Project 1: Explore Weather Trends

1. **Extracting the data using _SQL_:**

    - Extract the global data:
      SELECT *
      From global_data;

    - Search for a city:
      SELECT *
      From city_list
      WHERE city = 'Beirut';
      Tried multiple times using for example: WHERE city LIKE 'Jer%', '%ru%', etc.

    - Extracting a city data:
      SELECT *
      From city_data
      WHERE city = 'Beirut';

    - After comparing the two data I noticed that Global data contains data from 1750 to 2015, and Beirut data from 1791 to 2013. To have a good comparison I chose a specific time frame from 1791 to 2013.

    - Extract the new global data again:
      SELECT *
      From global_data
      WHERE year Between 1791 AND 2013;

    - There are two missing values (years 1800 and 1806) in Beirut data, because the number of missing data is very small I decided to drop it from the calculations.


2. **Moving Average using _Excel_:**
    I tried different MA's periods: 15-year MA, 10-year MA, and 5-year MA. I chose the 5-year MA.
    MA calculation for the first 5 years (=AVERAGE(C2:C6)), drag and drop for l the rest.

3. **Visualizing the trends using _Excel_:**
    I want to show more information in the chart and view the trends in a better way. I used a smaller MA to view more details, and a line chart that displays the trend over the selected interval. Putting the two data in one chart makes it easier and clearer for comparison.

4. **The line chart using _Excel_:**

WEATHER TRENDS
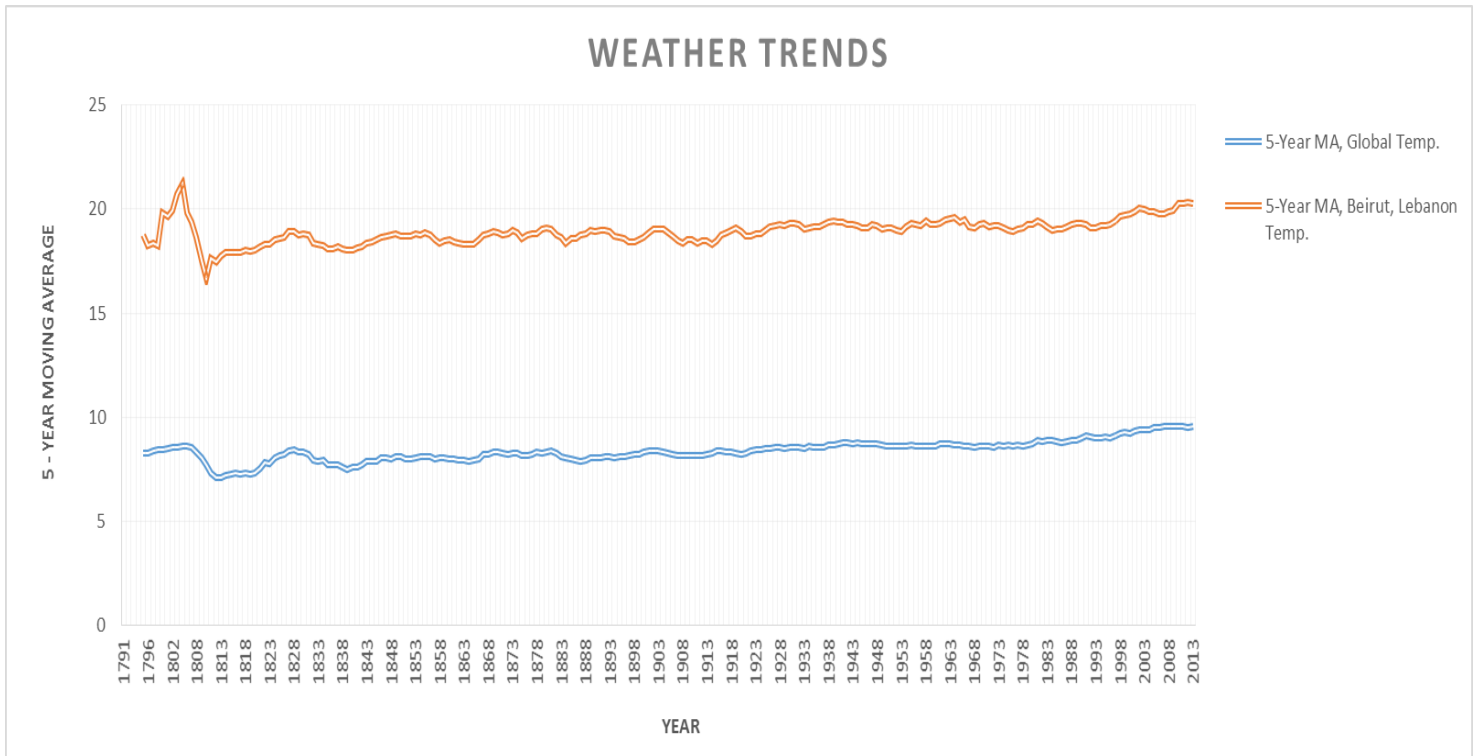
5. **Observations:**
   1. As it can be seen from the chart, Beirut is hotter on average than the global average. All values in Beirut's chart are higher than the global chart's values.
   2. The chart shows that the two trends are moving almost similarly, when there is an increasing or decreasing in a specific year in the global line, we can see a similar trend on the other. The difference between values differ from year to year (not consistent)
   3. Beirut's temperature got hotter over time, as well as the global temperature.
   4. Overall, it seems that our world is getting hotter. The global Temperature started to increase gradually after 1823.
   5. From Beirut's chart, the temperature rose significantly between 1802 and 1808 and dropped dramatically between 1808 and 1813.
   6. After 1818, the temperature in both lines fluctuated at the same pace.
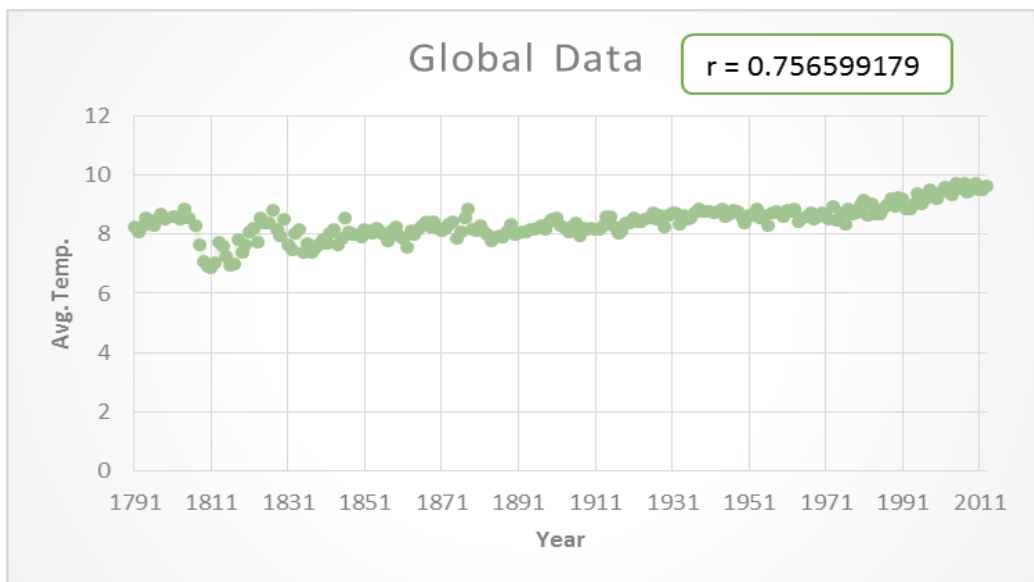
7. Correlation Coefficient:

- **Beirut data:**
  R is positive but < 0.5 so the relationship between time and temperature is weak.
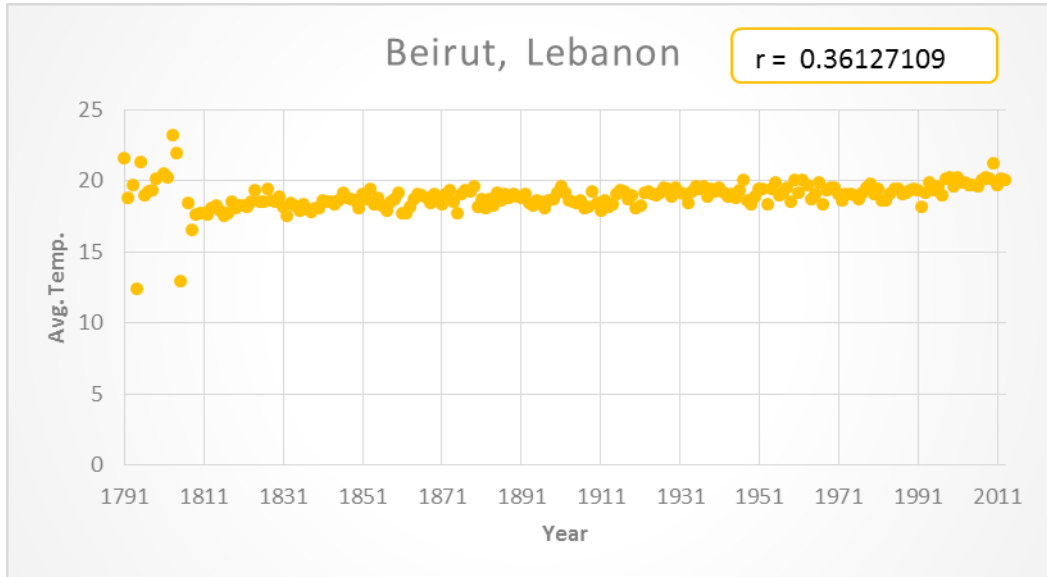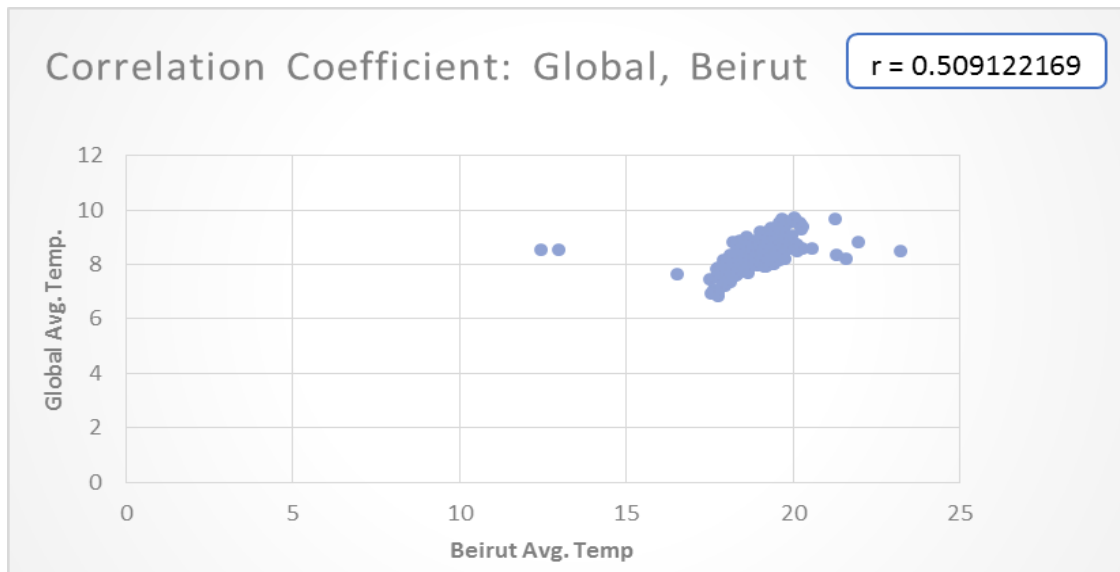

- **Global Data:**
  R is positive and > 0.5 so the relationship is strong.

- **Global and Beirut:**
  R is positive, and the relationship between the global temperature and Beirut temperature is moderate.

8. **Can we estimate the average temperature in my city based on the average global temperature?**
   I think that estimating the average city temperature based on the average global is not accurate. I used the Regression method using Excel, and the results were incorrect. I think that we need to take other factors into consideration. Since we are dealing with averages, outliers may affect the average.

   I used the Trendline (Excel) to forecast future trends (30 years forward).