Exploring Weather Trends

Comparing Austin, TX and Global Temperature Changes

Luisa Mayorga

Introduction

In this project local and global temperature data was extracted from a database and analyzed. The yearly temperature in Austin, TX was compared to global temperature trends.

Fire: Jose A. Bernat Bacete/Getty, Skyline: David Hensley/Getty via Texas Monthly: Being Texan

Goals

1. Extract data from the database and export as CSV
2. Create a line chart with local and global temperature trends
3. Makes observations based on trends

Tools Used

- SQL
- Microsoft Excel
- Udacity database

Process

STEP 1 - Extracting Data from Database

The following SQL query was used to extract city level and global data exported to CSV.

- Joining city_data and global_data to extract city level variables for Austin:

```
SELECT c.year,c.avg_temp AS city_temp, g.avg_temp AS global_temp
FROM city_data c
JOIN global_data g
ON c.year=g.year
WHERE city='Austin';
```

STEP 2 - Creating a Line Chart

A line chart comparing Austin's temperatures with global temperatures was created. The moving average was used rather than the yearly averages to smooth out lines and make trends more observable.

The line chart and moving averages were calculated using the following method:

1. A column titled "25-year MA" was created for the moving average field to be stored.

2. The 25-year moving average was calculated using the following technique:
    a. The 25th year was selected and the function AVG() was used to calculate the average for the first 25 years of recorded temperatures provided in the database as seen in Table 1.
    b. The formula was then copied through the column to calculate the moving average for the remainder of the 25-year increments as seen in Table 2.

Table 1: Calculating 25-year moving average in single cell

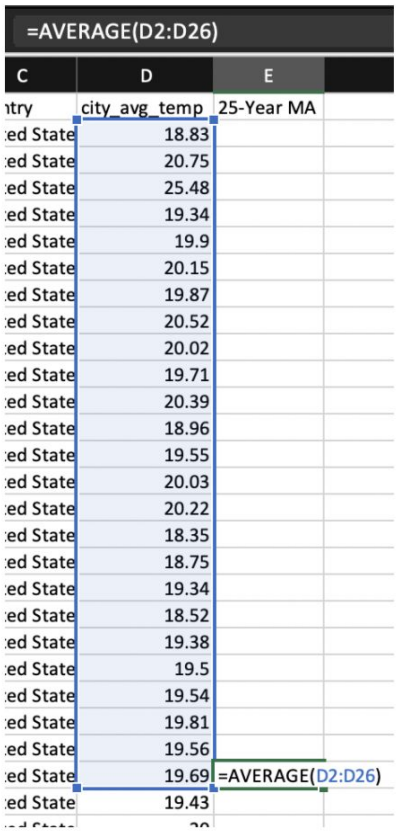
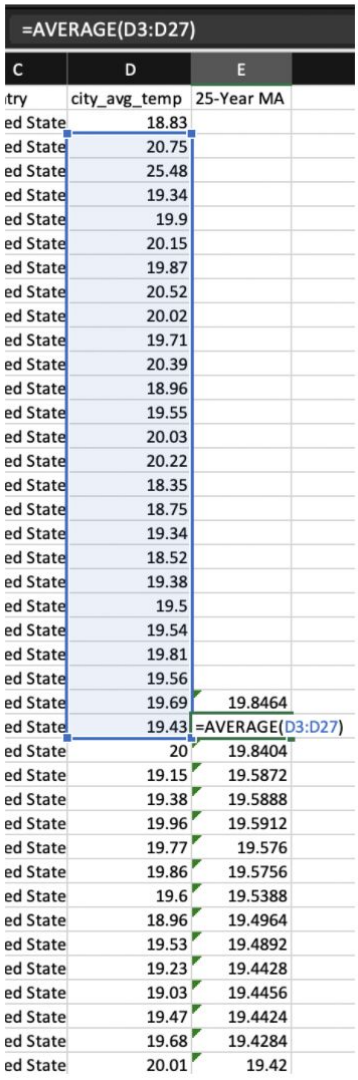


Table 2: Calculating 25-year moving average in remaining cells of column



3. Steps 1-2 were repeated to calculate the 25-year moving averages for global temperature data.

4. The resulting 25-year moving averages were plotted in a line graph for both Austin and global temperatures as seen in Figure 1.

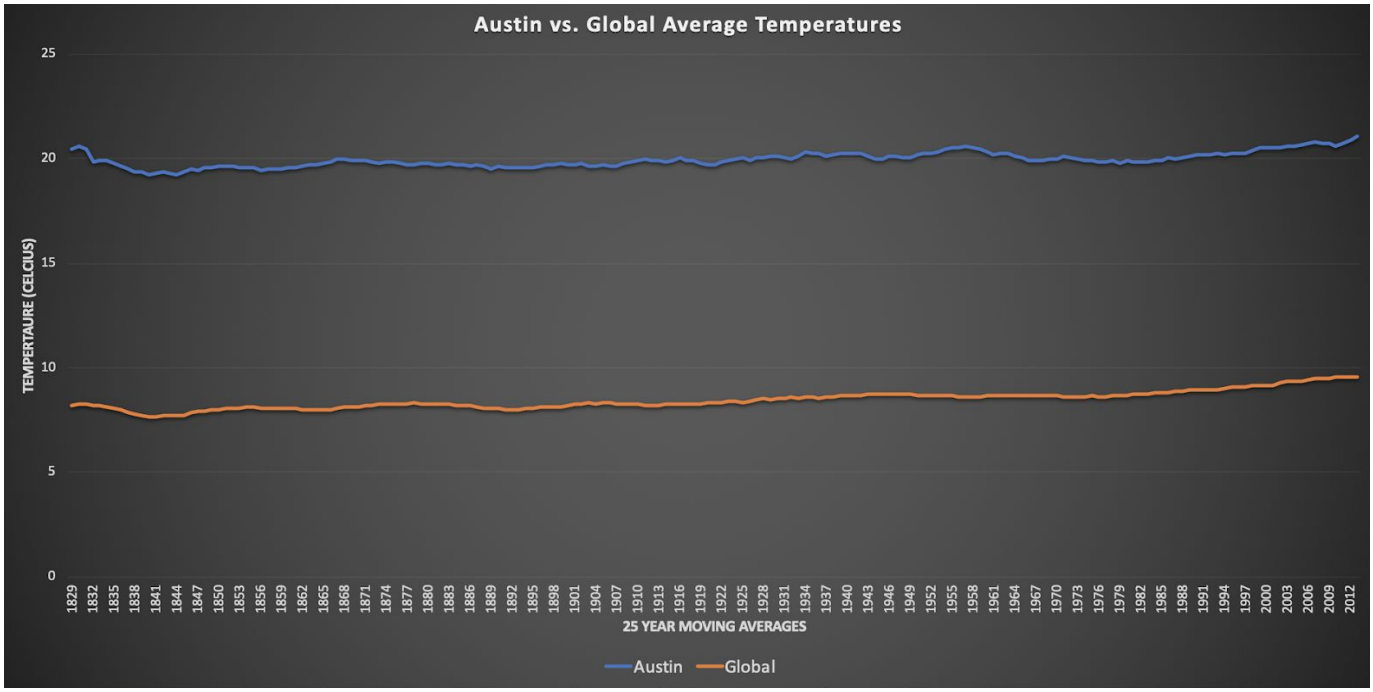


Figure 1: Austin vs global temperatures 25-year moving averages

Key Considerations for Visualizing Trends

Key considerations for visualizing trends included varying color for datasets on the same plot, playing with different charts, and calculating various moving average ranges with the goal of optimizing the best display for intuitive storytelling.

Insights

The following observations were made based on the trends reflected in local and global data:

1. Austin is 11℃ hotter than the global average with consistently higher temperatures throughout the dataset.
    a. Average difference calculated by subtracting the 25-year moving averages between Austin and Global temperatures using the formula "=AVERAGE(AC2:AC186-AD2:AD186)" in Excel
2. Austin had a decrease in temperatures between 1829-1838. The reduced temperatures in Austin dropped an average of 11% compared to the 4% global decrease.
    a. Average percent temperature decrease for Austin and global data was calculated by taking the average of the differences using the following formulas "=((AC2-AC11)/10)*100" and "=((AD2-AD11)/10)*100" in Excel.
3. Austin saw a spike between 1950-1966. A 0.4% average increase was observed from 1950-1957 and a decreasing temperature was observed at a rate of 0.4% from 1958-1966. Austin's temperatures returned to an average yearly increasing rate of 0.1% for the remainder of the dataset.
    a. The temperature spike was evaluated by taking the average percent increase rate for the ranges of 1950-1957 and 1958-1966 using the following formulas "=AVERAGE(AE123:AE130)", "=AVERAGE(AE131:AE139)." Austin's average temperature increase was calculated by taking the average of percent increase rate for each year using "=AVERAGE(AE3:AE187)."
4. The overall trend for both Austin and Global temperatures is increasing at a rate of 0.05%. Hotter temperatures have been consistent for the past 174 years.
    a. Percent increase rate was calculated by subtracting the current year's average temperature from the former year's average temperature and dividing the results by the former year's average using the formula "=(AC3-AC2)/AC2." Percent increases were calculated for both Austin and Global temperature data and combined for a total percent average of 0.05% using "=AVERAGE(AE187:AF187)."