Exploring Weather Trends: Chicago

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Introduction

Weather temperatures tend to constantly change in infinitely many ways. This project consists of graphing and analyzing two sets of historical annual temperature trends: the global temperatures and local temperatures from a particular city. In here I am going to compare the global temperature trends with those of Chicago, IL, the city where I pursued my master's degree. The steps taken for this project involve querying through weather databases in order to acquire the dataset of the global temperatures as well as the Chicago temperature sets. Then, using Excel, I would calculate a moving average for the annual temperatures in each dataset. After that, I plot the moving average temperatures for each of the two categories and document their similarities and differences over the years.

Methods

In SQL, I wrote two queries: one to get the global annual temperatures and another to get the Chicago annual temperatures.

```
select *
from global_data
```

```
select *
from city_data
where city = 'Chicago'
```

Once I exported my results to CSV, I started calculating the moving averages of the temperature

variables. Since the average temperatures were recorded over the last three centuries, I

decided to make the moving averages span over 10 years. I calculated the moving averages by

first taking the average of the first 10 observations [=AVERAGE(B2:B11)]. Then, I double clicked

on the Excel fill handle so that it computes the rest of the moving averages up to the last

observation. Once I performed these calculations on both datasets, I moved the years and the

moving averages for both datasets to one spreadsheet in order to create a line chart.

Results
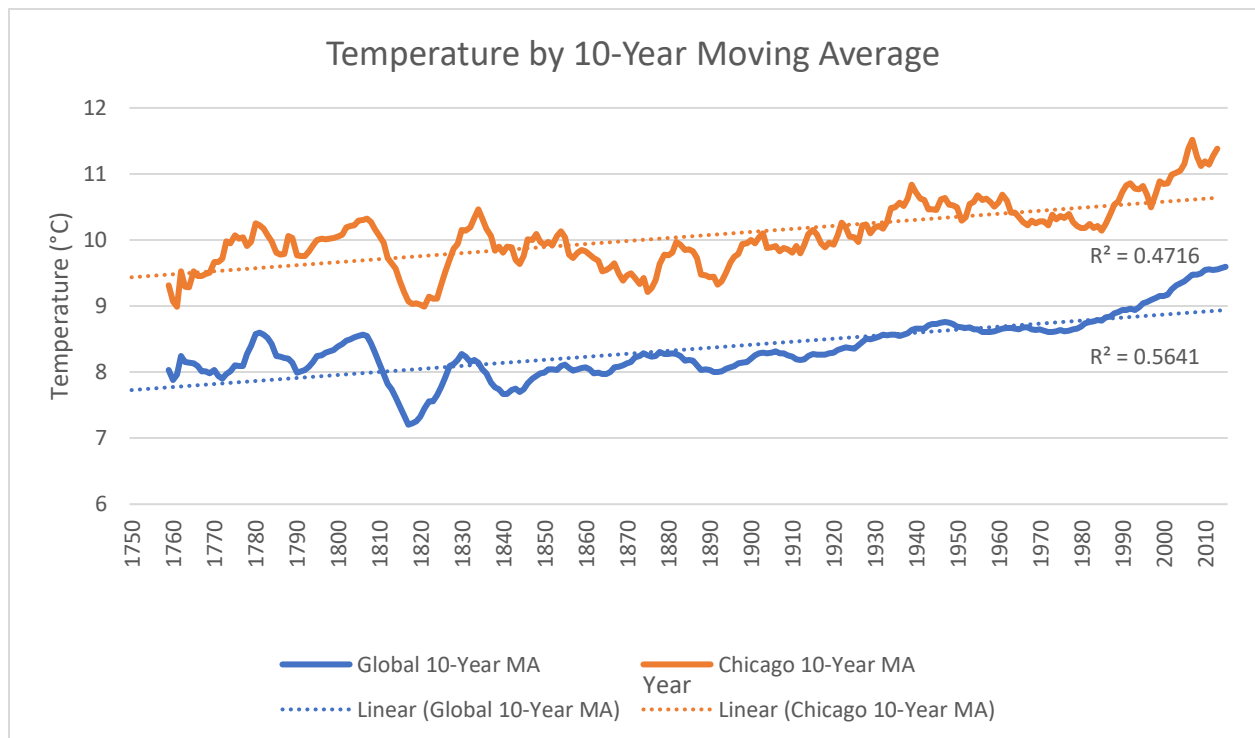
The line chart above shows the moving average trends for historical annual

temperatures in the world and the city of Chicago. At first glance, the Chicago moving average

is always higher than that of the global moving average. Additionally, the correlation coefficient

for Chicago is lower than that of the global series but not significantly different. In other words, the lines are parallel to each other during the whole course of time. Furthermore, Chicago is generally warmer compared to the global average ever since the beginning. This difference is consistent over time as both series increase steadily since the 1890s.

The changes in Chicago temperatures are similar to that of the global temperatures. The patterns for the first 80 years are pretty much the same, including the 1810-1830 period where there was a plunge in average temperature. Furthermore, the correlation coefficient for Chicago is lower than that of the global temperatures. This implies that the global moving average series is smoother than that of Chicago's, especially after 1830. Despite these observations, the temperature increase patterns similarly increase until the present day.

The overall trends indicate that temperatures are getting hotter in Chicago and the world. In the present day, there is almost a 2-degree increase in average global temperature compared to mid 19th century. Chicago, which had a consistent increase in temperature since 1900, has increased about 1.2°C since then. It seems that these annual temperatures indicate evidence that the earth is warming up as well as in local cities.

Conclusion

From the analysis comparing Chicago temperatures to the global temperatures support the fact that the earth is getting warmer every year. The steady increases over the past decades suggest that those temperatures will keep increasing in the years to come. This means that Chicago will have warmer winters and hotter summers while the earth will experience cities with record temperatures in the northern hemisphere as well as other natural disasters, such as hurricanes and wildfires, that will form as a result of these temperature increases. Even though

this is a comparison between one city with the global temperatures, it would be great to support global warning trends by adding a few more cities to the chart.