

Indiana's Probable Climate During the Glacial Period

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My volumes *Climate of Indiana* (1944), *Climatic Atlas of the United States* (1954), *Climate Changes, their nature and causes* (co-author) (1922), and several papers afford considerable basis for the following surmises concerning the probable climate of Indiana during the Glacial Period.

Indiana's climate then was far less different from the present climate than most people suppose. It surely then, as now, was "continental," that is characterized by sharp contrasts between winter and summer. The summers were relatively warm much of the time, inducing rapid melting and permitting considerable vegetative growth in areas not ice-covered. The winds blowing off the icesheet were relatively cold and strong, and as their temperature rose, as they blew down off the icesheet and were warmed by the ice-free land, their relative humidity dropped sharply. Hence, they were drying winds. There is much evidence that considerable wind erosion occurred on the bare areas near the margin of the icesheets, especially when they were melting away rapidly, and their margin was retreating. Much wind erosion also occurred along the valleys of rivers whose wide floodplains were water-covered in summer but were largely bare in winter. Deposits of wind borne materials known as loess were partly a consequence of these strong winds blowing off the icesheets or of strong westerly and north-westerly winds in winter blowing across the silt-covered valleys of rivers flowing out from the icesheets. Considerable loess deposits accumulated just east of the lower Wabash Valley. When the winds blew northward onto the ice, as they very frequently did, the cooling induced by the ice and by the rise in elevation to get onto the icesheet, caused much precipitation near the ice margin. Doubtless snowfall was much heavier than now, and the rainfall heavier also. The rain falling on the ice supplemented the summer warmth to increase runoff, which was very rapid. In Indiana, many streams flowing out from the icesheets were torrents during the warmer months. The Wabash River "sluiceway" is clear evidence of this, as are the vast valley fillings downstream from the "sluiceway" and elsewhere. The very extensive deposits of glacial gravels along such Indiana valleys as the White, Whitewater, Wabash, Tippecanoe, Eel, and Kankakee are also indications of vast runoff.

Indiana's climate was clearly of the humid type, as now, rather than semi-arid or arid. Doubtless the rainfall was greater than now, and the snowfall greater during the colder months.

Then as now, there surely were frequent changes of weather from day to day, associated with the passage across the state of cyclonic disturbances or air masses. The day-to-day changes were greater than at present because winds from the north, from off the icesheet, were

colder than now, while winds from the south were almost as warm as now.

The length of the frost-free or growing season doubtless was shorter than at present because of the sharp cooling that occurred for a considerable distance from the glacier as a result of the off-the-icesheet winds, which prevailed approximately a third of the time.

The air-mass fronts frequent along the glacial margin increased thunder storms and their intensity. Cloudiness was greater than at present in much of the state when southerly winds blew. But conversely, near the glacial margins, when the drying winds blew off the icesheets the sky was clear; and an almost blinding glare was reflected by day from the snow-covered areas.

Instead of the climate being much colder than at present, the average temperature of the year was only about 20 degrees lower than now, about 32° instead of 52°. When the average temperature was below 32°, the icesheet expanded, when higher than 32° it decreased. In the areas which were not ice-covered, considerable vegetation grew except where exposure was brief. This is proven by many remaining logs covered by the advancing ice. The numerous fossils found buried under glacial deposits, in bogs or in loess near the ice margins also prove that climatic conditions were less severe than many people have believed. The sizeable area in southwestern Wisconsin and small bordering parts of Minnesota, Iowa, and Illinois which was not covered by the ice contained a varied flora and fauna throughout the glacial period. There is considerable evidence that the unglaciated part of Indiana, the south-central part, was similarly inhabited. Men lived very close to the glaciers in Europe.

During the interglacial epochs, the climate differed little from the present, though one was drier and another was warmer than recent decades.