
CLIMATIC REGIONS OF ILLINOIS

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The purpose of this paper is to present a brief resumé of the characteristics of the two climatic regions of Illinois: the humid subtropical on the south and the humid continental (long summer phase) on the north. Many systems of classifying climates have been advanced by as many climatologists. The system here employed in delimiting regionally the climates of Illinois is that of Koppen. The use of quantitative values for the delimiting of climates has led to the world wide use of his formula or some modification of it.

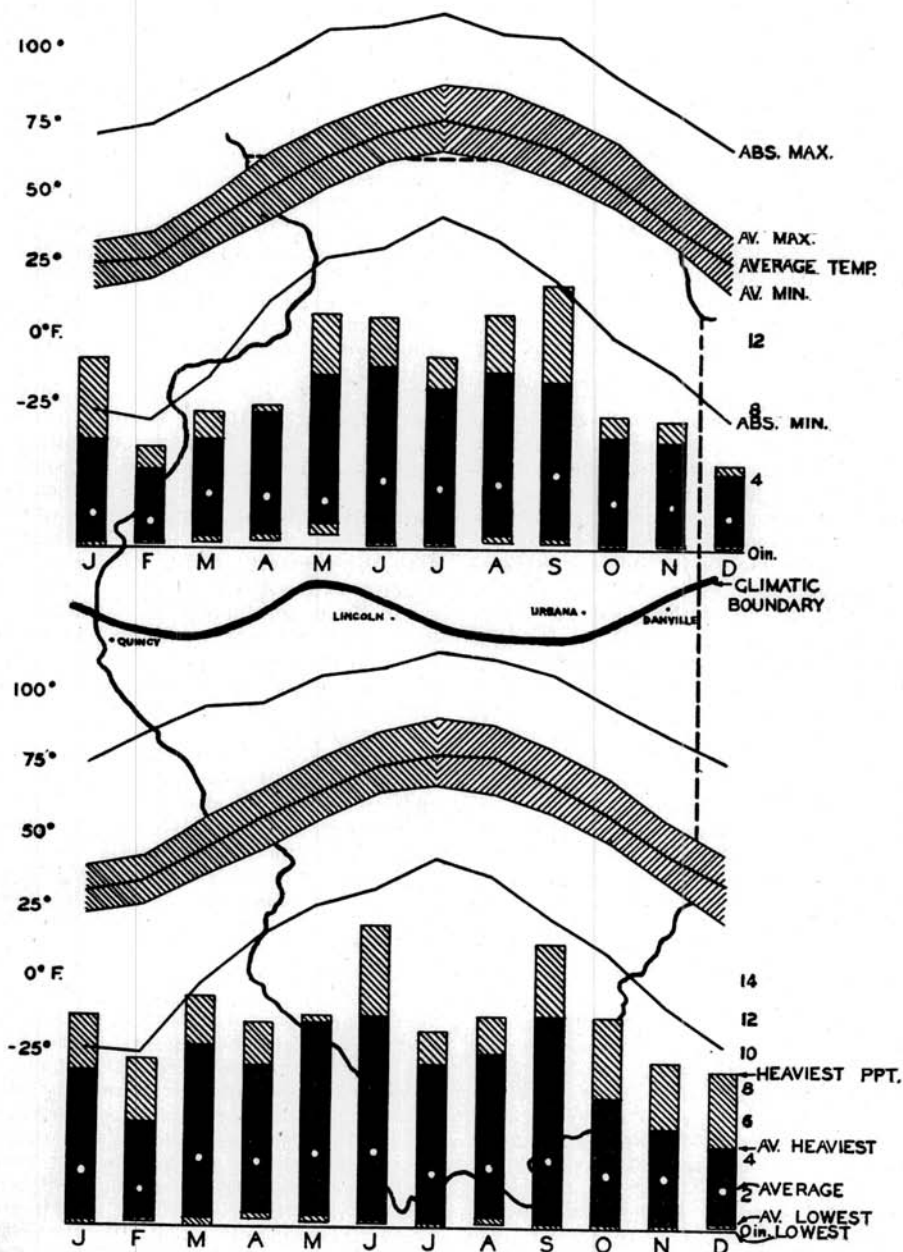
According to the Koppen formula the boundary between the Cfa¹ (humid subtropical) and Dfa² (humid continental) is the 26.6° F. isotherm for the average of the coldest month. This line coincides quite closely with the 40th parallel and passes across the state approximately midway between the northern and southern extremities. With the boundary so situated, the state therefore reflects the

transitional aspect of both types of climate. As a matter of fact, the regions differ more in degree than in kind. For instance, average temperatures decrease gradually and quite evenly from the southern to the northern borders of the state; precipitation also decreases in the same direction. Continentality and latitude make for great annual ranges of temperature in both regions. Summer temperatures differ little, but marked differences are evidenced between the extremes in winter, Cairo's average for January being 16° higher than the January average for the northern extremity.

CFA REGION

Temperature. Although the latitudinal extent of this climate is only 3° the differences in temperature are well marked from south to north, especially during the winter months. Average monthly isotherms assume for the most

TEMPERATURE AND PRECIPITATION CHARTS FOR CLIMATIC REGIONS OF ILLINOIS



Dfa Stations: Bloomington, Chicago, LaHarpe, Marengo, Morrison, Ottawa, St. Louis.
Ofa Stations: Cairo, Danville, Effingham, Mount Vernon, New Burnside, Quincy, Springfield,

part a definite east-west trend, and decrease gradually toward the north, an indication of latitudinal control. January is the month of lowest average temperature for the entire region, 34° being the average, and of great extremes, from -34° ³ to 74° ⁴—a range of 108° . Isotherms representing the absolute minimum and the absolute maximum assume no definite pattern, indicating controls exerted by local topography, its accompanying air drainage, and differential heating and cooling. Of the 32 Weather Bureau stations in the region, 18 have registered their all-time low temperature in January, generally typical of continental areas. The remaining 14, with a February minimum, reflect cold air invasions from northern U. S. and Canada, and air drainage.

Average temperature increases are not so great from January to March because too much heat is consumed in taking frost out of the ground, but from April to July the more direct sun's rays become very effective in heating the entire region. July, with a regional average of 77.7° , is the month of highest temperature. Differences between the averages of the northern and southern extremities of the region are very small during the summer months. Except for two stations⁵ the absolute highest temperatures are recorded in July; the 115° F. for Greenville is the absolute maximum for the region as well as for the State, while 41° is the regional absolute minimum, making the greatest range in July 74° .

Average monthly temperatures begin to decrease very slowly at first, only 1.6° from July to August; then with increased rapidity. Average monthly isotherms maintain the normal wide spacing until December, when they assume the definite close alignment characteristic of the winter season.

Average annual isotherms are evenly spaced and trend in a uniform east-west direction. Cairo's average of 58.3° and Lincoln's 52° make an extreme difference for the region of only 6.3° . The regional annual average of 55° compares favorably with the regional monthly average for April.

Growing Season. Rather marked differences in length of the frost free season are to be found in the region. In the southern tip of the State and along the Mississippi River to St. Louis the grow-

ing season is 200 days and over, long enough to permit successful cotton cultivation. Cairo's 216 days is the longest frost free period in the region; while Lincoln's 165 days is the shortest. The regional average is 186 days.

Precipitation. It seems desirable to consider precipitation characteristics within each region on the basis of summer half year and winter half year.⁶ Isohyets trend in a southwest-northeast direction for all winter months in the region. Cyclonic paths or tracks usually cross Illinois. By the time these storms reach the State they are importing maritime tropical air masses from the Atlantic Ocean and the Gulf of Mexico. Out of a compromise between these competing sources of moisture evolves the isohyetal pattern.

February is the driest month of the entire year, partially because of its length, but also because of southerly paths taken by many cyclones in crossing central United States at this time of the year. March is the wettest month of the winter half year in the entire region, with the greatest amount falling in the southeastern section, where a cyclonic storm from the northwest is likely to unite with a Texas storm in the lower Ohio valley. Seven stations in the southeastern section⁷ have less precipitation during the summer half year than during the winter half.

Summer Rainfall. With the advent of the summer half year the control of precipitation gradually changes from cyclonic to convectional. In the months of May and early June rainfall is the result of both these factors; consequently May is the rainiest month for 3/5 of all stations in the region. For the remaining 2/5, June, September and March are most commonly the wettest.

For most of the summer months convection associated with high temperatures and monsoonal tendencies is responsible for the primary type of rainfall, which as a result, is sporadic in character. July and August suffer droughts occasionally, as do other summer months, as a result of slowly moving, non-rainbearing anticyclones. September is second only to May in receiving greatest average amounts of precipitation. By October, convection's grip is broken by cyclones. For the most part, however, summer half year precipitation varies little through the

entire region, the extreme difference being only 4.3".

Average monthly precipitation is greatest in the southern part of the region because it is nearer the sources of moisture, because it receives convectional showers earlier in the spring and later in the fall, and also because of the merging of lows over the lower Ohio valley. A gradual decrease from south to north and northwest is noticeable. Quincy's 35" is the lowest annual precipitation; Golconda's 47" is the greatest.

DFA REGION

North of the 26.6° isotherm for the coldest month, which coincides roughly with the 40th parallel, is located the Humid Continental climate, long summer phase. The north-south extent is only about 175 miles, but within this short latitudinal distance sharp contrasts in temperature and precipitation are to be found as a result of continentality and paths of cyclonic storms.

Temperature. Extremes of temperature are evident in this region. Mt. Carroll has experienced the lowest temperature ever recorded: -35° F. Continentality, snow cover which permits excessive cooling during the long winter nights, and severe cold waves produce such an extreme minimum. For $\frac{2}{3}$ of the stations February is the month of absolute minimum temperature, January for the remaining third; more snow and snow cover remaining for a longer time make such extremes possible in the region. Lake Michigan exerts enough influence to prevent absolute minimum temperatures in its vicinity from reaching as low a degree as other stations in the region. On the whole January is a month of extremes of temperature. A temperature of 74° has been recorded in the southern section—making an all time absolute range for January of 111°. This is greater than is found in the Cfa region to the south, indicative of higher latitude and of more continental position. However, the greatest extreme difference of temperature from absolute maximum (114° recorded at Bloomington) to absolute minimum for the region is 149°, the same as for the Cfa region.

Except for a definite poleward trend in the immediate vicinity of Lake Michigan, isotherms assume a definite east-west

trend. For January the regional average is about 23.7°. February is 3° warmer, in spite of the fact that 3/5 of the stations record all time lows in that month. By March broader spacing of isotherms indicate a definite warming of the earth by the sun. During April, isotherms for the first time, bend equatorward near Lake Michigan, a trend which is noticed in that locality definitely until June.

Typical of continental regions, July is the month in which highest average as well as absolute maximum temperatures occur. From north to south within this region the July differences in average temperatures are small, only 4°, 75° being the regional average. August for the region is only 2° cooler than July. From September to mid-winter the contrast between months is much more marked. A slight, but decided lag in temperatures is obvious for stations in the immediate vicinity of Lake Michigan from August until late winter, as reflected in the poleward bending of all isotherms near there. For instance, Chicago has an average temperature for December equal to that of Bloomington, 95 miles to the southwest.

Influences of Lake Michigan so apparent in monthly temperatures are not generally noticeable in annual averages. Isotherms have in general characteristic east-west trends, bending only slightly poleward near the lake, and are rather equally spaced. A decrease in temperature occurs from south to north, with a difference between the extremes of the region amounting to only 7°. Havana with 53° has the highest average annual temperature in the region, Marengo with 46° the lowest.

Growing Season. Topographic features and Lake Michigan make for irregularity of isopleths representing the average length of growing season. An ill-defined decrease in length takes place from south to north. Peoria in the Illinois River valley and Chicago on Lake Michigan share the distinction of recording the longest growing season, 187 days. On the average, Chicago has 21 days longer growing season than Aurora, 40 miles westward. Average length of growing season for the region is 167 days.

Precipitation—Winter Half Year. As in the Cfa region, February is the month of least average precipitation in the Dfa region, for the same reasons. April receives more precipitation than any of the

other months in the winter half year group, because cyclones take more northerly courses, thus exposing the region to the rain bearing quadrants of the cyclonic storms. Some convectional showers are evident by April too, as a result of more effective heating by the sun. An irregularity of isohyets reflects this fact.

Precipitation for the winter half year is dominated almost entirely by cyclones which are most highly developed in mid-winter. Averages of precipitation for the entire region in the winter half year are less than for the summer half. The decrease in amount is from southeast to northwest. Of the annual total, 44 per cent occurs during the winter half year in the southern section and only 33 per cent in the northwestern section, a reflection of the more southerly paths of cyclones during the winter.

Precipitation—Summer Half Year. May is not the month with highest average precipitation for the region, but does rank high; for 1/7 of the stations it is highest. The high ranking is caused by well developed cyclones moving along northerly routes and by convectional showers. June

is blessed with ample rainfall as a result of very abundant convection plus some lingering cyclones. Of the other summer months July has less precipitation because weak, semi-stagnant anti-cyclones with low absolute humidity are prevalent then. For ¾ of all stations September is the month of highest average precipitation, and convection is an important cause as indicated by an irregular pattern of isohyets. For the entire summer half year little differences in average precipitation are to be noted within this region. Isohyets trend in a more or less irregular north-south direction.

For the most part average annual precipitation decreases from south to north. Clinton, in the southern extremity of the region, has the highest annual average, 42.7"; Galena with 30.6" has the lowest. With the Dfa region receiving from 56 to 67 per cent of its rainfall during the summer half year, mostly as a result of convection, it follows that an isohyetal map of annual average precipitation would be irregular and indefinite in pattern.

¹ C means average of coldest month over 26.6°F.; f means humid throughout the year; a means average of warmest month over 71.6°F.

² D means average of coldest month under 26.6°F.; f and a same as above.

³ Recorded at Lincoln.

⁴ Recorded at Cairo.

⁵ Duquoin and Jacksonville's all-time highs came in August.

⁶ May to October, inclusive; November to April, inclusive.

⁷ Mt. Carmel, McLeansboro, Shawneetown, New Burnside, Anna, Golconda, and Cairo.