Explore Weather Trends

Steps:

- **Data Extraction**
- **Data cleaning**
- **Analyze the data.**
- **Data visualization**

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Data Extraction:

I used SQL to extract data from data base.

1- Query 1 for City_list:

```
select *
from city_list
where country = 'Egypt'
```

I used this query to define which cities in my country I will extract which the cities are Cairo and Alexandria.

2- Query 2 for City_data:

```
Select year, avg_temp
from city_data
where country = 'Egypt' and city = 'Alexandria'
```

to extract years and average temperature of Alexandria.

```
Select year, avg_temp

from city_data
where country = 'Egypt' and city = 'Cairo'
```

to extract years and average temperature of Cairo.

3- Query 3 for global_data:

```
select *
from global_data
```

to extract all data of global weather.

Finally, export all the results of the queries in CSV format.

Data Cleaning:

While doing visual assessment in Microsoft Excel which I will use for analysis and visualizing I realized that avg_temp for global temperature started from 1750, for Cairo started from 1808 and Alexandria started from 1791, so I removed all years and corresponding avg_temp values that are not in the three sets taking Years of Cairo data set as a reference.

Finally, I used Merge method in Microsoft Excel to merge three data sets depend on years columns which mean take all the years common in the three data sets, so I can analyze them all using only one data set.

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Analyze the data:

To smooth out data to make it easier to observe long term trends and not get lost in daily fluctuations I will use Moving Average (MA) for these data set taking 10 years moving average and calculate it for all avg_temp (Global, Cairo, Alexandria).

In next figure Show us the data set after merging and calculate Moving Average.

year	Globalavg_temp_avg	Global_temp_MA	Cairo_avg_temp	Cairo_temp_MA	Alexandria_avg_temp	Alexandria_temp_MA
1808	7.63	8.44	17.11		19.69	20.54
1809	7.08	8.30	19.87		19.03	20.38
1810	6.92	8.14	19.93		19.12	20.24
1811	6.86	7.97	20.00		19.19	20.07
1812	7.05	7.82	19.93		19.02	19.88
1813	7.74	7.74	20.51		19.55	19.74
1814	7.59	7.61	20.43		19.50	19.62
1815	7.24	7.48	20.30		19.39	19.53
1816	6.94	7.33	20.51		18.91	19.38
1817	6.98	7.20	21.88	20.05	19.08	19.25
1818	7.83	7.22	11.60	19.50	19.90	19.27
1819	7.37	7.25	20.31	19.54	19.44	19.31
1820	7.62	7.32	20.58	19.61	19.73	19.37
1821	8.09	7.45	20.63	19.67	19.69	19.42
1822	8.19	7.56	20.72	19.75	19.80	19.50
1823	7.72	7.56	20.71	19.77	19.82	19.53
1824	8.55	7.65	21.44	19.87	20.52	19.63
1825	8.39	7.77	21.00	19.94	20.03	19.69
1826	8.36	7.91	20.94	19.98	19.96	19.80
1827	8.81	8.09	21.63	19.96	20.70	19.96
1828	8.17	8.13	20.99	20.90	20.08	19.98
1829	7.94	8.18	20.91	20.96	19.98	20.03
1830	8.52	8.27	21.25	21.02	20.32	20.09
1831	7.64	8.23	20.52	21.01	19.61	20.08
1832	7.45	8.16	20.20	20.96	19.23	20.03
1833	8.01	8.18	20.81	20.97	19.89	20.03
1834	8.15	8.14	20.69	20.89	19.74	19.95
1835	7.39	8.04	20.17	20.81	19.23	19.87

Data Visualization:

In next figure I plotted line chart which compare the weather trends of global, Cairo and Alexandria taking 10 years MA.

In X-axis: Years of all data set.

In Y-axis: temperature moving average values in Celsius.
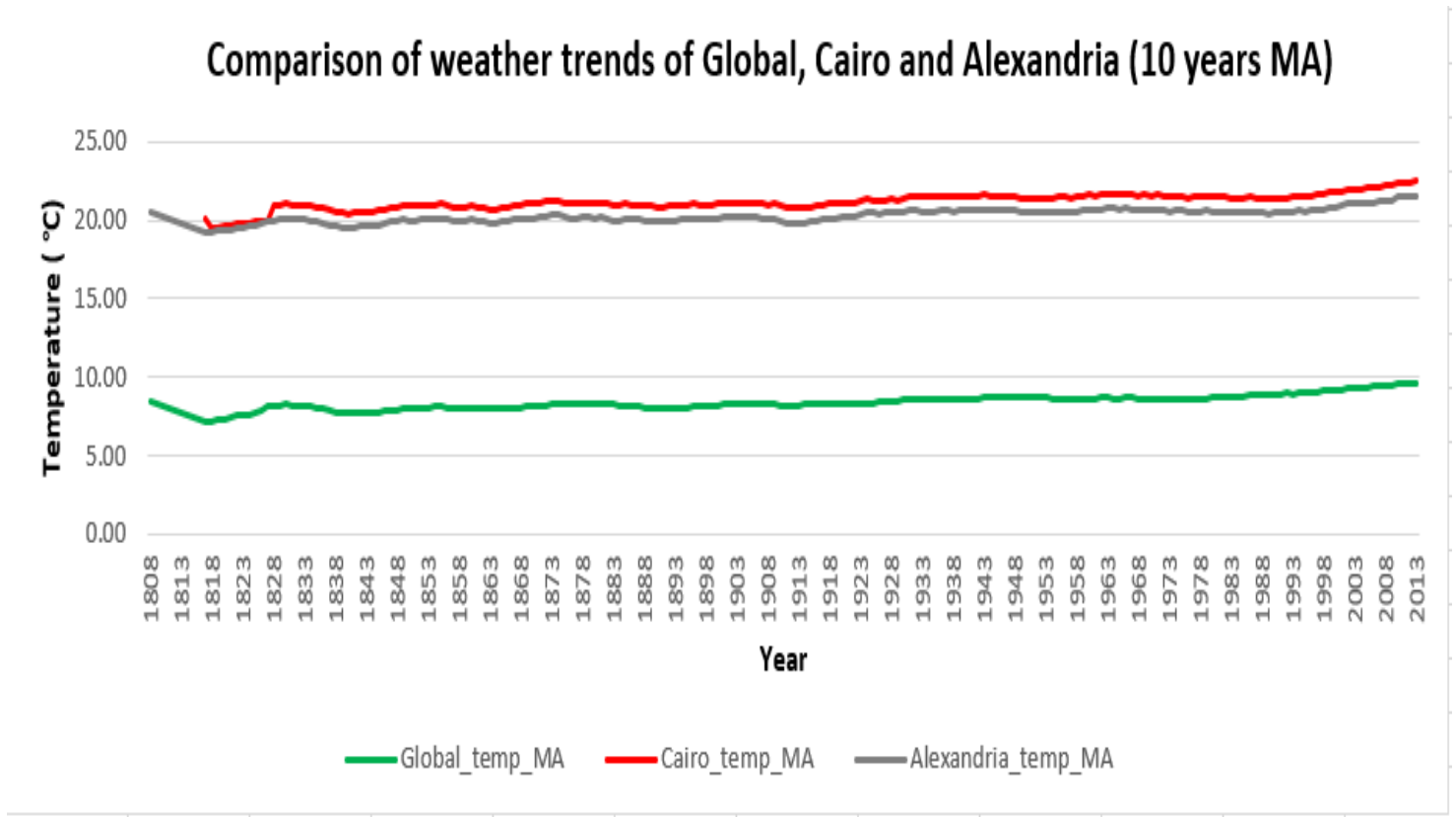
Observations:

From the previous plot I realized that:

1- There was upward trend for global average temperature, also Cairo and Alexandria have upward trend.

2- Over time each of Cairo and Alexandria average temperatures have been hotter than the overall Global average temperatures.

3- Alexandria is cooler than Cairo which I am think this slightly difference occurred due to Alexandria as the city extending along the coast Of Mediterranean Sea which can be a reason for this slight difference.

4- For about 10 years from (1817-1827) I realized that average temperatures for Cairo and Alexandria was almost the same, also in this period there was upward trend for global, Cairo, Alexandria average temperatures after a duration of downward trend from 1808 to 1817.