

## The Climate of Illinois from Dinosaurs to Data Chips

Millions of years ago when dinosaurs roamed the earth, Illinois had a tropical climate with marshes and tropical vegetation (figure 1). Our state's coal reserves were formed during this period. But with the ice ages between 10,000 and 1 million years ago came more extreme climate shifts than we experience today.

The ice ages brought glaciers and tundralike conditions to Illinois, and warmer periods (interglacials) brought semi-tropical conditions. During the "Illinoian" glacial period most of our state was covered with ice. In fact, much of northern Illinois was once buried under ice a mile thick. Soil and gravel deposits left by the retreating glaciers (glacial till) became the fertile soils of central Illinois, and they formed the water-trapping aquifers from which we obtain most of our drinking water. We are currently in an interglacial period, but another ice age may occur in a few thousand years.

A combination of science and detective work were required to reconstruct what we know of Illinois' climate before instrumental records of weather and climate were kept. Scientists pieced together the information from various sources such as personal diaries, tree rings, diets of earlier people, ancient soils, pollen records, fossils, and surface landforms. Climate information obtained this way is far less precise, however, than an instrumental record.

For instance, temperatures in Illinois between 5,000 and 8,500 years ago were several degrees warmer and precipitation was probably less than today. This warmer, drier climate prompted a change from stands of forests to vegetation characteristic of prairies.

From 700 to 1100, temperatures were again somewhat warmer than they are today but probably less than during the previous warm period. During this 400-year period, the Vikings discovered and colonized Greenland, and in Illinois the Cahokia people built Monk's Mound near the present town of Cahokia. The Illinois site remained viable until about 1200, after which the Cahokia culture disappeared, presumably because of a cooling of the climate.

The period from 1550 to 1880 is known as the "little ice age," and temperatures were much colder than today. For example, 1816 has come to be known as the "year without a summer" because frost was reported each month in New England and snow even fell in the summer. Temperatures and precipitation in Illinois are thought to have undergone similar swings.

### Modern Recordkeeping

For more than 100 years, the Illinois State Water Survey has kept instrumental records of our state's weather. Illinois' climate can be expressed as an average of this entire period or as an average of a smaller time

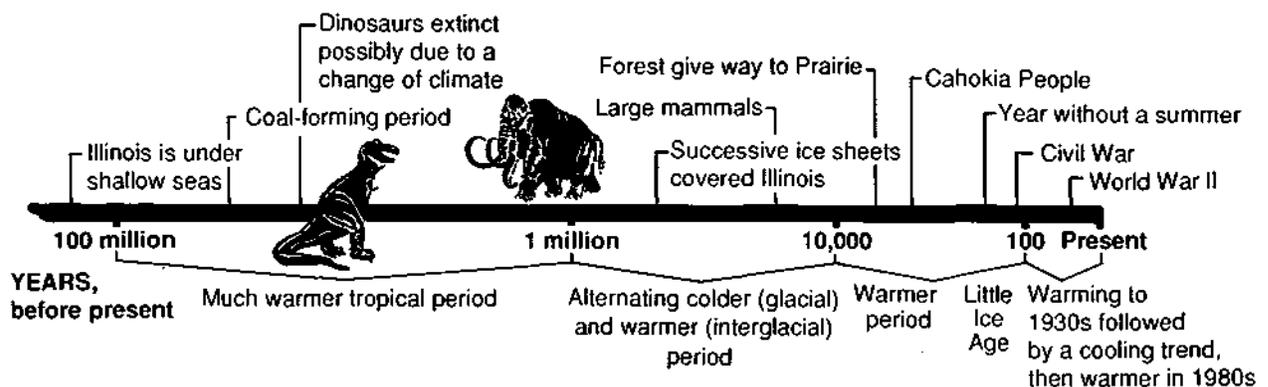


Figure 1. If the history of the earth were contained in a 24-hour day, the period from 100 million years ago to the present would account for only 10 minutes.

segment. Climate is often expressed as the most recent 30-year average or "normal," the standard average to which meteorologists compare daily, monthly, and yearly conditions.

Thermometers and raingages have been relatively common in Illinois since the mid-1800s. Observations of cloud cover, winds, pressure, visibility, etc. only began with the advent of aircraft (circa 1930) because of aviators' special needs for this type of information. Today there are more stations than when recordkeeping began. In addition to airport stations in Illinois, the National Weather Service maintains a network of about 200 cooperative observers in Illinois, and the Illinois State Water Survey operates another network of 20 automatic stations.

Based on this instrumental data, the mean annual statewide temperature of Illinois (the average from all stations operating in the state for a given year) has warmed by about 2.5 degrees between the Civil War era (1860s) and the Dust Bowl era (1930s), and then cooled about 1.5 degrees thereafter. The high temperatures (figure 2) combined with drought in Illinois and on the Great Plains brought great devastation during the 1930s.

Since 1980 there has been another wanning, but whether this represents a continuing trend in climate is still speculation. The temperature trends shown in the Illinois record are also apparent for North America and the Northern Hemisphere, but they are less pronounced than trends in Illinois. Although mean annual statewide precipitation exhibits no such trends, the very wet and dry years seem to recur at 5- to 15-year intervals.

Climate characterizes average conditions and while there may be trends (warmer, cooler, wetter, or drier), inherently weather and climate also have a natural variability. Within the last 15 years Illinois has experienced a continuing series of all types of weather extremes in all seasons. Examples include record cold winters (1977-1981); the wettest 5-year period of this century (1982-1986); three extreme summer droughts (1983, 1988, and 1991); record high summer temperatures (1980 and 1985); and extreme storminess with many heavy rainstorms, tornadoes, and winter storms throughout the 15-year period. This active period of variability and extremes contrasts markedly with the "quieter" period of the 1960s and early 1970s, but is similar to that of the 1940s and 1950s.

The great variability of climate in Illinois from season to season, year to year, decade to decade, and century to century has made it very difficult to detect major, long-term shifts. (Envision trying to measure the depth of water in a leaky pail in which someone is adding water while someone else is hitting its sides). Natural causes have always been responsible for shifts in the earth's climate.

And now with the alleged enhanced greenhouse warming, human activities may be added as another mechanism of change. Global climate models, which may or may not be accurate, predict major changes in the midwestern climate. These changes will bring more extremes and generally warmer, seasonally wetter/drier, and stormier conditions—at least for the next 100 years. *(Portions of this fact sheet were contributed by Wayne Wendland, State Climatologist for Illinois.)*

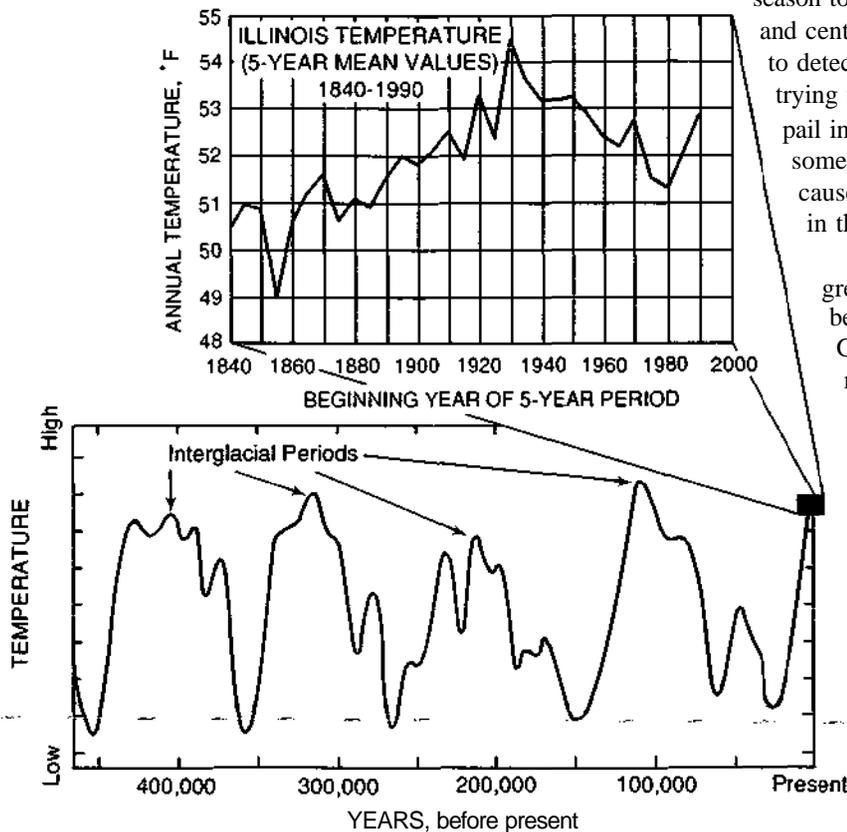


Figure 2. Past temperature fluctuations and temperatures in Illinois from 1840 to 1990.