Local Climate Analysis: Kirksville, MO

By Jessica Lopez



Truman State University

PDAT 622G - Fall 2026

Introduction

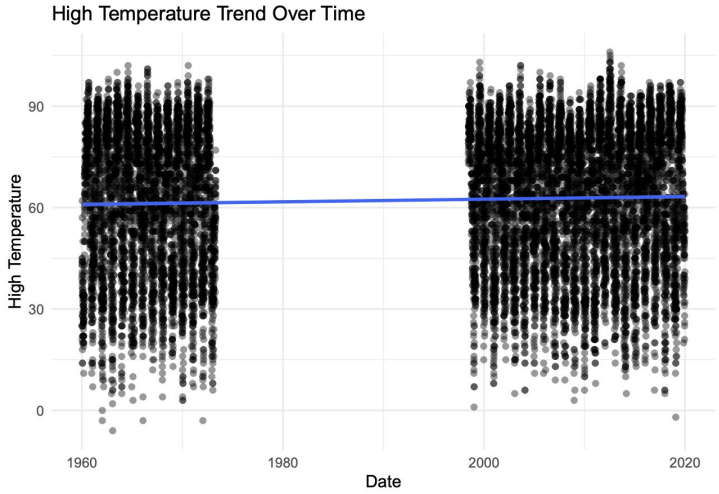
This is a study on the effects of climate change determined by an analysis of temperature data in Kirksville, MO from 1960-2020.

The dataset (CSV file) was retrieved from the National Oceanic and Atmospheric Administration (NOAA) data page.

This will determine the public warnings and environmental actions needed in the upcoming seasons for the City of Kirksville.

Missing Data

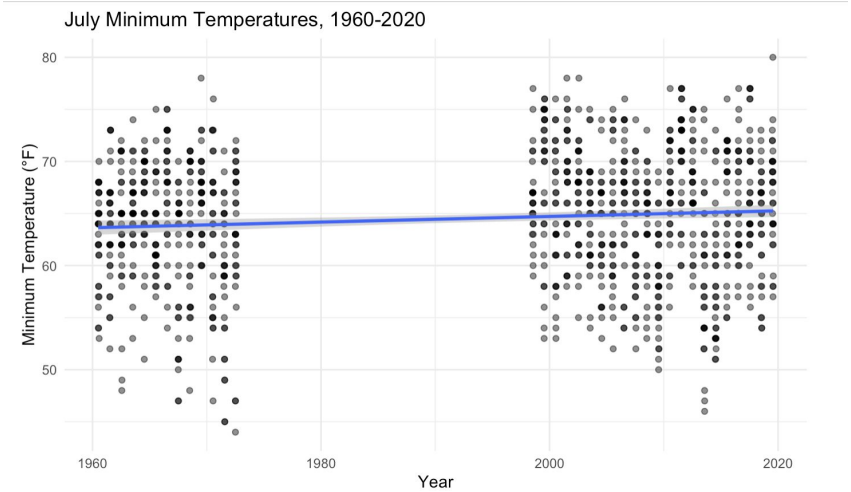
It's important to note there is missing data from 1973 to 1989. This is missing from the raw data set and is apparent on all graphs. This fact needs to be taken into account when doing analysis.

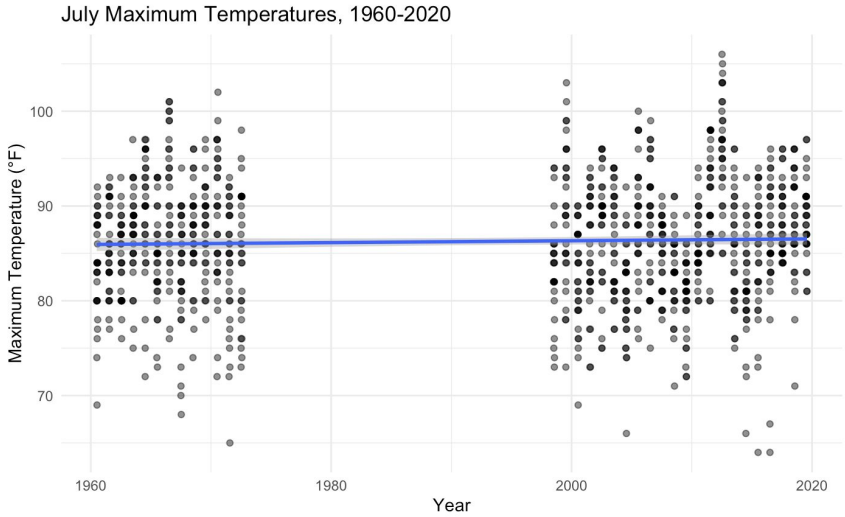


July-Dec Analysis

In order to determine the effect of climate change in Kirksville, I began by analyzing weather data from 1960 until 2020. I used R code to create scatter plots of high and low temperatures for the months of July and December, based on those months being the hottest and coldest months of the year.

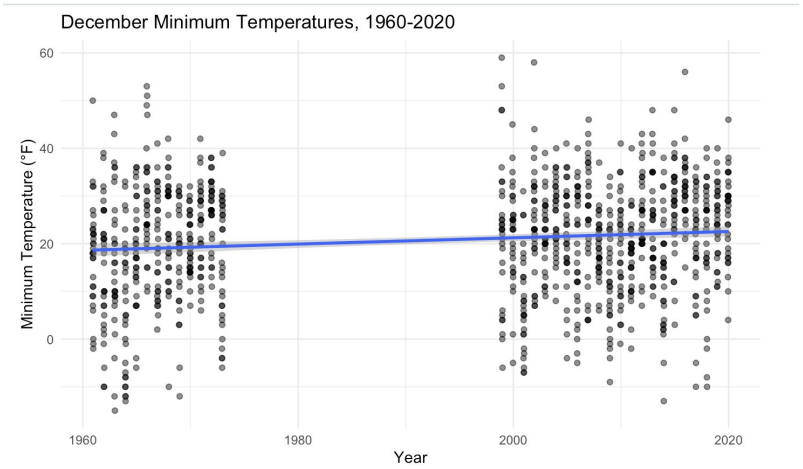
July - Typically the hottest month of the year

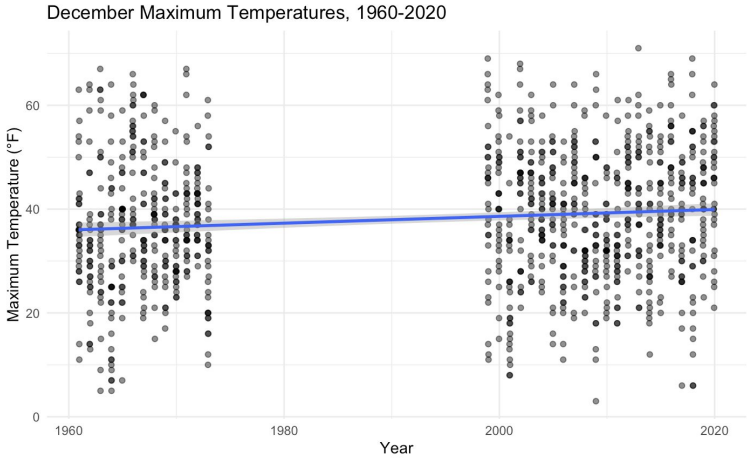




The next two graphs are of monthly analysis (July), part 1 and part 2. I decided to show only the max temperature data points from the months of July. On both graphs, the July temperatures after 1989 have a greater standard deviation than before 1973. The mean lines of each graph also increase steadily. **July is usually one of the hottest months of the year and the graphs prove it, as temperatures are mainly between 80 and 90 degrees with high variation.**

December - Typically the coldest month of the year



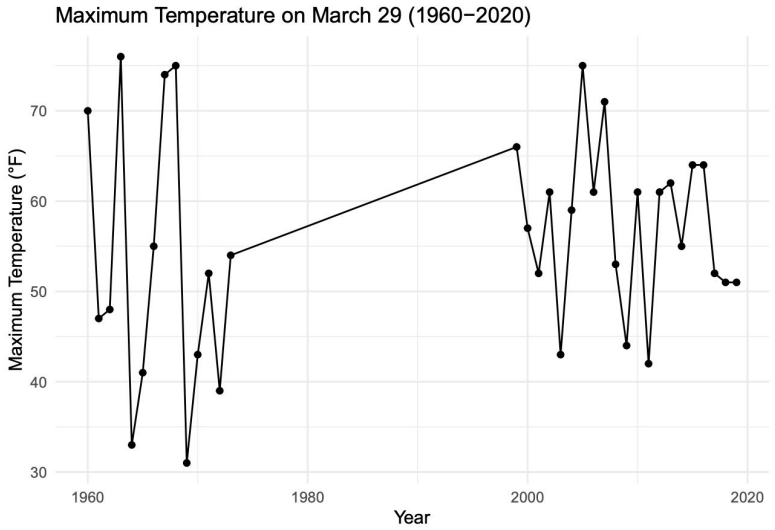


The part 1 and part 2 July graphs pair well with the next 2 graphs of December. I mainly included the December temperature comparison to track the cold months and the occurrences of ice and snow. **December temperatures show a greater standard deviation after 1989**. The mean temperature line, especially on the part 1 graph, increased significantly. My conclusion from this is that **December is trending to colder temperatures, indicating signs of climate change.**

Birthday Analysis

I chose one day out of each year, March 29 (my birthday) to track.

On the one day that I tracked, March 29, there was no temperature below 40 degrees after the year 1989. The plotted temperatures actually have less standard deviation after 1989, which was contrary to my prediction. What did match my prediction, however, was that the overall temperatures rose collectively from the period prior to 1973 and after 1989.



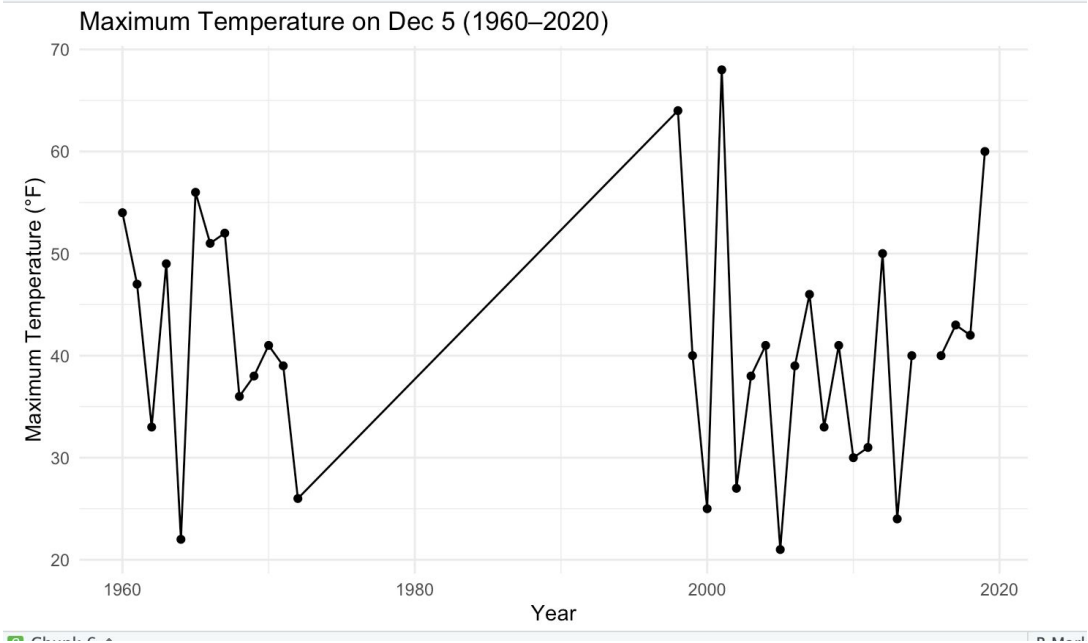
Changing Variation

In my analysis of the temperatures from 1960-2020, the graphs show that the summer months are getting hotter and the winter months are getting colder. **The indicates an increase in temperature variation.**

However, the birthday analysis did not align with the rest of the data and showed less variation after 2000. To examine further, I choose a different day to test for variation. This day is December 5.

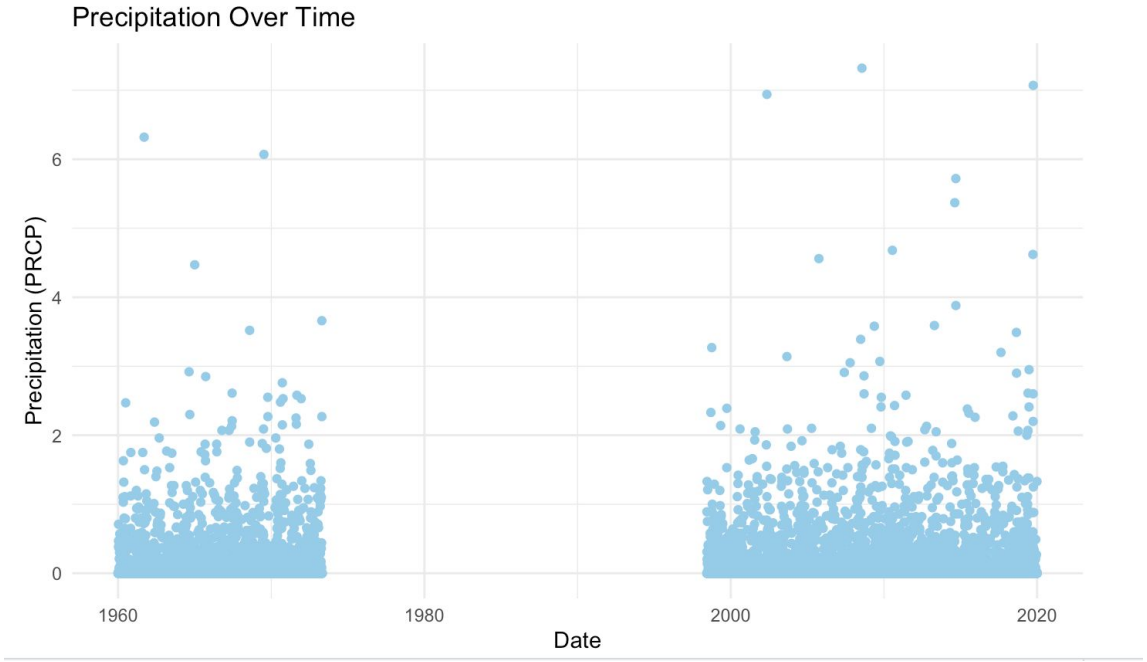
The December 5 graph shows there was a large variation in high temperatures.

Since most of the data shows an increase in variation, it is safe to say that **climate change is having an increasing effect on the city**.



Precipitation

In my analysis with precipitation, I found that there was more data with high variation of rainfall after 2000 than before 1980.



City Actions

Based on the data I reviewed, I can see that temperatures have been rising during summer months and decreasing in winter months. The standard deviation has been regularly increasing, which proves that climate change is verifiable. It can impact the city of Kirksville in several ways:

- Effects of higher temperatures in summer include an increased need for excessive water for crops and grass (shown with July graphs).
- Bodies of water, like lakes and rivers, will be shallower, impacting wildlife and vegetation.
- Pools will also be able to stay open later in the year due to increased heat in the fall.
- Since winter months will be colder, there will be more snow and ice (shown with December graphs). This could impact traffic, snow removal, salt deposits, school closures, etc.

Public Warnings

The **public should be aware of the effects of climate change in Kirksville** and the possible incoming warnings when the temperature hits an extreme low or high point and causes issues in the city. This warning could be with snow and ice issues or in summer months drought and low vegetation. Extreme circumstances like floods, tornados or severe weather **should be announced to the public** along with **precautionary information** like evacuation, road closures or emergency services.



Credits

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