	54.2	44.7	35.8	34
Williamstown	22.5	21.4	32.3	43.9	55.6	63.5	68.6	66.2	59.2	49.6	37.1	25.8	18

MICHIGAN

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Alpena	18.8	17.4	25.5	38.8	50.2	60.4	65.9	63.9	57.8	47.0	34.7	24.7	46
Big Rapids	20.2	18.3	29.8	43.8	55.0	64.4	69.0	66.4	59.4	48.0	35.9	35.0	27
Cheboygan	17.7	15.5	25.8	40.3	50.8	61.9	67.0	65.0	59.2	47.9	34.7	23.7	30
Detroit	24.6	24.5	33.5	45.9	57.7	67.2	72.2	70.2	63.6	52.1	39.1	29.1	50
Escanaba	15.1	14.6	24.3	37.9	49.0	60.5	66.0	64.0	57.2	46.2	33.6	21.6	38
Ewen	10.8	10.7	23.4	38.7	50.5	60.4	65.0	61.3	54.8	44.6	30.6	16.4	22
Grand Haven	24.2	23.5	31.6	43.7	54.1	63.7	68.7	67.0	61.0	50.3	38.4	29.4	48
Kalamazoo	23.3	23.3	34.2	46.7	57.8	67.6	72.3	70.1	63.1	51.1	38.0	27.3	45
Lansing	21.9	22.1	31.6	45.6	57.6	66.9	71.0	68.5	61.2	49.5	36.3	26.0	57
Marquette	16.6	16.4	24.7	38.2	49.0	58.8	65.4	63.6	57.5	46.7	32.1	23.3	47
Omer	19.0	16.9	28.7	42.0	52.9	63.2	69.2	66.5	59.7	49.4	36.6	24.8	22
Sault Ste. Marie	14.0	11.6	22.6	37.7	48.8	56.7	63.7	62.3	56.8	45.0	33.9	20.7	33
Traverse City	22.1	19.2	29.5	41.5	52.1	63.0	69.1	67.4	60.8	50.2	37.7	27.6	27

MINNESOTA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Alexandria	6.8	9.4	25.4	42.3	54.6	64.5	69.5	67.0	58.4	46.2	29.6	13.5	27
Bird Island	11.1	13.3	28.6	44.6	56.7	65.6	71.0	68.6	61.0	47.8	31.4	17.3	31
Collegeville	11.7	14.1	28.3	44.6	56.0	65.7	70.8	68.1	60.0	47.6	31.6	17.6	28
Duluth	9.3	12.4	23.8	38.0	48.1	58.4	65.4	63.8	56.3	45.0	29.6	16.6	47
Fairmont	13.2	15.8	30.4	45.6	57.0	66.6	71.6	69.6	61.3	49.2	32.8	20.0	30
International Falls	2.5	6.2	20.4	39.4	51.4	62.2	66.6	62.9	55.6	42.4	25.6	9.9	17
Montevideo	11.4	13.6	28.4	45.4	57.0	66.4	71.2	68.7	61.2	48.1	32.0	17.6	30
Park Rapids	3.7	6.4	22.4	40.2	52.1	63.0	67.7	64.3	55.6	43.0	26.6	11.4	29
Pine River Dam	5.4	7.1	23.8	40.6	52.8	62.8	68.3	65.6	57.1	45.2	29.4	12.3	24
Roseau	-0.2	2.0	20.1	40.0	52.0	61.2	65.4	62.1	54.2	41.4	23.9	7.6	18
St. Paul	12.3	16.2	29.3	46.2	57.6	67.2	72.0	69.5	61.0	48.4	32.3	19.4	46
Worthington	13.0	14.6	28.9	44.3	55.9	65.0	70.2	68.3	60.2	47.6	32.0	18.8	26

MISSISSIPPI

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Bay St. Louis	52.0	53.7	62.0	67.4	74.6	80.3	81.3	81.6	79.0	69.4	60.0	52.5	28
Booneville	41.6	42.8	52.5	60.6	69.0	76.9	79.4	78.8	73.6	62.2	51.2	42.8	25
Brookhaven	48.5	50.6	59.1	65.5	72.9	79.6	81.5	81.1	76.6	66.1	56.5	49.4	33
Duckhill	45.0	46.2	55.8	62.4	70.3	77.0	79.7	79.4	74.3	63.3	53.3	45.2	22
Hattiesburg	49.7	51.7	60.4	65.6	73.8	80.4	81.9	81.6	77.1	66.1	57.1	50.3	28
Holly Springs	39.9	40.6	51.7	60.0	69.3	77.4	79.9	79.2	74.0	62.3	50.5	40.6	30
Lake	56.7	47.9	57.0	63.8	71.0	77.9	79.9	79.3	74.7	63.1	53.4	46.3	33
Louisville	46.0	47.2	56.1	62.7	70.4	77.7	79.4	79.8	75.2	64.6	54.4	46.2	30
Meridian	47.2	48.7	57.1	64.2	71.5	78.1	79.7	79.5	74.9	64.3	54.6	47.3	30
Natchez	49.9	51.5	60.4	66.7	73.4	79.6	81.6	81.6	77.4	67.1	57.6	49.9	31
Vicksburg	48.2	51.3	58.7	65.6	72.8	79.3	81.3	80.9	76.2	66.5	56.6	49.8	49

MISSOURI

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Arcadia	32.1	33.5	44.8	55.3	64.6	72.0	75.9	74.5	67.6	56.1	44.0	34.3	40
Bethany	24.6	27.0	40.6	51.2	63.4	70.3	76.7	74.0	66.7	55.1	42.6	30.3	31
Brunswick	26.8	29.1	41.9	54.1	64.3	73.2	77.1	75.1	66.7	55.4	41.5	30.0	42
Clinton	31.4	31.9	44.3	55.7	65.2	73.4	77.5	76.8	70.2	58.8	47.3	34.4	28
Columbia	30.0	31.4	43.5	54.5	64.4	73.4	77.0	76.0	68.9	57.3	44.2	33.3	34
Hannibal	27.7	28.4	42.3	55.3	63.9	73.0	76.9	75.4	68.2	56.2	42.9	31.1	31
Kansas City	29.7	30.8	43.2	54.9	64.6	73.9	78.2	76.8	69.4	58.1	44.6	33.3	34
Lebanon	30.3	33.9	45.4	55.7	65.6	73.3	77.0	76.0	68.9	57.3	46.0	35.6	34
Rolla	31.3	35.2	45.5	56.2	64.5	72.5	77.4	75.8	68.0	55.9	44.9	33.6	33
St. Louis	30.8	34.5	43.8	55.8	66.0	74.8	78.6	77.3	70.1	58.4	45.1	34.8	41
Springfield	33.6	33.7	44.8	56.1	64.6	72.6	76.3	75.7	69.5	58.0	46.2	36.2	33
Unionville	23.5	25.4	38.6	50.7	62.4	71.8	76.6	75.0	67.2	55.4	40.2	27.4	30

MONTANA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Augusta	20.8	22.3	29.2	41.2	48.9	56.6	62.3	60.7	52.0	45.0	32.3	26.2	21
Billings	22.5	25.3	34.2	45.2	54.8	63.6	70.8	69.9	58.7	48.1	35.7	26.5	26
Como	26.0	29.1	37.2	45.4	51.6	59.6	65.8	63.9	54.5	45.5	35.7	26.0	13
Crow Agency	18.6	20.2	32.2	44.6	56.7	65.0	71.2	69.1	58.7	47.1	33.3	24.5	37
Cut Bank	16.6	18.8	29.2	42.2	48.5	59.2	65.2	63.2	54.3	45.7	30.6	23.0	12
Fort Benton	20.6	21.2	30.6	45.2	53.4	62.4	69.0	67.5	56.2	47.8	33.9	24.0	16
Fort Logan	18.9	20.6	27.5	39.1	48.1	55.9	63.1	61.6	51.7	41.2	27.7	20.5	20
Havre	12.6	13.2	27.5	44.0	53.4	61.6	68.0	66.0	56.0	45.0	30.3	20.4	40
Helena	20.3	23.2	32.2	43.7	51.4	59.6	67.1	66.1	55.7	45.4	32.7	25.0	42
Jordan	13.2	16.6	29.6	42.9	51.8	62.8	71.6	67.8	57.1	45.0	30.5	18.3	11
Kalispell	22.0	24.2	33.1	43.8	51.4	58.1	64.5	62.8	53.2	43.6	32.7	24.9	25
Malta	10.0	12.6	25.1	44.4	54.3	61.3	69.8	67.9	57.0	44.4	29.0	15.3	13
Miles City	15.3	16.9	31.1	46.6	56.7	66.4	74.0	71.3	60.1	47.4	32.9	21.6	44
Missoula	21.8	25.8	35.2	44.5	52.4	59.4	66.0	64.9	55.4	44.8	33.1	24.6	29
Popiar	6.1	8.6	23.8	43.8	54.9	62.7	70.6	67.9	57.2	44.7	27.7	14.7	36
Red Lodge	20.9	20.7	27.9	38.6	45.9	55.7	61.4	60.2	51.2	51.0	31.5	23.3	21
Springbrook	14.1	15.3	27.7	43.7	52.6	64.8	68.6	66.8	55.8	45.6	31.9	19.3	20
Valentine	14.8	17.8	30.4	42.9	52.2	62.2	69.2	67.0	55.5	45.5	31.9	20.1	14
Wibaux	15.7	16.2	25.9	43.0	54.1	61.0	68.6	65.6	55.4	43.7	28.6	18.4	14

NEBRASKA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Atkinson	19.3	20.9	33.4	46.7	57.3	67.6	73.6	71.0	63.1	50.2	35.2	23.3	32
Curtis	26.2	27.2	38.3	50.3	60.6	69.8	75.4	73.9	64.7	51.7	38.5	27.4	24
Fort Robinson	23.0	23.2	33.5	45.8	54.5	65.0	71.1	69.8	60.8	47.7	35.6	26.5	36
Halsey	22.7	25.5	36.8	47.5	56.8	64.9	73.5	71.8	63.5	50.2	37.5	25.5	18
Hartington	18.7	19.9	33.4	45.7	58.4	68.2	73.4	71.3	62.9	50.0	34.0	22.0	19
Kennedy	23.0	23.0	33.1	46.8	57.6	66.7	72.7	71.3	62.2	49.1	32.4	28.7	17
Kimball	26.8	27.2	35.0	45.2	54.6	65.2	71.0	69.7	60.8	48.3	36.4	27.4	31
Lincoln	22.2	25.5	38.4	50.7	62.1	71.7	76.9	74.6	65.6	53.5	38.5	27.4	36
Madison	21.3	22.2	34.7	48.0	59.4	68.4	74.0	71.4	62.6	49.0	34.1	23.9	24
Minden	22.9	25.3	36.9	50.0	59.9	70.1	75.4	73.7	65.2	52.6	38.0	26.7	37
North Platte	23.0	27.4	36.4	48.6	58.8	68.2	73.8	72.3	63.5	50.7	37.2	27.5	46
Omaha	21.3	24.8	37.0	51.2	62.3	71.6	76.4	74.6	66.1	54.4	39.0	27.1	47
Scotts Bluff	25.9	26.0	35.3	46.4	55.6	66.3	72.2	71.1	62.1	48.9	36.8	28.1	30
Valentine	21.1	21.3	34.3	46.1	56.0	66.5	72.8	70.9	61.9	49.0	34.2	25.2	32

NEVADA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Austin	27.6	30.6	35.6	44.2	50.7	60.2	69.2	68.1	58.4	47.4	37.4	30.0	29
Belmont	25.4	27.4	33.6	41.6	49.7	60.3	67.8	66.1	56.2	46.4	37.6	27.6	18
Eureka	27.8	30.4	35.8	45.2	51.2	60.1	70.4	69.6	60.6	50.2	38.3	30.2	22
Fallon	30.0	35.6	42.4	50.4	56.6	65.2	70.1	71.8	61.2	50.0	39.3	31.2	26
Las Vegas	43.1	47.0	53.2	62.2	68.7	77.3	83.2	81.8	73.7	62.2	51.2	42.1	12
Logandale	43.9	49.2	55.5	63.9	70.3	79.1	86.6	85.7	77.1	65.4	52.8	43.6	20
McGill	26.6	29.2	35.7	43.5	51.2	61.2	69.2	68.2	59.0	46.0	37.0	26.6	16
Minden	30.7	36.0	41.8	48.2	54.6	61.6	67.3	66.9	59.7	49.8	42.3	32.2	18
Quinn River Ranch	26.6	30.9	40.8	46.8	53.8	61.8	69.6	67.2	57.8	46.0	37.3	27.3	18
Reno	31.4	35.3	40.7	47.2	53.2	60.4	67.9	66.8	61.0	49.4	41.3	36.3	30
Tecoma	23.3	27.4	36.7	45.7	52.8	61.7	70.4	68.4	59.4	47.4	36.8	25.4	19
Thorne	33.3	37.0	44.2	50.2	59.0	66.8	74.9	74.2	64.6	53.4	43.6	35.4	23
Tonopah	30.4	33.4	40.7	48.4	53.7	66.0	73.8	71.7	62.5	50.8	40.9	30.7	14
Winnemucca	28.2	33.3	40.0	46.8	53.9	62.7	70.9	69.3	59.2	48.2	37.8	30.2	42

NEW HAMPSHIRE

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Concord	21.5	20.7	32.4	42.7	55.4	63.2	69.8	66.5	59.4	49.4	36.8	25.2	18
Hanover	17.3	17.6	28.0	42.3	54.8	62.6	68.5	66.0	58.8	48.3	34.4	21.1	20

NEW JERSEY

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Atlantic City	33.0	32.7	39.0	47.7	57.9	66.8	72.4	72.3	67.0	56.8	45.4	36.2	47
Trenton	32.3	31.4	41.3	51.6	62.7	70.9	75.8	73.7	67.4	57.2	45.1	35.3	27
Vineland	32.2	32.5	40.5	51.0	62.3	71.2	76.2	73.7	67.0	56.0	44.1	34.5	51

NEW MEXICO

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Agricultural College	42.3	46.3	53.2	60.7	69.3	78.3	80.5	78.7	72.3	61.6	49.4	42.2	58
Albuquerque	35.2	40.3	48.6	55.4	63.7	73.0	76.0	74.2	67.7	56.2	44.0	35.2	21
Alma	38.0	41.5	46.9	53.3	60.7	69.3	74.1	72.8	66.9	55.8	45.6	37.4	22
Chama	23.4	25.1	32.2	42.0	48.6	58.2	63.2	62.6	55.6	46.1	35.8	24.7	19
Clayton	35.1	37.6	43.4	51.5	60.6	69.6	73.4	72.6	66.3	55.4	44.2	33.2	16
Clovis	35.6	40.6	46.4	54.9	65.3	73.6	78.0	75.8	70.1	58.2	45.4	35.2	10
Corona	33.5	38.6	43.2	49.4	57.4	66.6	69.5	68.2	63.0	53.0	43.0	34.9	10
Cuervo	38.8	41.6	48.8	55.8	66.1	74.4	78.6	75.8	69.8	58.8	47.8	37.4	14
Fort Bayard	38.7	40.7	46.1	52.8	61.2	70.8	72.4	70.9	66.1	56.5	46.2	38.5	30
Fort Stanton	35.4	38.4	43.7	50.9	58.7	67.0	69.0	67.1	61.3	51.9	41.8	35.5	24
Fort Sumner	38.0	42.2	49.2	55.8	65.8	74.4	77.9	76.8	69.1	56.9	46.4	37.2	11
Fort Union	32.2	33.1	39.2	45.2	53.2	62.0	65.9	65.0	58.7	49.0	40.4	31.2	23
Fort Wingate	32.1	35.6	40.8	47.8	55.2	65.4	69.6	68.3	62.0	51.4	40.3	32.3	14
Haynes	23.0	28.8	36.6	42.6	52.8	63.2	68.6	66.6	59.5	48.2	36.7	23.6	9
Lovington	42.2	45.0	48.4	59.5	67.0	75.6	77.8	76.9	70.9	59.5	45.3	40.8	13
Roswell	40.1	43.3	51.4	58.3	66.5	75.2	77.7	77.6	69.7	57.9	47.2	38.5	27
San Jon	38.2	41.4	48.6	55.9	64.8	74.0	78.4	76.8	70.7	59.2	47.2	37.1	15
San Marcial	38.4	44.0	51.4	58.4	65.9	74.7	77.8	76.9	69.8	57.7	48.6	36.9	25
Santa Fe	29.2	32.8	40.0	46.9	55.4	64.9	68.0	67.4	61.0	50.2	39.0	30.8	48
Socorro	38.1	43.3	49.3	57.0	65.1	74.6	76.9	75.2	68.6	57.2	46.2	37.0	26
Springer	29.9	32.0	41.6	49.6	58.6	67.1	70.6	69.4	62.4	51.0	39.7	29.8	23
Taos	26.5	31.4	39.6	47.2	55.1	62.9	68.0	66.7	60.0	49.0	38.2	26.4	23

NEW YORK

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Albany	23.5	24.2	33.4	46.7	59.1	68.2	72.3	70.4	62.6	50.6	39.2	28.0	99
Angelica	23.1	21.5	30.5	43.2	54.3	63.4	67.6	65.0	58.7	47.6	36.2	26.2	35
Binghamton	24.1	22.8	32.9	45.2	56.8	65.3	69.8	67.7	61.4	50.4	38.4	27.7	30
Buffalo	25.0	23.7	31.7	42.5	54.2	64.6	69.8	68.2	62.5	51.5	39.2	29.4	50
Canton	16.0	15.6	27.0	42.6	54.5	63.9	68.6	66.6	58.7	48.0	34.3	21.5	23
Cooperstown	20.4	20.2	28.3	41.3	54.4	63.6	68.0	65.5	58.4	47.0	35.1	24.8	65
Indian Lake	16.1	15.0	26.5	38.9	51.9	59.7	65.1	62.4	56.2	45.8	32.2	20.1	21
Ithaca	24.5	24.1	32.1	44.8	57.2	66.0	70.7	68.2	61.8	50.7	38.5	28.7	42
New York City	30.8	30.7	38.0	48.8	60.0	69.0	74.3	72.7	66.8	56.1	44.4	34.2	49
Oswego	23.8	23.5	30.8	42.5	53.5	62.9	69.0	67.8	61.2	50.2	38.9	28.3	65
Rochester	24.6	23.6	31.8	44.4	56.6	66.0	20.9	68.8	62.6	51.1	38.8	28.7	49
Syracuse	23.8	21.7	32.6	44.0	56.4	64.6	70.3	67.9	61.8	51.3	38.8	27.2	18
West Point	29.7	27.7	36.1	48.0	59.4	68.6	73.2	71.3	64.1	52.9	41.5	30.9	86

NORTH CAROLINA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Asheville	38.2	38.0	47.1	54.0	62.7	68.9	71.9	71.4	66.0	56.1	45.8	38.0	18
Brewers	38.4	38.7	47.7	55.1	64.6	71.6	74.0	74.1	68.9	59.0	47.7	39.2	26
Charlotte	41.5	43.5	51.3	59.6	69.0	75.7	78.4	76.9	71.8	61.2	50.8	42.9	44
Edenton	42.6	42.2	50.9	58.5	68.4	74.8	79.2	78.4	71.8	61.5	50.9	42.8	24
Greensboro	39.1	40.2	49.7	58.0	68.0	74.8	77.8	76.0	70.7	59.8	48.7	40.4	23
Hatteras	46.0	45.9	50.0	56.5	65.8	74.2	78.0	78.0	75.0	66.8	57.2	49.1	44
Lenoir	37.3	41.1	46.9	56.2	64.9	71.7	75.1	73.8	67.4	57.1	46.4	38.7	31
Lumberton	44.4	43.8	53.6	60.6	70.4	76.5	80.1	79.2	73.4	62.7	52.2	44.2	33
New Bern	45.7	46.0	53.5	60.0	69.4	76.0	79.0	78.3	72.7	63.2	53.8	46.2	33
Raleigh	41.7	42.5	50.6	58.9	68.9	75.5	78.3	77.2	71.5	60.8	50.7	42.6	34
Southern Pines	44.0	44.3	53.6	61.3	70.4	76.9	78.9	78.5	73.3	62.8	52.8	44.8	29
Weldon	39.7	41.1	48.4	57.5	68.2	75.2	79.2	77.3	71.7	60.1	49.2	39.8	47
Wilmington	47.1	48.3	54.6	61.4	70.0	76.4	79.6	78.7	73.8	64.4	54.9	48.0	50

NORTH DAKOTA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Bismarck	6.7	9.7	23.6	43.1	54.1	63.5	69.5	67.4	57.0	44.8	27.9	14.9	43
Bottineau	-0.7	1.8	17.7	39.4	51.3	61.0	65.8	63.6	55.5	41.6	23.6	6.7	26
Crosby	1.7	7.1	22.0	40.0	50.4	60.6	65.9	63.7	53.7	41.5	27.8	12.3	11
Devils Lake	2.9	4.2	19.8	40.1	52.0	61.7	67.1	64.7	55.9	43.0	26.8	9.4	21
Dickinson	10.3	11.8	24.4	42.9	52.4	60.8	68.0	66.3	56.2	45.5	29.8	17.3	23
Garrison	6.5	8.4	21.7	42.6	52.6	62.2	68.1	65.7	56.8	43.8	27.0	13.6	23
Grand Forks	3.6	6.5	22.4	42.4	53.4	62.9	67.4	64.9	56.2	43.5	26.1	10.6	43
Hannah	6.5	7.9	22.6	42.4	53.5	63.1	68.5	66.2	56.4	44.8	27.2	13.6	29
McKinney	3.2	5.1	19.2	41.0	52.0	60.7	66.0	63.5	54.1	41.7	24.6	10.1	25
Manfred	4.0	6.8	23.1	41.8	51.6	61.6	66.0	64.3	55.4	43.2	29.0	11.3	15
Minot	5.0	7.9	21.4	41.7	52.3	62.5	68.1	65.1	56.7	43.6	29.4	12.3	19
Mott	7.5	11.8	26.6	42.4	51.6	63.0	69.1	65.9	56.3	43.0	31.2	14.1	11
Oakdale	14.4	13.3	24.1	42.8	53.3	61.9	68.0	67.6	57.1	45.6	28.4	20.3	13
Pembina	-2.9	1.4	16.0	37.9	52.5	62.6	67.7	64.1	55.0	42.7	22.7	6.0	30
Williston	5.8	7.9	22.7	43.0	53.3	63.1	68.5	66.5	56.0	43.6	27.0	13.6	39

OHIO

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Cincinnati	32.4	33.9	43.1	53.7	64.4	73.1	77.2	75.3	68.8	57.0	44.5	35.3	48
Circleville	30.9	29.9	42.4	52.1	62.9	71.2	75.4	73.5	67.6	55.6	43.0	32.5	27
Cleveland	26.9	26.3	35.0	46.2	57.9	67.7	71.8	70.6	64.1	53.2	40.6	30.8	51
Columbus	28.8	29.1	39.1	50.7	62.1	71.5	75.6	73.3	66.7	54.9	42.0	31.2	43
Greenville	27.6	28.0	39.3	49.1	59.6	69.6	73.6	71.3	64.1	52.9	40.6	30.8	35
Millport	26.4	25.0	37.8	47.0	58.0	65.2	70.7	68.9	62.3	50.2	36.9	26.9	25
North Lewisburg	27.4	29.2	38.0	50.7	61.2	69.3	73.3	71.2	64.8	51.6	39.1	29.7	27
Portsmouth	34.7	36.7	45.0	55.5	64.9	72.6	76.3	74.8	67.9	57.9	46.6	36.5	91
Sandusky	26.9	27.1	35.0	45.8	59.1	69.0	73.6	71.9	65.3	53.6	40.9	30.7	53
Toledo	20.2	26.6	35.3	47.5	59.2	[illegible]	73.4	71.0	64.7	53.1	40.3	30.2	48
Wooster	26.5	26.2	36.7	47.9	58.5	67.6	71.5	69.5	63.6	51.6	40.0	30.1	36

OKLAHOMA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Ada	41.3	43.0	53.2	60.2	68.3	76.4	82.3	81.2	74.7	62.2	53.0	41.7	14
Alva	34.8	36.6	48.2	58.0	66.9	76.4	81.0	80.1	72.6	59.6	48.2	36.8	20
Ardmore	41.9	43.8	54.8	62.0	69.9	78.9	83.4	83.3	76.1	64.3	54.2	42.4	20
Bacone	38.9	40.3	52.3	60.4	68.3	76.8	80.7	81.1	74.8	62.9	52.3	40.1	22
Beaver	33.2	33.7	47.0	57.3	66.6	75.7	80.9	80.2	71.3	57.8	45.3	34.2	25
Chandler	37.2	39.1	51.6	60.1	68.4	77.6	82.4	81.6	74.0	61.6	52.3	38.7	20
Enid	35.9	36.3	49.9	57.8	66.9	76.8	81.8	81.4	74.0	60.4	49.6	36.4	23
Idabel	44.5	46.8	55.9	62.8	69.5	79.7	82.3	80.7	76.6	64.5	50.5	45.0	9
McAlester	41.0	43.6	54.6	61.6	69.6	78.5	82.7	82.0	76.3	64.3	54.0	42.8	19
Mangum	40.0	42.0	52.1	61.4	69.6	78.0	82.5	81.9	74.4	62.4	52.3	40.8	28
Marlow	39.6	41.0	53.0	60.6	68.4	77.0	81.1	81.8	74.0	62.7	54.4	40.7	20
Newkirk	35.3	36.3	49.3	58.9	67.7	77.1	82.0	81.7	73.5	61.9	49.6	36.7	24
Oklahoma City	37.1	38.5	50.0	59.6	67.4	76.1	80.2	80.1	73.4	61.6	49.7	38.7	30
Tulsa	36.5	38.7	51.0	59.1	67.7	77.4	81.6	81.5	74.7	61.6	51.0	39.1	16
Vinita	36.6	38.3	49.8	59.2	67.0	74.9	79.0	78.7	73.9	60.6	50.1	38.4	19
Weatherford	36.6	39.2	51.0	58.6	67.4	76.6	81.4	81.2	73.5	61.0	49.6	37.2	20
Woodward	35.2	37.6	48.0	58.1	68.6	76.4	81.7	80.2	72.3	59.6	48.4	35.4	20

OREGON

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Albany	39.4	42.2	46.6	51.1	56.5	61.4	66.4	66.0	59.9	52.5	45.1	40.5	40
Ashland	38.1	41.7	45.4	50.2	55.8	62.0	69.2	68.7	61.5	53.5	44.5	38.7	39
Astoria	40.1	42.2	45.3	49.0	53.3	57.4	60.7	61.1	58.6	53.5	47.0	42.2	70
Baker	25.7	29.6	36.6	44.5	51.1	57.9	66.1	65.6	56.4	47.2	36.7	27.7	30
Bend	30.5	33.0	37.8	43.8	49.6	57.2	64.2	63.3	56.6	48.0	38.6	31.5	19
Dayville	34.2	37.9	43.2	49.7	54.7	61.7	68.4	66.9	58.8	50.2	41.9	35.7	26
Diamond	29.1	30.7	35.7	43.8	50.3	56.7	63.9	62.9	53.6	45.3	37.3	29.5	10
Eugene	40.0	42.6	45.8	50.4	54.9	60.1	65.8	65.2	57.8	53.3	42.6	41.2	30
Joseph	23.7	26.2	33.1	41.9	48.7	55.1	63.3	62.6	54.0	44.7	34.4	25.4	30
Klamath Falls	28.9	32.9	38.8	46.1	52.7	59.8	67.8	67.1	58.5	49.0	38.7	31.1	30
Lakeview	27.7	30.0	35.0	43.4	49.9	58.0	65.9	66.1	56.8	48.1	37.3	29.5	29
Newport	43.8	45.1	46.0	48.4	51.6	55.0	56.8	57.3	57.0	53.5	48.9	45.2	33
Portland	39.0	42.0	47.0	51.6	57.1	62.0	67.0	66.6	61.5	54.3	46.4	41.5	51
Riverside	26.5	32.7	40.0	48.1	53.6	63.0	71.2	69.1	58.9	47.7	36.8	27.4	20
Roseburg	41.0	43.4	47.4	51.3	56.4	61.2	67.1	67.0	61.3	53.7	46.3	41.8	45
Silver Lake	27.9	31.1	35.8	42.4	49.1	55.9	63.8	62.0	53.2	44.0	36.3	32.4	24
The Dalles	32.3	37.8	45.7	53.2	60.1	66.3	72.2	71.2	62.7	53.2	42.3	35.2	60
Vale	26.5	31.7	41.1	49.5	56.6	64.1	71.5	69.1	59.6	48.5	37.2	28.2	26
Weston	31.8	34.4	41.4	49.0	54.8	61.1	69.1	68.4	59.2	50.0	40.9	33.9	30

PENNSYLVANIA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Erie	27.2	25.8	33.6	44.7	56.7	66.1	71.2	69.5	63.8	52.8	41.3	31.5	46
Franklin	26.5	24.6	35.7	46.3	58.0	65.6	70.5	68.3	62.3	51.3	39.6	29.2	25
Gettysburg	29.0	30.3	39.2	50.4	61.3	69.6	74.0	71.7	65.0	52.2	41.3	31.7	42
Harrisburg	29.9	29.0	39.1	51.5	62.1	70.0	74.7	72.7	66.0	54.4	43.0	33.0	33
Huntingdon	28.6	28.4	38.3	49.6	60.7	68.2	72.2	70.7	64.3	52.5	41.5	31.5	31
Lewisburg	25.4	25.8	35.3	48.2	58.5	67.2	71.5	68.9	62.0	50.2	39.1	29.0	45
Philadelphia	32.7	33.1	40.6	51.6	62.8	71.4	76.5	74.4	68.1	57.2	45.4	35.8	49
Pittsburgh	31.0	31.3	39.6	50.9	62.5	70.6	74.7	72.7	66.4	54.9	42.7	33.8	49
Reading	29.9	30.0	39.4	51.1	61.9	70.3	74.9	72.4	65.6	53.9	42.7	32.7	40
Scranton	27.2	25.5	36.2	47.9	59.5	66.7	72.1	69.2	63.0	52.2	40.6	30.0	25

SOUTH CAROLINA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Allendale	48.0	48.3	57.0	64.3	73.2	79.0	83.3	80.3	75.8	65.3	55.5	47.0	38
Camden	46.1	47.8	54.3	62.5	69.5	77.7	80.0	78.9	73.8	62.6	52.0	48.1	42
Charleston	49.3	51.7	57.2	63.8	72.4	78.5	81.3	80.3	76.2	67.1	58.1	51.3	38
Cheraw	43.7	45.0	53.4	61.5	70.7	77.2	79.9	78.6	73.1	62.1	52.2	43.8	39
Florence	45.3	46.1	55.4	62.6	72.2	78.4	81.2	80.2	74.6	64.1	53.9	44.9	39
Georgetown	48.8	49.1	57.5	63.5	72.2	78.4	80.5	80.4	75.6	66.3	56.1	48.9	28
Greenwood	42.9	43.5	52.7	61.6	70.9	77.4	79.6	78.4	73.1	62.2	52.0	43.0	37
Kingstree	47.7	47.5	56.6	63.2	71.8	78.0	80.6	79.5	74.3	64.5	54.7	47.3	39
Saint Matthews	46.4	46.7	56.1	63.2	71.8	77.8	80.2	79.5	74.2	62.7	54.7	46.3	39
Spartanburg	41.6	42.8	51.1	60.1	69.4	76.0	79.1	77.5	72.0	61.1	50.7	41.9	44
Winthrop College	43.5	43.4	53.3	60.8	70.1	76.1	79.1	78.4	72.6	62.4	51.7	43.0	21

SOUTH DAKOTA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Aberdeen	9.9	11.9	27.3	44.6	56.2	65.5	71.0	68.5	59.5	46.0	30.0	15.1	25
Academy	19.2	19.2	33.6	47.4	58.3	68.0	74.0	72.1	63.2	51.2	36.8	22.9	22
Brookings	12.7	14.6	29.5	44.5	55.7	64.8	70.1	68.4	59.7	47.3	31.8	17.7	25
Camp Crook	17.0	19.1	28.3	43.6	53.6	62.8	70.1	68.4	58.3	45.3	31.6	21.6	22
Cottonwood	18.4	19.1	34.7	46.8	55.5	67.8	74.5	71.0	61.7	48.0	34.5	20.9	11
Highmore	13.4	15.4	29.0	45.1	55.8	66.5	72.3	70.4	62.2	48.3	33.6	18.8	21
Huron	11.2	13.7	29.0	45.8	56.2	66.3	71.6	69.6	60.8	47.7	31.4	18.8	39
Milbank	10.7	12.7	27.8	43.6	55.5	64.6	70.1	68.1	59.6	47.2	31.1	17.1	25
Mitchell	16.0	16.9	31.7	46.4	57.7	66.9	72.1	69.8	61.5	49.4	34.4	20.7	25
Oelrichs	21.5	22.6	33.2	45.4	55.0	65.5	72.3	70.3	60.8	47.7	34.6	23.8	23
Ottumwa	16.0	17.7	31.2	44.7	54.0	67.0	72.8	69.6	60.4	47.5	33.6	20.0	12
Pierre	17.1	18.2	31.8	47.4	58.1	68.6	74.9	73.0	63.7	50.4	34.2	22.3	29
Pollock	7.6	12.2	27.6	44.4	54.2	65.0	70.9	68.3	58.6	44.9	30.2	15.0	11
Rapid City	22.8	22.5	32.1	45.2	53.7	64.1	70.9	69.6	60.7	48.4	36.0	27.7	33
Rosebud	22.8	22.1	32.5	47.0	56.8	66.5	73.4	71.0	61.1	49.0	36.4	24.0	20
Sioux Falls	15.1	16.5	31.3	46.2	58.0	67.2	72.3	70.5	61.9	49.4	33.5	19.7	25
Vale	18.7	21.0	33.0	46.2	54.2	65.1	71.7	68.8	59.9	46.8	34.2	21.7	13
Yankton	16.9	19.8	32.4	47.9	59.4	68.9	74.1	72.2	63.4	51.0	34.9	22.9	48

TENNESSEE

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Carthage	38.4	40.4	49.7	58.9	67.4	75.1	77.6	76.9	71.6	60.1	48.7	40.0	37
Chattanooga	41.4	43.5	51.6	60.2	68.6	75.6	78.2	77.4	72.1	61.6	50.8	42.6	42
Johnson City	37.1	38.3	47.8	55.4	65.2	72.0	75.0	73.9	68.6	57.7	45.8	37.9	25
Johnsonville	39.6	40.1	51.3	59.2	68.4	75.5	78.9	78.3	72.3	60.8	49.3	39.9	25
Knoxville	38.7	41.2	49.0	58.0	66.9	74.0	77.0	75.9	70.4	59.1	47.7	39.8	50
Memphis	41.0	43.6	52.6	61.8	70.4	78.0	80.8	79.6	73.4	63.0	51.6	43.6	50
Nashville	38.8	40.9	49.6	59.0	68.2	76.0	79.1	78.0	71.7	60.6	48.9	41.0	50
Rugby	36.2	36.9	46.4	54.8	64.1	71.2	74.1	73.0	67.4	55.7	45.0	37.3	33
Savannah	40.7	42.6	51.9	60.5	68.8	75.9	79.0	78.5	72.3	61.0	50.2	42.1	34
Trenton	38.3	40.4	49.8	59.6	67.6	75.0	78.1	77.4	71.3	59.7	48.3	39.6	38
Tullahoma	38.6	39.7	49.6	57.8	66.1	73.1	76.3	75.6	70.2	58.7	47.4	40.0	32

TEXAS

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Abilene	44.5	46.8	56.2	64.3	71.8	79.2	82.6	82.0	75.4	65.2	53.9	45.9	35
Alice	56.2	58.2	64.5	71.1	77.4	82.7	84.6	85.7	81.2	73.4	64.0	57.3	11
Amarillo	36.4	35.4	47.0	55.2	65.6	72.7	74.9	75.4	66.2	57.6	46.4	36.6	29
Big Spring	45.7	48.2	57.1	64.4	73.1	81.0	83.2	83.1	76.2	65.2	53.6	44.2	19
Blanco	48.8	49.0	57.5	63.7	71.8	79.5	82.7	82.8	77.1	66.9	56.6	48.4	22
Brenham	51.4	53.7	62.2	68.4	74.9	81.3	83.9	83.9	79.1	69.9	60.7	42.3	37
Brownsville	59.4	62.9	68.3	73.7	78.6	82.4	83.8	83.9	80.5	74.6	67.5	61.5	60
Brownwood	46.8	48.4	56.7	65.1	72.4	80.7	83.9	83.7	76.9	65.8	54.1	46.3	27
Childress	39.9	42.6	53.0	61.8	69.0	78.0	81.8	80.8	74.5	63.4	49.7	43.6	14
Claytonville	44.3	46.5	54.3	63.6	71.2	78.8	81.7	81.1	75.4	65.3	53.1	44.3	23
Corpus Christi	56.2	58.1	64.4	70.5	75.8	80.5	82.0	82.3	79.7	73.1	64.6	57.7	34
Dalhart	33.4	35.4	45.3	52.3	61.8	71.8	76.6	74.6	68.0	55.2	43.2	32.0	13
Dallas	45.1	47.4	56.4	64.7	72.7	80.7	84.0	83.3	77.3	66.2	54.9	46.7	44
Del Rio	52.4	55.6	63.7	69.5	76.6	82.8	84.5	84.6	79.5	69.5	59.1	51.1	15
El Paso	44.7	49.5	55.9	63.5	71.9	80.3	81.6	79.6	73.9	63.7	52.3	45.1	41
Encinal	55.9	58.8	65.1	72.0	79.9	85.2	86.6	86.8	81.6	73.4	63.6	54.8	10
Falfurrias	59.1	61.7	67.9	73.7	78.7	83.5	85.3	85.9	81.8	74.4	66.0	58.6	14
Fort McKavett	44.4	50.5	58.1	65.4	72.7	78.4	81.5	80.4	74.5	65.7	53.7	46.8	23
Fort Stockton	46.5	50.5	57.9	64.7	73.5	79.9	81.2	79.8	73.9	64.9	54.1	46.4	33
Galveston	53.6	55.9	62.5	69.2	75.5	81.3	83.4	83.2	79.9	72.5	63.0	56.3	49
Graham	44.1	46.3	58.0	65.5	73.1	80.9	84.6	83.7	77.2	65.8	53.8	45.9	22
Hallettsville	53.7	55.0	63.4	69.8	76.3	82.2	84.6	84.4	79.9	70.9	61.9	54.1	29
Haskell	43.4	45.3	55.0	64.2	72.0	80.8	84.4	83.6	76.8	65.3	53.3	44.2	26
Houston	53.2	55.1	62.9	69.3	75.1	81.1	83.3	82.9	78.8	70.4	61.2	54.2	32
Huntsville	49.3	51.0	59.8	67.3	74.0	80.8	83.5	83.0	77.6	68.2	58.7	50.9	38
Lampasas	47.6	49.0	58.5	65.1	72.4	79.7	83.0	83.1	76.8	66.5	56.1	48.3	29
Liberty	55.0	55.8	62.5	68.0	74.0	80.9	83.0	82.7	79.1	69.5	61.4	53.8	16
Longview	47.4	49.4	57.8	65.1	73.7	81.3	83.9	81.1	77.2	66.3	56.1	48.0	37
Mexia	47.1	48.9	58.3	64.7	71.8	80.1	83.5	83.4	78.2	66.9	57.1	47.5	16
Miami	38.0	40.7	49.7	57.9	66.6	76.0	80.3	78.8	72.2	59.2	47.9	37.0	15
Midland	42.5	47.2	54.8	64.5	72.2	78.3	81.6	79.5	73.9	64.3	52.6	43.3	14
Nacogdoches	47.9	50.9	59.0	64.7	71.8	79.0	81.5	81.7	76.6	66.4	57.3	48.0	21
O2 Ranch	47.2	52.3	55.6	63.2	72.3	78.3	79.5	76.9	71.9	64.5	53.9	47.0	7
Palestine	47.9	50.9	59.0	65.9	72.2	79.4	82.0	81.8	76.9	67.4	57.6	50.4	39
Pierce	54.5	54.7	62.0	67.3	73.7	79.5	81.8	82.4	77.9	69.8	61.8	54.2	15
Plainview	41.0	42.2	51.0	59.0	67.6	74.8	77.3	76.8	70.6	60.6	50.2	40.6	25
San Antonio	42.7	55.2	62.6	69.1	75.0	81.1	83.5	83.6	79.0	70.3	60.8	53.8	36
Sherman	43.6	46.6	55.5	63.8	71.6	79.6	82.8	82.2	76.1	65.6	54.1	45.8	33
Taylor	49.4	51.2	60.4	66.4	73.2	80.4	82.9	83.0	78.0	68.1	58.8	49.6	19
Uvalde	53.1	56.6	64.5	70.1	76.6	82.6	84.9	84.1	79.1	71.1	60.3	52.9	17
Victoria	55.9	57.1	64.7	70.6	76.2	81.9	84.1	84.4	80.4	72.5	63.8	55.8	21
Weatherford	43.9	45.5	55.9	64.0	71.5	79.8	83.8	82.4	76.1	65.4	54.7	45.2	32

UTAH

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Castle Dale	19.3	25.8	37.8	45.9	53.9	63.8	69.3	68.1	58.9	47.8	36.8	23.1	19
Fort Duchesne	13.0	19.3	36.0	47.8	55.7	64.8	71.0	69.3	60.5	46.8	33.7	17.5	29
Hite	35.7	42.4	51.1	59.2	68.2	77.7	84.2	82.8	72.5	59.7	47.5	35.2	14
Kelton	22.5	28.1	39.2	48.3	57.4	68.0	75.6	73.0	60.2	47.5	34.3	26.3	39
Loa	24.6	24.1	32.2	40.6	48.7	58.6	65.9	62.9	53.0	41.3	31.1	20.9	18
Logan	24.3	26.7	36.2	47.5	54.4	63.4	71.7	70.7	61.2	49.9	37.7	25.7	27
Moab	28.8	36.2	43.4	55.2	63.6	72.1	77.7	75.3	66.3	53.6	41.4	30.3	28
Parowan	29.0	31.9	39.4	47.1	54.6	64.3	70.5	66.6	60.2	49.4	40.6	28.8	28
Salt Lake City	29.2	33.3	41.7	49.9	57.4	67.1	75.6	74.5	64.4	52.5	40.9	32.1	45
Scipio	27.2	31.1	38.7	46.6	53.1	62.9	69.2	68.3	59.3	47.9	37.5	26.6	24

VERMONT

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Burlington	18.9	18.8	29.9	43.2	56.2	64.9	70.0	67.6	60.2	49.5	36.3	23.5	35
Enosburg Falls	15.2	15.0	26.8	41.5	54.1	62.2	68.1	64.9	57.8	47.5	33.6	18.9	20
Northfield	15.2	15.7	26.2	39.8	52.4	60.9	65.7	62.8	55.8	45.2	32.7	20.0	34
Wells	18.3	17.1	28.8	41.6	54.5	62.8	68.6	65.6	58.7	47.2	33.8	21.3	20

VIRGINIA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Callaville	39.0	38.3	48.5	56.4	66.0	72.9	76.9	76.0	69.9	59.6	48.6	40.0	29
Charlottesville	36.2	35.2	46.1	55.7	66.3	72.3	76.2	74.7	65.5	58.3	46.0	37.5	25
Lynchburg	37.2	38.5	46.4	55.8	65.8	73.4	77.2	75.4	69.1	57.9	46.9	39.2	48
Norfolk	41.2	41.8	48.2	56.8	66.5	74.4	78.6	77.3	71.8	61.8	51.3	42.9	50
Richmond	38.4	39.9	47.2	57.0	67.2	74.5	78.1	76.8	70.9	59.9	48.9	40.3	40
Wytheville	34.4	34.1	43.6	51.1	60.8	67.4	70.9	70.0	64.2	53.9	42.7	34.0	17

WASHINGTON

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Aberdeen	39.1	41.0	44.1	47.9	52.2	56.3	59.7	60.5	57.4	52.0	45.2	40.4	30
Blaine	35.8	38.2	41.7	47.2	52.6	57.7	61.0	60.1	55.0	48.6	42.1	38.0	23
Centralia	38.4	40.7	44.4	49.2	54.2	59.1	63.7	63.6	58.2	51.8	45.1	39.9	28
Moxee	28.2	33.9	42.7	50.4	57.7	64.4	70.9	69.5	60.0	49.6	38.9	30.6	30
North Head	41.6	42.8	44.9	47.8	51.4	54.7	57.5	58.0	56.5	53.2	48.0	43.9	34
Odessa	26.7	32.4	41.4	49.0	56.1	63.3	71.1	69.1	59.8	49.3	38.1	29.1	18
Republic	22.6	25.9	36.8	45.7	51.5	57.8	64.4	63.0	54.6	43.8	32.8	24.4	17
Seattle	40.0	41.7	44.9	49.5	54.7	59.4	63.7	63.6	58.6	52.0	46.0	41.9	31
Spokane	27.2	31.0	39.9	48.2	55.8	62.3	69.5	68.4	58.6	48.4	37.7	30.9	41
Totoosh Island	41.1	41.8	43.6	46.6	50.1	53.2	55.3	55.4	53.9	50.8	46.5	43.4	33
Walla Walla	33.1	37.2	45.7	52.9	59.5	66.0	74.5	73.7	64.0	54.3	43.3	36.1	36
Waterville	20.7	25.5	34.6	44.8	52.8	59.5	66.8	66.6	56.9	46.4	33.2	24.4	28

WEST VIRGINIA

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Elkins	31.2	29.6	40.4	48.3	59.3	66.0	70.0	69.1	62.9	52.8	40.3	31.6	22
Glenville	33.1	32.7	44.3	53.4	63.5	70.8	74.9	73.9	67.7	56.0	43.6	35.0	28
Huntington	32.8	32.6	44.6	54.0	64.9	72.6	76.4	74.8	68.2	56.2	43.6	34.4	27
Parkersburg	32.9	32.6	43.1	53.0	63.5	71.5	75.1	73.7	67.7	55.9	44.0	35.1	32
Powellton	36.8	35.4	45.7	54.5	63.9	70.7	74.2	72.9	67.1	55.9	44.7	36.5	25
Terra Alta	27.8	27.8	39.0	47.2	59.0	65.8	69.1	67.9	62.3	51.9	41.5	30.0	27
Union	32.6	33.1	43.0	50.6	60.8	67.0	71.0	70.6	65.1	54.1	41.0	31.9	17

WISCONSIN

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Barron	9.4	11.5	26.2	42.7	53.4	63.6	68.3	64.9	57.9	45.0	30.0	16.3	29
Eau Claire	12.6	14.7	29.7	45.9	57.2	66.7	71.1	68.8	60.8	48.8	32.6	18.9	30
Green Bay	15.4	16.5	28.7	45.0	54.6	65.3	70.1	67.6	60.6	48.7	34.3	22.3	34
Hayward	9.1	10.7	25.0	42.1	53.1	63.3	67.4	64.4	57.3	45.4	29.7	16.2	31
La Crosse	15.5	19.8	31.7	47.4	59.1	68.2	72.8	70.1	61.8	50.1	34.7	22.7	48
Madison	16.6	18.6	31.0	45.6	57.4	67.1	72.1	69.7	62.1	50.2	35.3	22.4	42
Medford	12.1	13.5	26.9	42.5	53.9	64.6	68.6	66.3	58.8	46.1	30.4	17.9	30
Milwaukee	20.4	22.1	32.0	43.4	53.7	63.7	70.0	69.0	62.2	50.5	36.8	25.6	50
Minocqua	9.5	10.9	24.4	38.8	52.0	63.0	67.4	64.1	57.3	45.1	30.5	16.2	17
Prairie du Chien	17.2	19.4	33.2	48.2	59.8	69.0	73.7	70.8	63.4	51.9	36.4	23.2	33
Waupaca	15.2	15.6	29.6	44.4	56.2	65.7	71.0	67.9	60.4	48.6	33.7	20.1	24

WYOMING

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Length of record (years)
Bedford	17.4	19.3	27.6	37.2	46.0	53.2	59.8	58.6	50.8	40.3	29.9	17.6	20
Cheyenne	25.8	26.6	32.9	41.0	50.6	60.8	66.8	65.6	57.0	45.5	35.0	28.1	48
Dubois	20.6	22.4	28.6	37.0	44.0	52.8	58.8	56.8	48.7	40.0	30.8	21.6	13
Ervay	21.2	22.2	29.6	38.2	47.0	58.2	65.0	63.4	54.0	42.4	32.3	21.6	12
Evanston	20.0	21.0	28.4	38.7	45.9	54.5	61.8	60.5	52.2	41.2	31.1	19.8	23
Fort Laramie	26.0	25.5	35.1	45.5	54.6	64.9	71.6	70.6	60.8	47.4	36.0	26.4	26
Green River	18.6	22.2	33.0	42.2	50.8	60.4	68.2	66.2	56.2	43.1	32.0	18.8	16
Hyattville	22.9	25.4	35.2	45.8	54.2	63.8	70.2	68.2	58.5	46.8	35.9	25.0	21
Lander	19.6	21.7	31.9	42.2	50.7	60.2	66.9	65.4	55.7	43.7	31.2	19.4	29
Laramie	22.2	22.6	29.8	37.6	46.6	56.6	62.9	61.3	53.5	42.0	32.2	21.8	29
Lusk	23.2	23.2	31.8	42.2	51.6	61.5	67.8	66.4	56.6	44.2	33.2	24.3	27
Pathfinder	24.7	24.4	33.3	43.0	52.2	62.8	70.2	68.6	58.7	46.2	35.8	24.3	21
Pine Ridge	17.4	19.8	30.1	43.8	50.3	62.2	69.8	68.8	57.8	46.6	34.5	21.8	15
Rawlins	22.2	23.2	30.8	41.4	50.0	60.4	67.6	65.2	55.2	43.8	33.0	22.1	19
Sheridan	18.9	22.4	32.7	43.4	50.7	61.1	67.3	65.4	56.3	43.7	32.8	22.1	25
Shoshone Dam	26.4	29.0	35.3	44.0	50.8	61.1	68.6	67.5	58.8	48.2	38.8	28.6	15
Yellowstone Park	18.0	19.7	27.0	37.3	45.5	53.9	61.3	60.2	51.4	40.4	29.2	20.7	34

SUNSHINE AND WIND

Source of data.—The sunshine data collected by the Weather Bureau are not entirely satisfactory, because the automatic instruments in use up to the present time do not indicate with sufficient accuracy the different degrees of sunshine intensity. The electrical thermometric recorder is used by the Weather Bureau. This instrument consists essentially of a straight glass tube with a cylindrical bulb at each end, the lower bulb, as exposed for service, being coated on the outside with lampblack. The whole is inclosed in a protecting glass sheath, the space between the inner tube and the protecting sheath being exhausted of air and hermetically sealed. Mercury is used to separate the air in the bulbs, and two platinum wires are inserted into the inner tube about midway between the bulbs, but above the point the top of the mercury column assumes in the absence of sunshine. The ends of the wires within the inner tube are slightly separated, but are so arranged that the electric circuit will be closed by the mercury coming in contact with them. The instrument operates by the expansion of the air in the lower blackened bulb and of the mercury in the tube, when exposed to the heat of sunshine, causing the top of the mercury column to move upward in the tube until it comes in contact with the end of the wires and thus closes the circuit. By this method the record is automatically maintained until in the absence of sunshine the mercury in the tube recedes below the inserted wires, when the circuit is broken.

The instrument is not delicate enough to record sunshine in the early morning immediately after the sun appears above the horizon, and likewise the sun's rays usually become too weak to maintain a record a short time before sunset. In such cases the actual unrecorded sunshine is noted by personal observation, and the records are corrected by adding thereto, when the sun is shining, the interval between the time of actual sunrise and the beginning of the automatic record, and between the ending of the record and the time of actual sunset.

These instruments are located at the first-order stations of the Weather Bureau only, and their records constitute the sole source of data used in the preparation of the several charts.

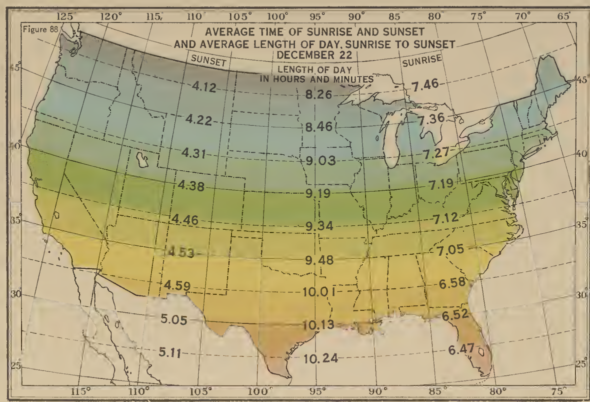


Figure 88 shows for each two and one-half degrees of latitude the average time of sunrise and sunset, mean solar time, and also the average length of the day, sunrise to sunset, on December 22, the winter solstice, and the shortest day of the year. The length of the day from sunrise to sunset, corresponding to the possible amount of daily sunshine, varies on December 22 from 10 hours and 35 minutes at latitude 25° N., the latitude of the southern end of Florida, to 8 hours and 10 minutes at latitude 49° N., the northern boundary of the United States from Minnesota westward. It decreases with increasing latitude until north of the Arctic Circle the sun does not rise above the horizon

Length of day and possible sunshine.—Sunshine data are usually expressed as the actual number of hours of daily sunshine or in percentage of the possible amount. Figures 88 and 89 show for the United States the possible amount of sunshine or length of the day from sunrise to sunset, for each two and one-half degrees of latitude, on December 22 and June 21, the winter and summer solstices, respectively, and the shortest and longest days of the year. At the time of the equinoxes, about March 21 and September 22, the length of the day, or total possible sunshine, is substantially 12 hours in all portions of the world.

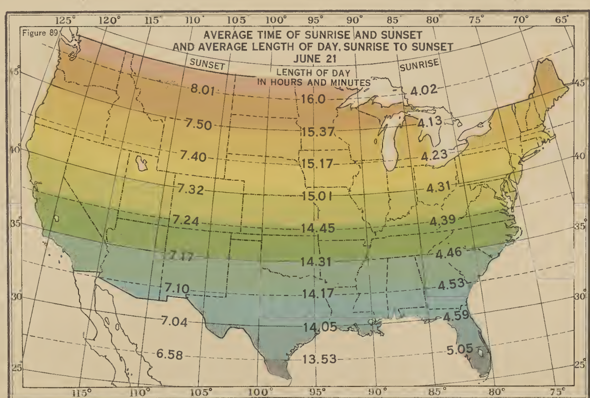


Figure 89 shows for each two and one-half degrees of latitude the average time of sunrise and sunset, mean solar time, and also the average length of the day, sunrise to sunset, on June 21, the time of the summer solstice, and the longest day of the year. The length of the day from sunrise to sunset, corresponding to the possible amount of daily sunshine, varies on June 21 from 13 hours and 41 minutes at latitude 25° N. to 16 hours and 19 minutes at latitude 49° N., increasing with the latitude until north of the Arctic Circle the sun on this day does not set and the day is 24 hours long

The variation in the length of the day from winter to summer increases with latitude. In the extreme southern portion of the United States the days during the latter part of June, or the longest of the year, are only about three and one-half hours longer than during the latter part of December, the shortest days; but in the extreme northern portion of the country the difference is nearly eight hours. On clear days in early summer the extreme Northern States receive about two hours more sunshine than that received in the Florida Peninsula and extreme southern Texas, but in early winter the reverse is true.

Geographic variations in annual sunshine percentage.—For the year as a whole the least relative amount of sunshine in the United States is received along the north Pacific coast, where the averages are only about 40 per cent of the total hours from sunrise to sunset, and in portions of the Great Lakes region and the central and northern Appalachian Mountain districts, where somewhat less than 50 per cent of the possible amount is received. In the remaining districts east of the Mississippi River and in the northern border States from the Great Lakes westward to the Rockies the average annual sunshine ranges between 50 and 60 per cent of the possible amount, except in portions of the Southeastern States, where it is somewhat higher, especially in the Florida Peninsula. Between the Mississippi River and the Rocky Mountains the annual percentage is mostly between 60 and 70, which is true also of the central portion of the Rocky Mountain and interior Plateau regions. The maximum amount of sunshine in the United States occurs in the far Southwest, including extreme western Texas, and portions of New Mexico, Arizona, and California. In southwestern Arizona and the adjoining portion of California the sun shines on the average for the year in nearly 90 per cent of the total number of hours from sunrise to sunset.

Seasonal variations in amount of sunshine.—Figures 90 to 101, inclusive, show for the different sections of the United States, and for each month of the year, the average number of hours of daily sunshine, from which the seasonal distribution of this important climatic factor may be seen. Figures 102 to 105, inclusive, show for the four seasons, winter, spring, summer, and fall, the average percentage received of the total possible amount of sunshine.

Because of the fewer hours of daylight and the greater amount of cloudy weather in winter the amount of sunshine is usually much less than in summer. Not only are there fewer actual hours of sunshine in winter, but the percentage of the possible amount is much less than in summer. This is due to the fact that in winter cyclonic action is more pronounced, and several successive days of cloudy weather may be experienced in the passing of a cyclonic storm, whereas in summer cloudy weather and rainfall are usually of a more local character and fewer entirely overcast days are experienced. During the winter months more than half of the United States, including nearly all districts from the Mississippi Valley eastward and the central and northern districts west of the Rocky Mountains, receive less than half the amount of sunshine that would be received with continuously clear sky. The Great Lakes region, western Montana, northern Idaho, and western Washington receive the least sunshine in winter, the average amount in some of these localities being less than two hours daily, or about one-fourth of that possible. In extreme western Texas, most of New Mexico and Arizona, and in southeastern California the winters are sunny, these districts receiving on the average nearly eight hours of sunshine daily.

With the advent of spring the amount of sunshine increases rapidly, especially in the more northern districts. In portions of the upper Lakes region and of the far Northwest, where in December and January the average daily sunshine is only about two hours, in April it is more than seven hours. The regions of least sunshine during the spring months are along the north Pacific coast, where only about 40 per cent of the possible amount is received, and in the upper Ohio Valley and the northern Appalachian Mountain districts, where somewhat less than half the possible amount occurs. The maximum amount of sunshine during this season is received in the lower Colorado River Valley, where the average for the three spring months is 12 hours a day, or about 90 per cent of the possible amount. Over most of the Great Plains region the average sunshine in spring ranges between 60 and 70 per cent of the possible amount but in most districts to the eastward it is from 5 to 10 per cent less than this.

The increase in the amount of sunshine from winter to summer in the northern portion of the United States is very pronounced. In most of the northern border States there are, on the average, in July, about six and one-half hours more of sunshine daily than in January. In the South the increases are not so large, the daily July excess over January in the central and east Gulf States being only about two and one-half hours. East of the Rocky Mountains the distribution of sunshine in summer is the reverse of winter, as the northern districts receive more than the southern. In much of the central and northern Great Plains there is usually received in July from 40 to 50 per cent more sunshine than occurs along the central and eastern Gulf coast. The minimum amount of sunshine in summer occurs along the central and northern Pacific coast, where at some places only about 40 per cent of the possible amount is received, and along the Gulf, the central and northern Atlantic coasts, and in the Appalachian Mountain districts, where the average amounts are somewhat less than 60 per cent of the possible. The maximum amount of sunshine in summer occurs in the Great Valley of California and over the western portion of the interior Plateau region. The interior of California experiences practically cloudless skies during the summer months, the average daily amount of sunshine in most of the Great Valley being nearly 14 hours, or about 95 per cent of the possible.

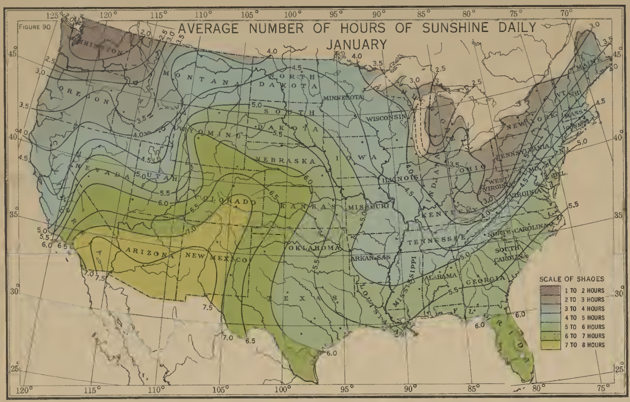
In fall, especially during October and November, much cloudy weather is experienced in the region of the Great Lakes, the upper Ohio Valley, and in the far Northwest. In western Washington the average daily amount of sunshine in November is less than two hours. The largest amount in fall occurs in the lower Colorado River Valley, where the daily average is over nine hours. In most of the important agricultural districts of the country the fall sunshine averages between 55 and 65 per cent of the possible amount.

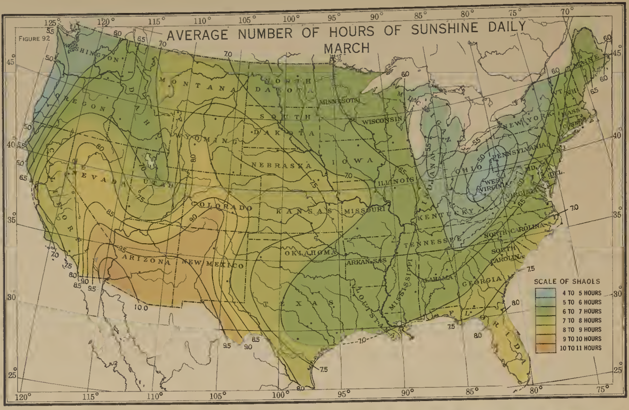
WIND

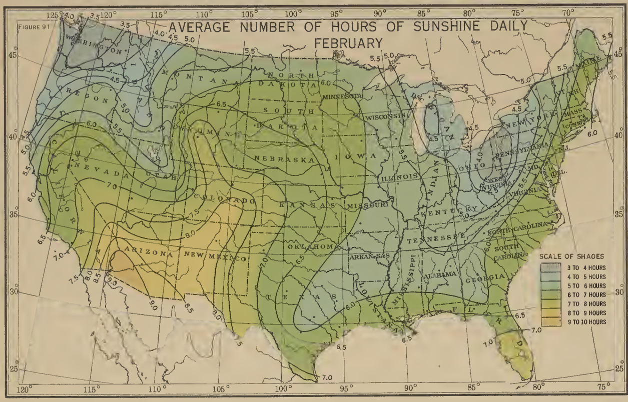
Importance of wind as a climatic factor.—The most important function of wind is the transportation of moisture from the oceans and other large bodies of water to the land, where it is condensed and precipitated in some form of water, for the sustenance of plant and animal life. The surface drift of the wind has also a marked influence on the temperature of many places, especially in localities to the leeward of large bodies of water. The on-shore drift of the wind gives to the Pacific coast region of the United States comparatively warm and equable winters and cool summers. This influence is also felt, but to a much less extent, on the leeward side of the Great Lakes and likewise is in evidence to some extent along the shores of smaller bodies of water.

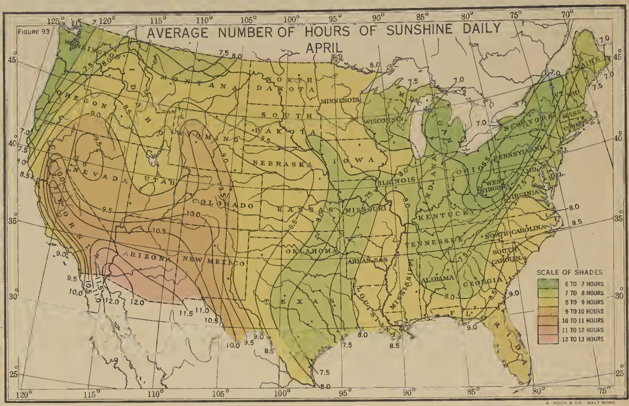
In addition to these climatic functions, air movements have an important physiological aspect. They produce a cooling tendency in all conditions of temperature, by accelerating the conduction of heat from the body and by increasing the opportunity for evaporation, which is a cooling process. The physical effects of high temperatures are very much modified when accompanied by brisk air movement. But a low temperature which may be even stimulating in a calm becomes unpleasant in windy weather.

Source of data.—There are two important aspects of air movement which should be considered in studying the relation of wind to climate, namely, velocity and direction. The average hourly velocities of the wind for the year as a whole in the different portions of the United States are shown in Figure 106, and the average velocities at 3 p.m. local standard time, the approximate hour of greatest wind movement, in Figure 107. These charts are based on anemometer records for the 20-year period 1891 to

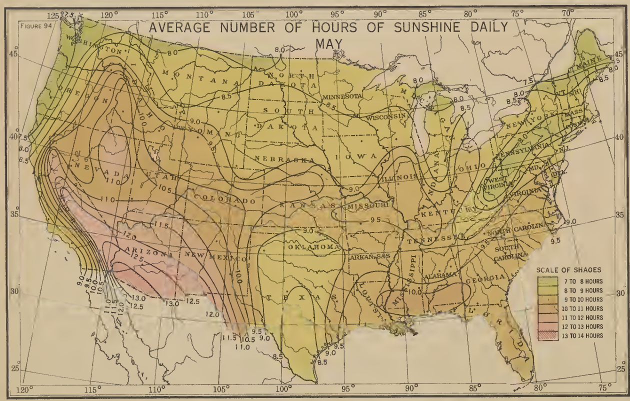


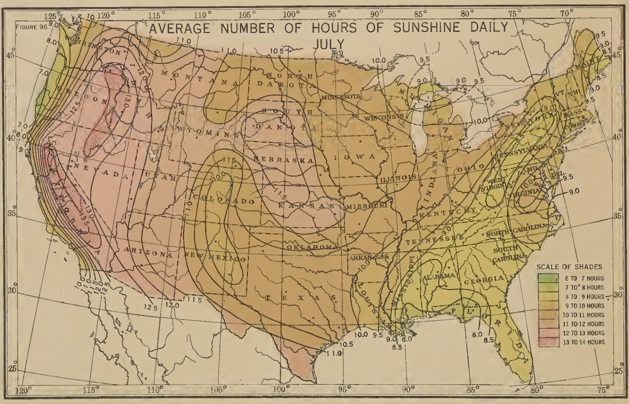


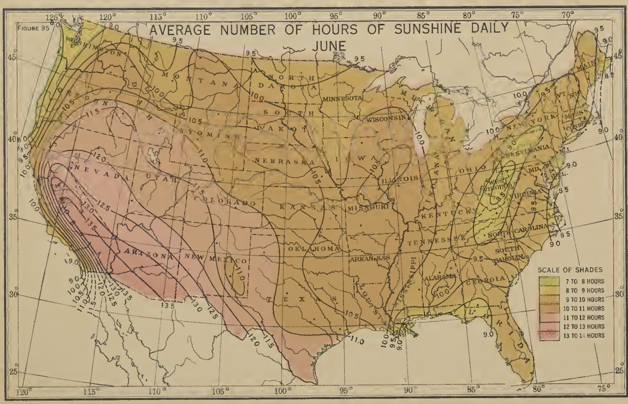


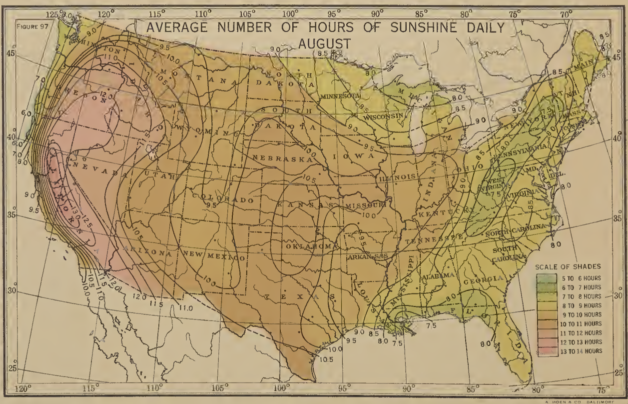


Figures 90 to 93 show for each month, from January to April, inclusive, the average daily amount of sunshine. In winter cloudy weather prevails in the Pacific Northwest and likewise in the region of the Great Lakes. Over most of the State of Washington the average amount of sunshine received in January is only about 2 hours daily and in much of the Lake region it is only slightly more, but in the far Southwest the average daily amount in this month is nearly 8 hours. With the advent of spring the amount of sunshine increases rapidly in the northern portion of the country and less rapidly in the southern. In the Pacific Northwest and in the Great Lakes region the average amount of sunshine daily in April increases to about 7 hours. In the lower Colorado River Valley the sun shines in April, on the average, more than 12 hours daily, which is in excess of 90 per cent of the possible amount. In the central and eastern United States the amount of sunshine in April averages 6½ to 8½ hours per day, except in the northern Appalachian region, where less than 6½ hours are received

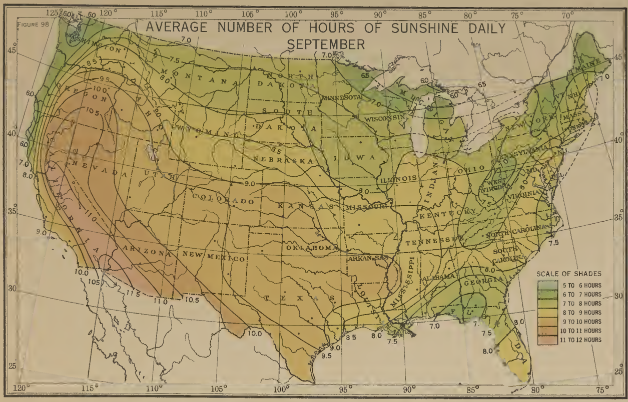


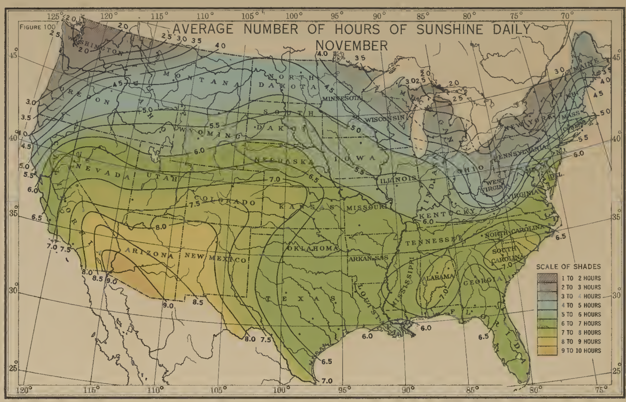


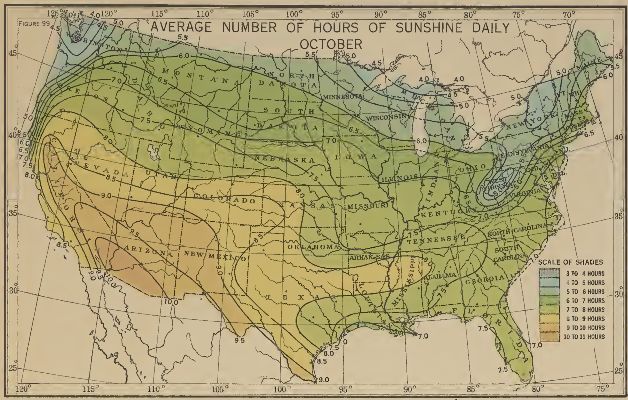


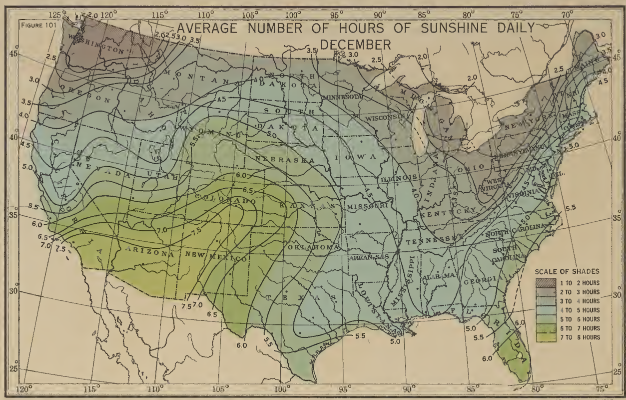


Figures 94 to 97 show for each month from May to August, inclusive, the average amount of daily sunshine. The excess of sunshine in summer over that of winter is much more pronounced in the North than in the South. East of the Rockies the geographic distribution of sunshine in summer is the reverse of winter, the Northern States receiving more than the Southern. In much of the central and northern Great Plains the average amount of sunshine in July is 40 to 50 per cent greater than along the central and east Gulf coast. The fewest hours of sunshine in the summer months are recorded along the north Pacific coast, and in the central Appalachian Mountain region, where about one-half, or slightly more, of the possible amount is received. The maximum number of hours occurs in the Great Valley of California, where there is usually almost continuous sunshine during the summer season, the average daily amount during July and August being nearly 14 hours, or about 95 per cent of the possible amount. In this region the drying of fruit in the sunshine is an important industry

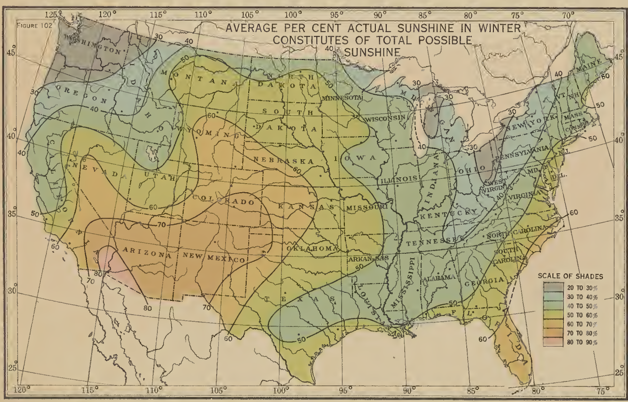


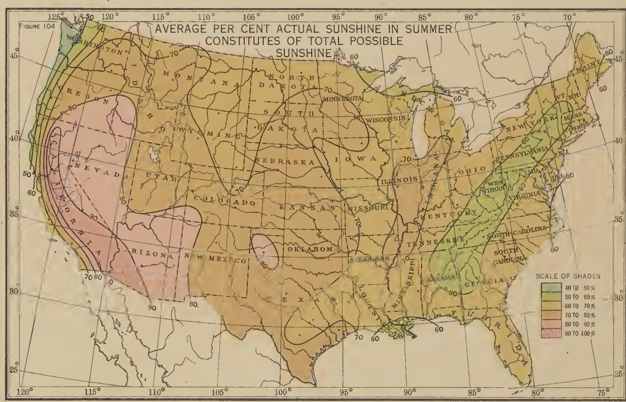


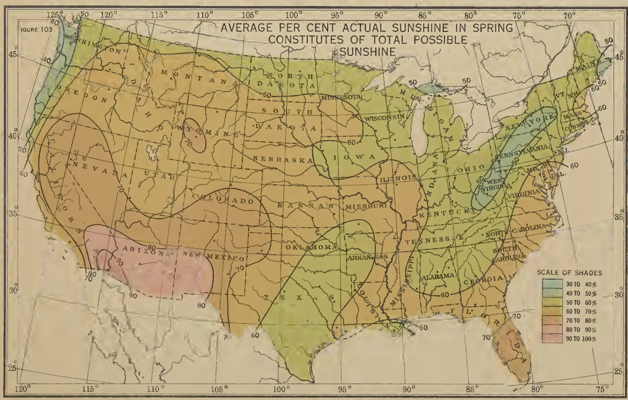


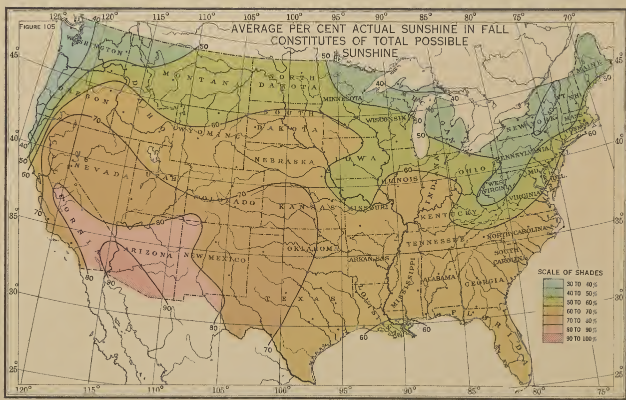


Figures 98 to 101 show for each month from September to December, inclusive, the average amount of daily sunshine. With the advance of fall there is a pronounced diminution in the amount of sunshine in all sections of the United States. This is due to the decreasing length of the days and to the increasing activity of cyclonic storms which often bring cloudy weather to large areas. During November and December cloudy weather is experienced in most of the Lake region and in the far Northwest, where at some points the average amount of sunshine received daily is less than 2 hours. The maximum amount during fall and early winter occurs in the far Southwest, where the average daily sunshine decreases from about 11 hours in September to somewhat less than 8 hours in December. The Mississippi Valley receives, in general, during September 7 to 9 hours of sunshine per day, during October from 6 to 8 hours, during November from 4 to 6.5 hours, and during December from 3 to 5.5 hours, the smaller amounts being in the Northeast and the larger amounts in the Southwest

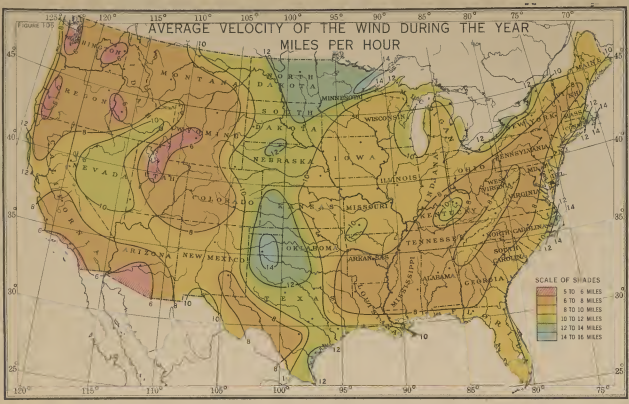


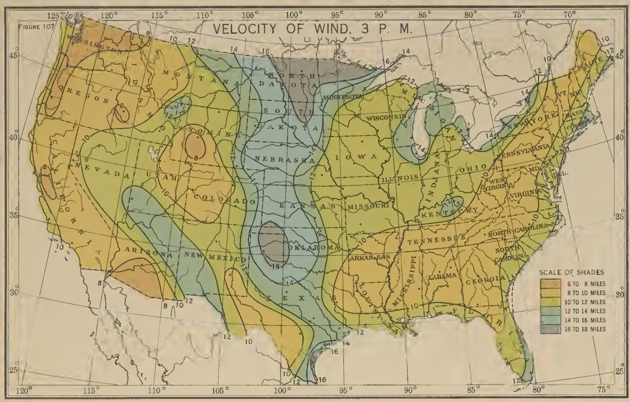






Figures 102 to 105 show for each season, winter, spring, summer, and fall, the average percentage which the sunshine actually received is of the total possible amount. These charts indicate for the different sections of the country the average proportion of the day, regardless of its length, during which the sun shines, and also show the seasonal distribution of sunshine. The minimum amount of sunshine, both actual and percentage of the possible, occurs in winter, when about half the United States, including all districts east of the Mississippi River, except the Gulf and south Atlantic coasts, receives on the average less than half the amount of sunshine that would occur with continuously clear sky. The maximum amount of sunshine, both absolute and relative, occurs in summer, when practically the entire country, except the north Pacific coast and the Appalachian Mountain region, receives more than 60 per cent of the possible amount of sunshine. In the lower Colorado River Valley and in the Great Valley of California the sun shines during the three summer months during more than 90 per cent of the hours from sunrise to sunset





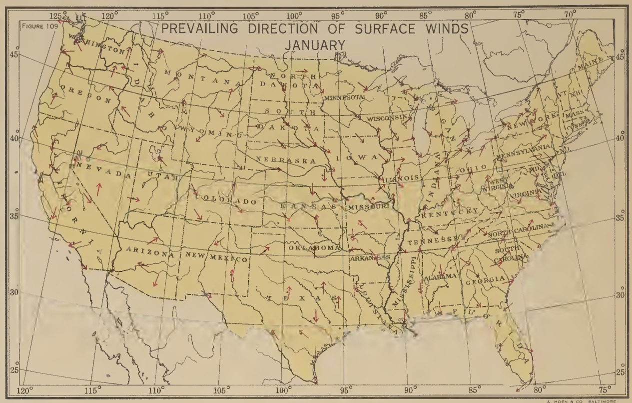


Figure 106 shows the average velocity of the wind during the year in miles per hour, estimated for a uniform elevation of 100 feet above the surface of the earth. As a rule the highest average wind velocities occur in the Great Plains region from northern Texas northward and along the coasts of large bodies of water, where the average velocity reaches 12 to 14 miles an hour. The smallest wind movement occurs, as a rule, in the protected valleys of the West and Southwest, where at some places the average annual velocity is less than 6 miles per hour

Figure 107 shows the average velocity at 3 p. m., which is usually the time of the greatest wind movement during the 24-hour period. The average velocity at this hour is from 2 to 4 miles greater than that for the entire day

Figures 108 and 109 show the prevailing direction of the wind during the months of January and July, respectively, the direction being indicated for each station by an arrow flying with the wind. In winter, winds from a westerly or northerly direction are of frequent occurrence; but in summer, especially east of the Rocky Mountains, southerly winds are, in general, of most frequent occurrence and of longest duration

1910, inclusive, taken at about 175 first-order Weather Bureau stations scattered throughout the United States.

For the first few hundred feet above the surface of the earth wind velocity increases rapidly with increase in elevation, and consequently for observed velocities to be comparable over a large area, such as the United States, the recording instruments should be exposed at a uniform elevation above ground, and as far as possible free from natural or artificial influences that would tend to vitiate the records or render them of purely local significance. Owing to the commercial demands for prompt meteorological information it is often necessary to locate Weather Bureau offices in the centers of large cities, where good exposure for the wind instruments can not be had except by placing them at considerable distances above the ground, and even then the erection of new and taller buildings in the immediate vicinity often interferes with the proper exposure of instruments and renders frequent changes in elevation necessary. In view of these facts an effort has been made to correct the recorded velocities at each station to the velocity it is estimated the wind would have attained at a unifrom elevation of 100 feet above the ground, and applying, in each case where the station is located in a large city, an approximated correction for the city effect on wind movement. These approximated values form the basis for Figures 106 and 107. In the mountainous districts of the west the data refer only to the lower valleys, where practically all the first-order Weather Bureau stations are located. No attempt has been made to show conditions at the higher elevations.

Geographic variation in wind velocity.—Over other than water surfaces the highest wind velocities, as a rule, occur in regions with large expanses of comparatively level land, such as the Great Plains, and along the coasts of large bodies of water. At points along both ocean coasts and in the immediate vicinity of the Great Lakes the average annual wind velocity is 12 to 14 miles, or more, per hour, which is also the case in the Great Plains region, whereas over other districts east of the Rocky Mountains it ranges generally from 8 to 10 miles per hour.

Daily march of wind velocity.—The daily march of wind velocity as a rule, except at high elevations, follows closely that of temperature. the minimum occurring soon after sunrise and the maximum in the afternoon, near the hour of maximum temperature. The average velocity at 3 p. m. local standard time, shown in Figure 107, is from 2 to 4 miles per hour greater than the average for the day, as shown in Figure 106. Figure 110 shows for Dodge City, Kans., representing the interior of the country, the average diurnal march of wind velocity for each month in the year. The action of the sun's heat in accelerating wind movement is clearly shown by this graph, there being a regular increase in velocity with the increase in power of the sun's rays and a corresponding diminution in the wind movement with

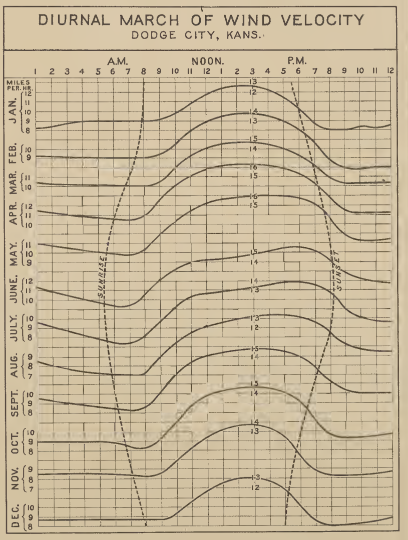


Figure 110 shows for Dodge City, Kans., representing the Great Plains region, the diurnal march of surface wind velocity. This follows closely the changes in temperature from hour to hour, the minimum velocity of the day occurring soon after sunrise and the maximum from two to six hours after noon, varying with the season. In high altitudes the daily march of wind velocity is the reverse of that at the lower levels, the midday winds on Pikes Peak and Mount Washington, for example, averaging only 75 to 85 per cent of the velocity at midnight

decreasing temperature. Near the earth's surface the average increase in wind movement during the daylight hours over that at night ranges generally from 20 to 40 per cent and is more pronounced in arid regions. The daily march of wind velocity in elevated mountain districts is the reverse of that at low altitudes.

Prevailing wind direction.—The normal direction of the surface winds in the United States in January and in July is shown in Figures 108 and 109, respectively. In winter, winds from a westerly or northerly direction are most frequent, but in summer the prevailing direction in most districts is southerly, especially from the Rocky Mountains eastward. The prevailing direction for the year as a whole is from some westerly point in most sections of the United States.

Although practically the whole of the United States lies within the region of the "westerlies," common to all middle latitudes, the weather is largely controlled by the movements of areas of low and high barometric pressure and the attendant characteristic winds peculiar to each. These cause, particularly in winter, the frequent alternation of warm, moist southerly winds, with cold, dry northerly winds, which when severe are commonly called "cold waves."

In addition to these interruptions to the prevailing wind direction there are other special winds of uncertain and irregular occurrence, but with such marked features and of such general climatic importance as to require brief mention. The most important of these are the "blizzard," the " hot winds," and the "foehn" or "chinook." The blizzard is an occasional winter visitor in the northern interior portion of the country, and in exceptional cases extends far to the southward and eastward. It is an intensely cold wind, usually blowing from a northerly direction and accompanied by snow and ice crystals, continuing sometimes for several days. Of directly opposite character are the hot winds, which sometimes visit the interior of the country during hot, dry weather, blowing generally from the southwest with considerable force. In extreme cases they have been described as similar to a blast from a furnace, absorbing the small quantity of moisture in the soil and literally drying up vegetation in the fields. Immense damage may be done in a few hours by these winds during critical periods of crop growth, but fortunately their occurrence is comparatively rare. The foehn, locally known in the western United States as the chinook, is usually a warm, dry wind, and is peculiar to mountain regions. It occurs on the leeward side of mountains and usually begins as a light breeze, but frequently increases to high velocities. The warmth and dryness of these winds rapidly melts and evaporates the snow which makes it possible for animals, exposed without shelter, to obtain food. Their influence at times extends to a considerable distance onto the plains bordering the Rocky Mountains on the east.

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