Exploring Weather Trends

Summary

In this project, we will analyze local and global temperature data and compare the temperature trends of the cities Chicago, San Diego, New York, and Phoenix to overall global temperature trends.

Goal

To create a visualization and prepare a write up describing the similarities and differences between global temperature trends and temperature trends in Chicago, San Diego, New York, and Phoenix. To do this, we'll follow the following steps:

Progress Outline

- **Extract the data** from the database using SQL queries

  Write a SQL query to extract the city level data. Export to CSV.

```
1   select * from city_data where country='United
    States' and city in('Chicago','San Diego','New
    York','Phoenix');
2
```

  Write a SQL query to extract the global data. Export to CSV.

```
2   select * from global_data;
```

- **Open up the downloaded CSV** using Excel

- **Calculate the moving average** using Excel

  Moving averages are used to smooth out data to make it easier to observe long term trends and not get lost in daily fluctuations.

  Create a new column called 10Year MA, to store the moving average of 10 years. Go down to the tenth year (1752) and use the AVERAGE() function to calculate the average temperature for the first ten years, as seen in the image below. Now, we can drag this formula down to all the where city is Chicago.

E11 =AVERAGE(D2:D11)

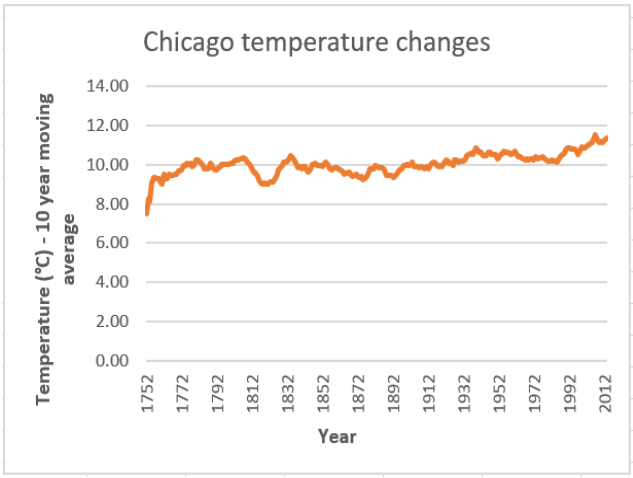
	A	B	C	D	E
1	year	city	country	avg_temp	10Year MA
2	1743	Chicago	United Sta	5.44	
3	1744	Chicago	United Sta	11.73	
4	1745	Chicago	United Sta	1.8	
5	1746	Chicago	United States		
6	1747	Chicago	United States		
7	1748	Chicago	United States		
8	1749	Chicago	United States		
9	1750	Chicago	United Sta	10.49	
10	1751	Chicago	United Sta	11.19	
11	1752	Chicago	United Sta	.5	7.53

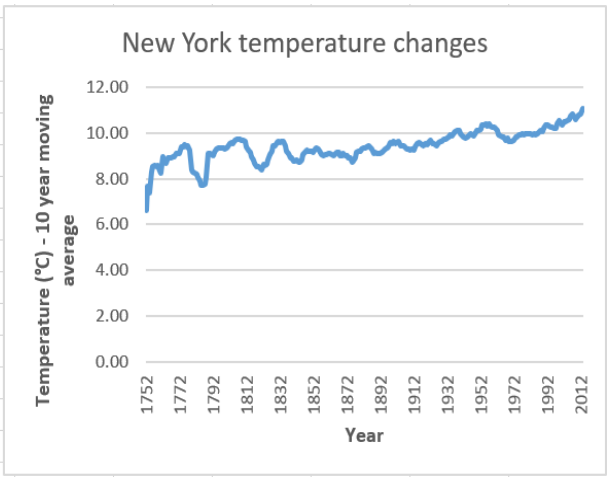
Similarly, we will calculate the 10 year moving average for other cities in this Excel sheet as well as for the global_data.

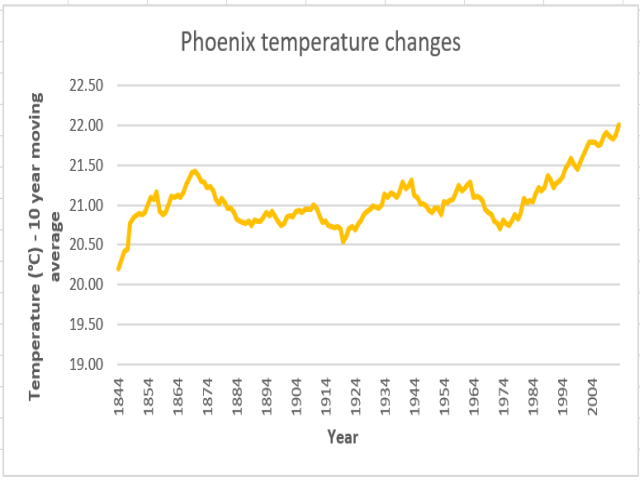
C11 =AVERAGE(B2:B11)

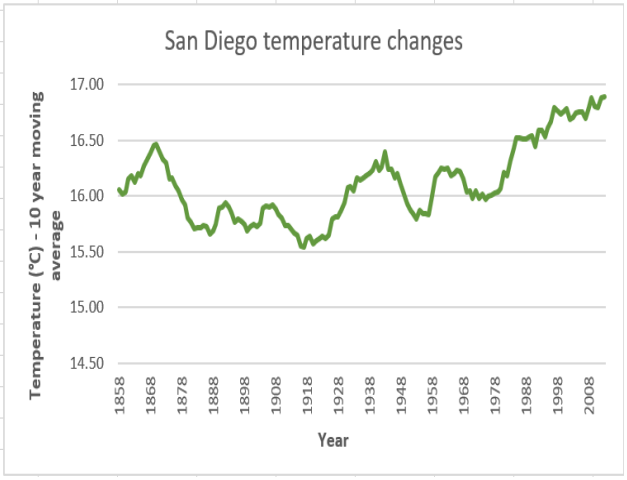
	A	B	C	D	E
1	year	avg_temp	10Year MA		
2	1750	8.72			
3	1751	7.98			
4	1752	5.78			
5	1753	8.39			
6	1754	8.47			
7	1755	8.36			
8	1756	8.85			
9	1757	9.02			
10	1758	6.74			
11	1759	99	8.03		
12	1760	7.19	7.88		

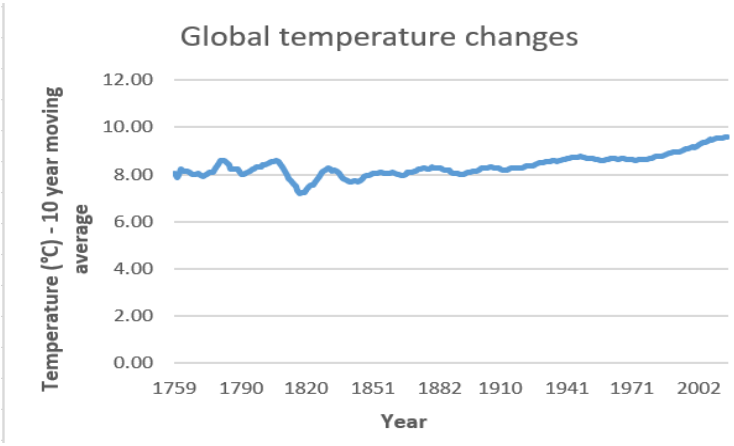
- **Create a line chart** to compares the city temperatures with the global temperatures. Plotting the *moving average* rather than the yearly averages in order to smooth out the lines, making trends more observable.

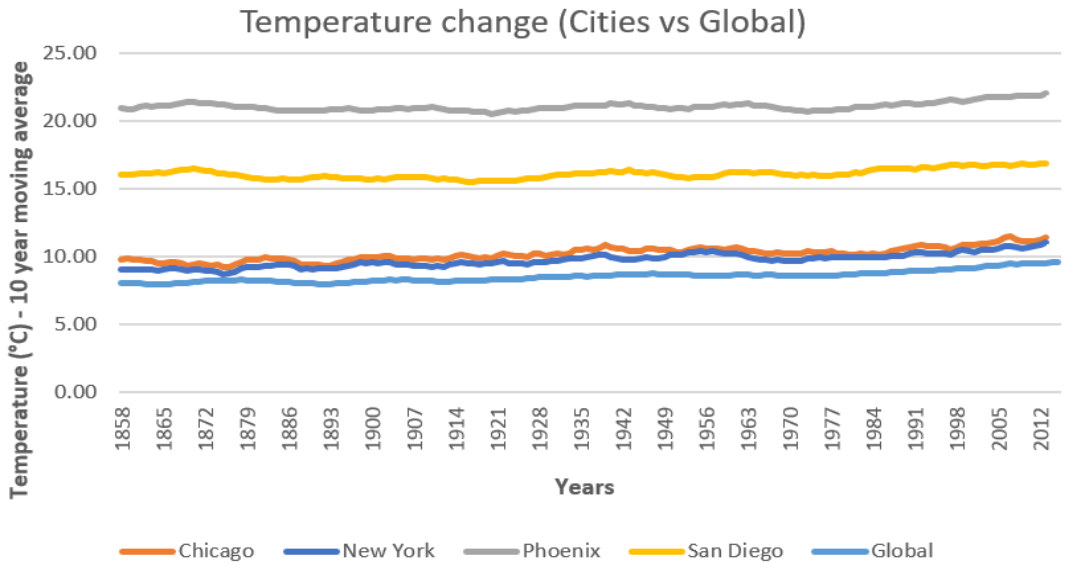





Phoenix temperature changes
Temperature (°C) - 10 year moving average
22.50
22.00
21.50
21.00
20.50
20.00
19.50
19.00
1844
1854
1864
1874
1884
1894
1904
1914
1924
1934
1944
1954
1964
1974
1984
1994
2004
Year


San Diego temperature changes
Temperature (°C) - 10 year moving average
17.00
16.50
16.00
15.50
15.00
14.50
1858
1868
1878
1888
1898
1908
1918
1928
1938
1948
1958
1968
1978
1988
1998
2008
Year


Global temperature changes
Temperature (°C) - 10 year moving average
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1759
1790
1820
1851
1882
1910
1941
1971
2002
Year


Temperature change (Cities vs Global)
Temperature (°C) - 10 year moving average
25.00
20.00
15.00
10.00
5.00
0.00
1858
1865
1872
1879
1886
1893
1900
1907
1914
1921
1928
1935
1942
1949
1956
1963
1970
1977
1984
1991
1998
2005
2012
Years
Chicago
New York
Phoenix
San Diego
Global

Observations

- All the four cities are hotter than the global average temperature. Since mid of 19th century the temperature is invariably raising in all of these cities.
- Based on the trend it can be concluded that there is more temperature raise seen in New York and Chicago as compare to that of Phoenix and San Diego
- Since the year 1752 to 2012, Chicago has seen a temperature raise of about 4 °C, while New York's temperature has raised by 3.5°C approximately during the same time period.
- All of these locations are getting hotter over time and thereby raising the global average.
- Over time Phoenix has seen a temperature raise of about 2.5 °C while New York has seen a raise of about 3 °C
- Since the year 1750 to 2002, the global temperature has raised by 2°C approximately.
- The temperature trend does not look consistent. It is increasing invariably in the given cities and the global average is raising as well.