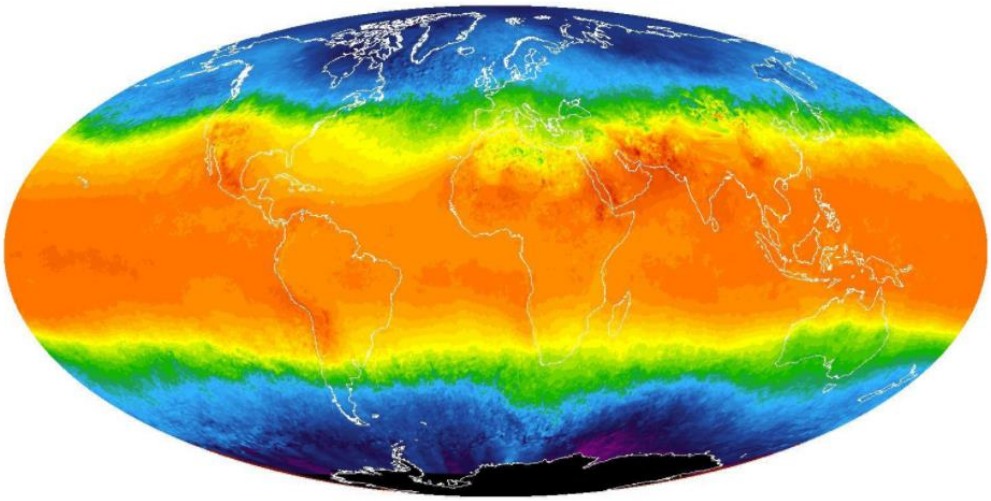
EXPLORE WEATHER TRENDS



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A comparison of average local temperature levels to the global average

This document details the data gathering methods and observations made on the data related to comparing a moving average of specific city temperatures with a moving average of global temperatures in the same time period.

Explore Weather Trends

A COMPARISON OF AVERAGE LOCAL TEMPERATURE LEVELS TO THE GLOBAL AVERAGE

DATA COLLECTION

The data provided was average temperature in centigrade for specific cities spanning the years of 1743 to 2013, and global average temperature in centigrade spanning the years of 1750 to 2015.

How the data was collected

The data was collected by first querying the CITY_LIST table to find a city close to where I live. Once the city was identified the CITY_DATA table was queried to get the temperature data for the selected city. The GLOBAL_DATA table was queried to get the global temperature data.

SQL queries used

1. Query used to determine closest city:

```
-- get cities in United States
SELECT * FROM city_list
WHERE country = 'United States';
```

2. Query used to select temperature data for selected city:

```
-- select avg temperature data for Memphis from city_data table - in Celsius
SELECT year,
        city,
        avg_temp AS avg_temp_celsius
FROM city_data
WHERE city = 'Memphis'
AND   country = 'United States'
ORDER BY year;
```

3. Query used to select global temperature data:

```
-- select avg global temperature in celsius from global_data
SELECT year,
        avg_temp AS avg_temp_celsius
FROM global_data
ORDER BY year;
```

Data Cleansing

The data collected for the local city (Memphis, TN) spanned the years of 1743 to 2013. The years 1746 to 1749 had no data values for average temperature, also the global temperature data started with the year 1750 so the decision was made to remove years 1743 to 1749 from the local data, and any years after 2013 in the global data in order to have a more uniform dataset to work with. All temperature values were rounded to two decimal places.

DATA PREPARATION

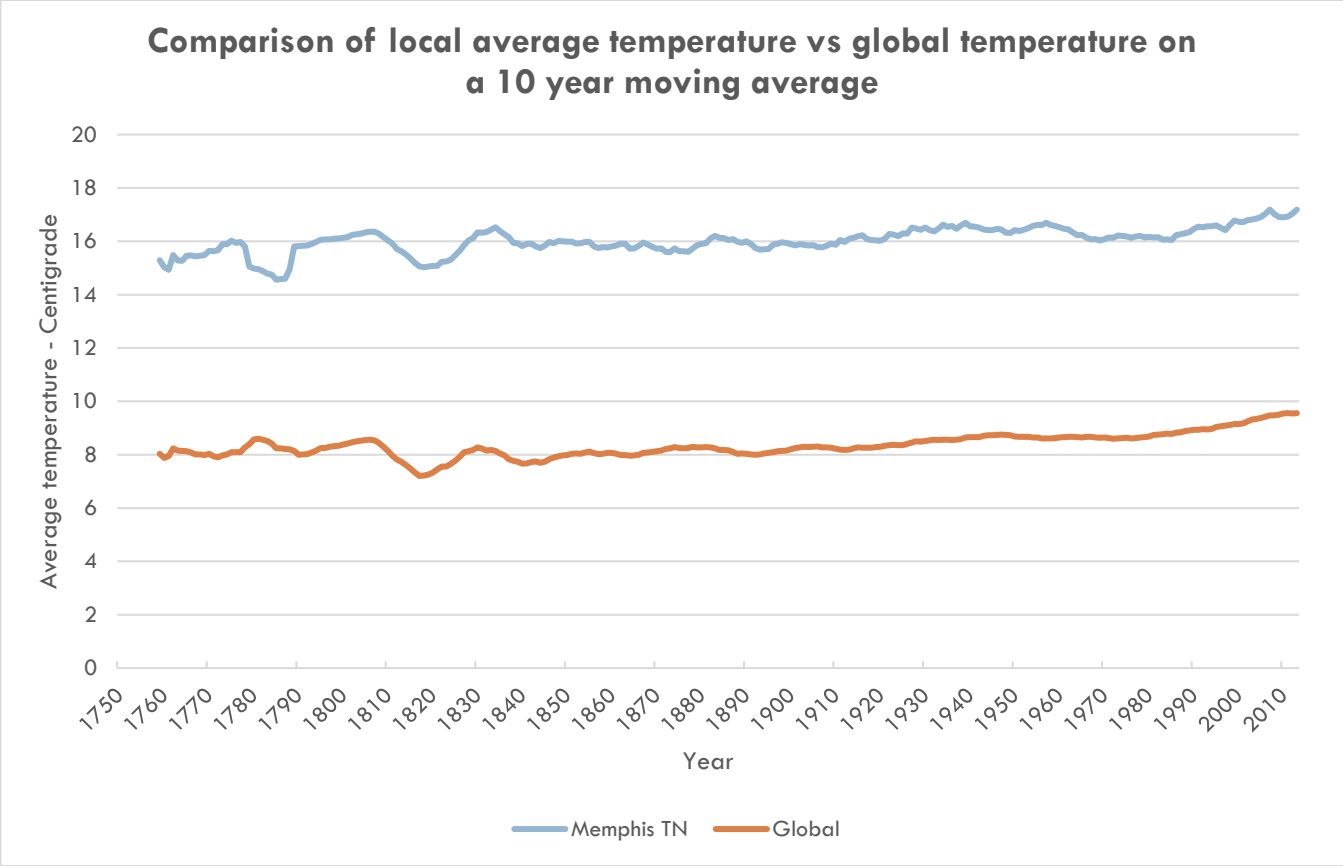
Calculating a moving average

The extracted data was loaded into an Excel spreadsheet in order to prepare the data for comparison and visualization. Based on project requirements a moving average calculation was necessary in order to remove volatility from the chart that will be used to compare the local temperature to global temperatures. A 5-year, 10-year, and 20-year moving average was calculated and charted for the dataset. Ultimately the 10-year moving average chart was determined to be the appropriate one to use in order to best visualize the data. The moving average was obtained by taking the mean of the first ten-year period and then shifting that calculation forward through the time series one year at a time.

				5-year MA		10-year MA		20-year MA	
Year	City	Avg Temp C°	Avg Temp F°	C°	F°	C°	F°	C°	F°
1750	Memphis	16.70	62.06						
1751	Memphis	17.46	63.43						
1752	Memphis	10.61	51.10						
1753	Memphis	16.06	60.91						
1754	Memphis	16.06	60.91	15.38	59.68				
1755	Memphis	13.84	56.91	14.81	58.65				
1756	Memphis	16.24	61.23	14.56	58.21				
1757	Memphis	15.76	60.37	15.59	60.07				
1758	Memphis	14.59	58.26	15.30	59.54				
1759	Memphis	15.62	60.12	15.21	59.38	15.29	59.53		
1760	Memphis	14.07	57.33	15.26	59.46	15.03	59.06		
1761	Memphis	16.52	61.74	15.31	59.56	14.94	58.89		
1762	Memphis	16.06	60.91	15.37	59.67	15.48	59.87		
1763	Memphis	14.04	57.27	15.26	59.47	15.28	59.50		
1764	Memphis	15.98	60.76	15.33	59.60	15.27	59.49		
1765	Memphis	15.68	60.22	15.66	60.18	15.46	59.82		
1766	Memphis	16.46	61.63	15.64	60.16	15.48	59.86		
1767	Memphis	15.34	59.61	15.50	59.90	15.44	59.78		
1768	Memphis	14.85	58.73	15.66	60.19	15.46	59.83		
1769	Memphis	15.84	60.51	15.63	60.14	15.48	59.87	15.39	59.70
1770	Memphis	15.69	60.24	15.64	60.14	15.65	60.16	15.34	59.61
1771	Memphis	16.40	61.52	15.62	60.12	15.63	60.14	15.29	59.51

DATA VISUALIZATION

A line chart was prepared in order to visualize the data in order to make observations about the data easier.



OBSERVATIONS

An analysis of the resultant chart and data leads to several observations.

1. Average local Memphis temperatures were ~9 degrees higher than the global average during the time period reported.

2. A drop in recorded temperatures in the magnitude of .33 degrees locally and .28 degrees globally occurred between 1815 and 1825 which was a result of an eruption of the Tambora volcano.

3. An increase in average temperature of ~1.5 degrees has been recorded both locally and globally between 1910 and 2010.

4. The rate of average local temperature increase was 0.0054 degrees per year between 1910 and 1989. The rate of average local temperature increase was 0.0433 degrees per year between 1990 and 2010 a 12% increase in magnitude over the previous 90 years a similar accelerated increase was observed in the global temperature data.

5. Calculating the correlation coefficient as:

$$\frac{Sxy}{\sqrt{Sxx \cdot Syy}}$$

Year	City	Avg Temp	Global Avg Temp	Local Deviation	Global Deviation	Local Std Dev	Global Std Dev	Sxy
2011	Memphis	17.17	9.52	1.16	1.16	1.3348	1.3470	1.341
2012	Memphis	17.99	9.51	1.98	1.15	3.9020	1.3239	2.273
2013	Memphis	17.93	9.61	1.92	1.25	3.6685	1.5640	2.395
	SUM	4227.87	2206.88			285.633	87.010	63.725
	MEAN	16.01	8.36			Sxx	Syy	Sxy
						Correlation Coefficient =		0.404221

Yielded a result of 0.404221 indicating a fairly weak positive correlation between the local temperatures and the global temperatures