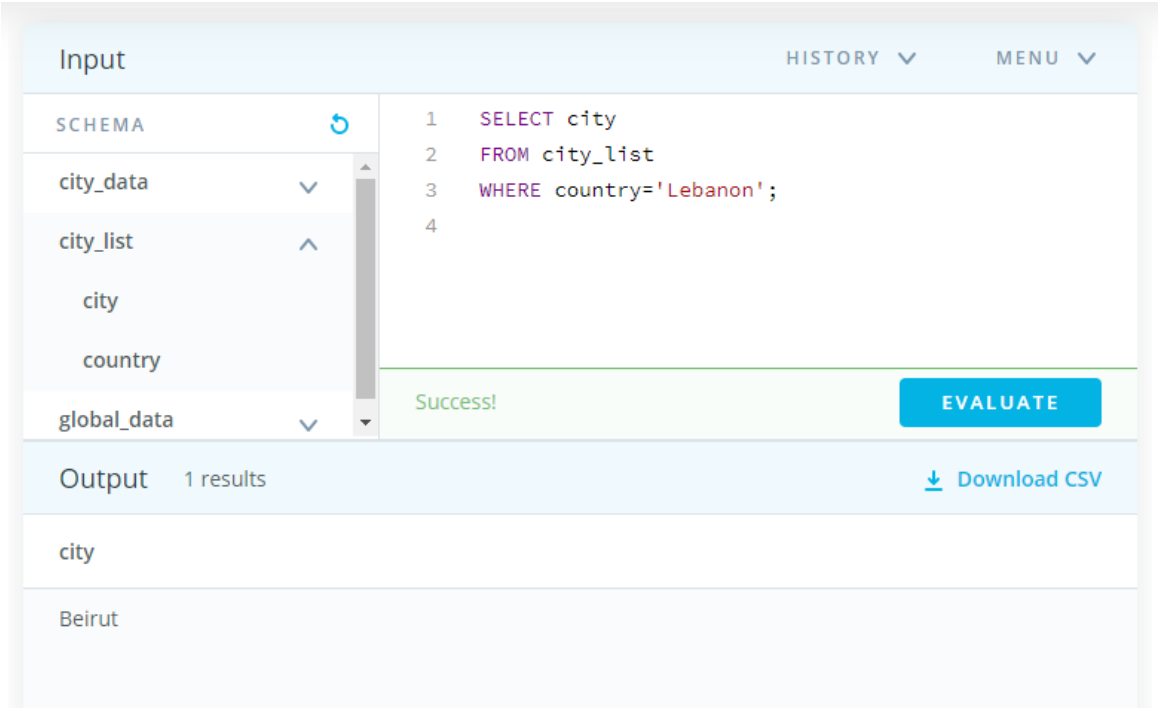
Student name: Nawal Nassif_Lebanon Saturday, 1 May, 2021

Project Title: Explore Weather Trend

Goal of the project: Create visualization and prepare a write up describing the similarities and differences between global temperature trends and temperature trends in the closest big city where I live.

1. **Extract the data from the database using SQL.**

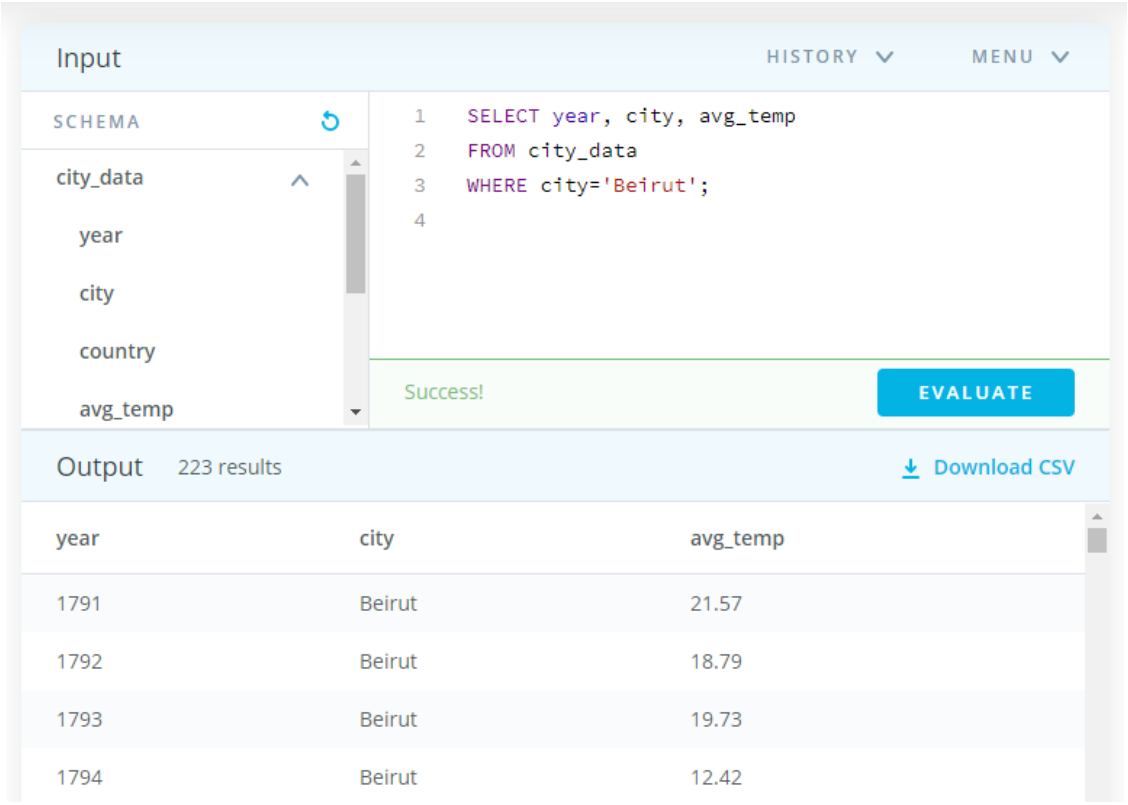
My country is Lebanon. Used query for Extract the city of my country.



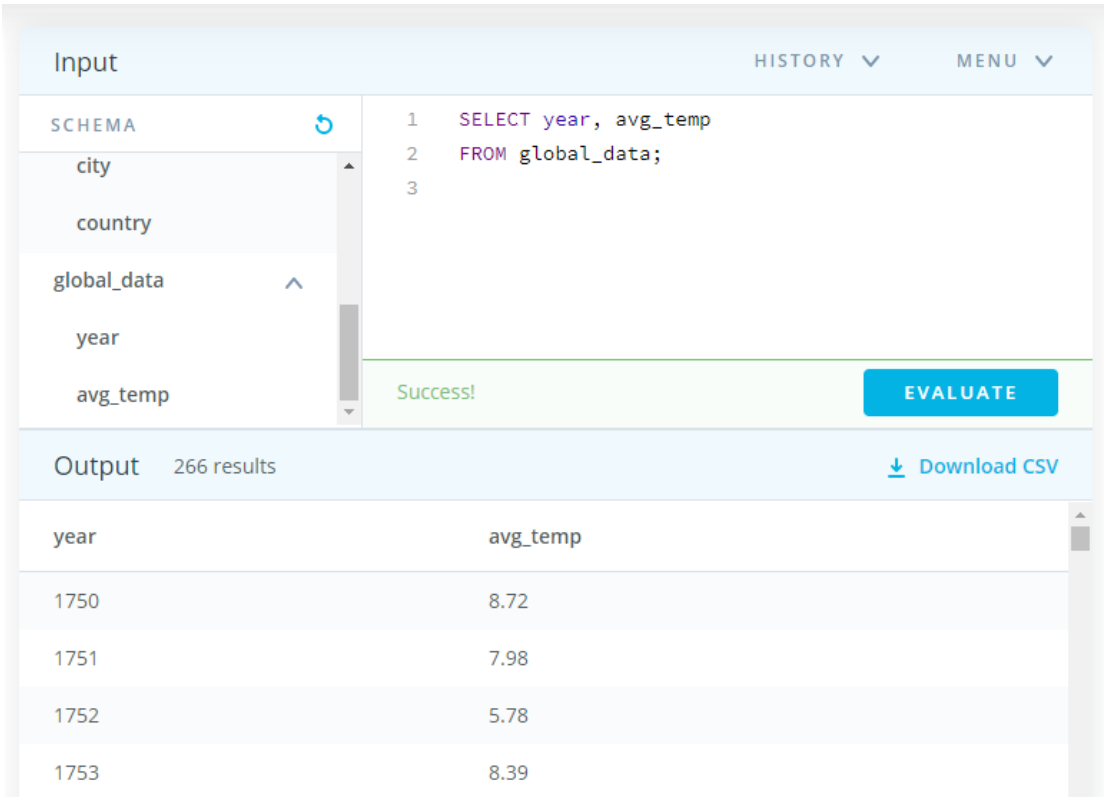
The closet big city where I live is Beirut.

Two ways for data extractions:

1. Separately which mean the Beirut data is extracted separately from the global data then two data can be treated together in the excel:
    a. SQL for extract the city level data:



b. SQL for extract the global level data:

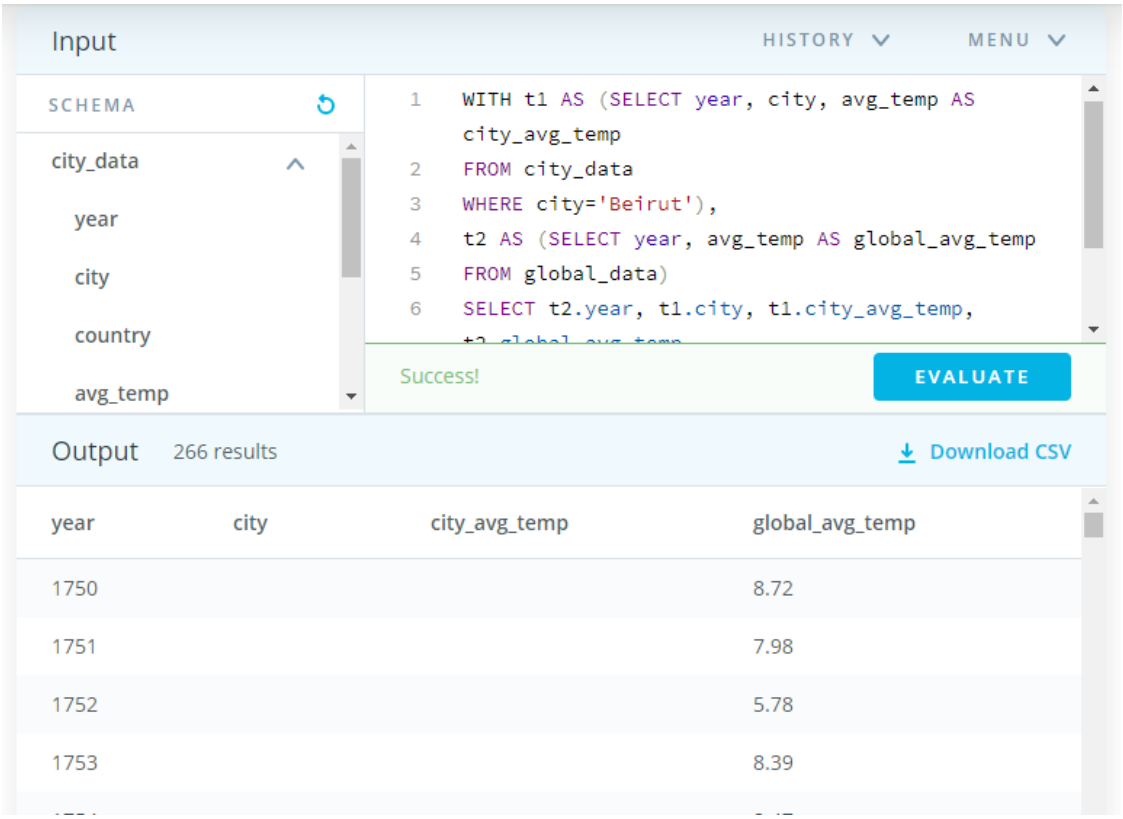


2. Data is extracted at once using one SQL:

```
WITH t1 AS (SELECT year, city, avg_temp AS city_avg_temp
FROM city_data
WHERE city='Beirut'),

t2 AS (SELECT year, avg_temp AS global_avg_temp
FROM global_data)

SELECT t2.year, t1.city, t1.city_avg_temp, t2.global_avg_temp
FROM t1
RIGHT JOIN t2
ON t1.year=t2.year;
```

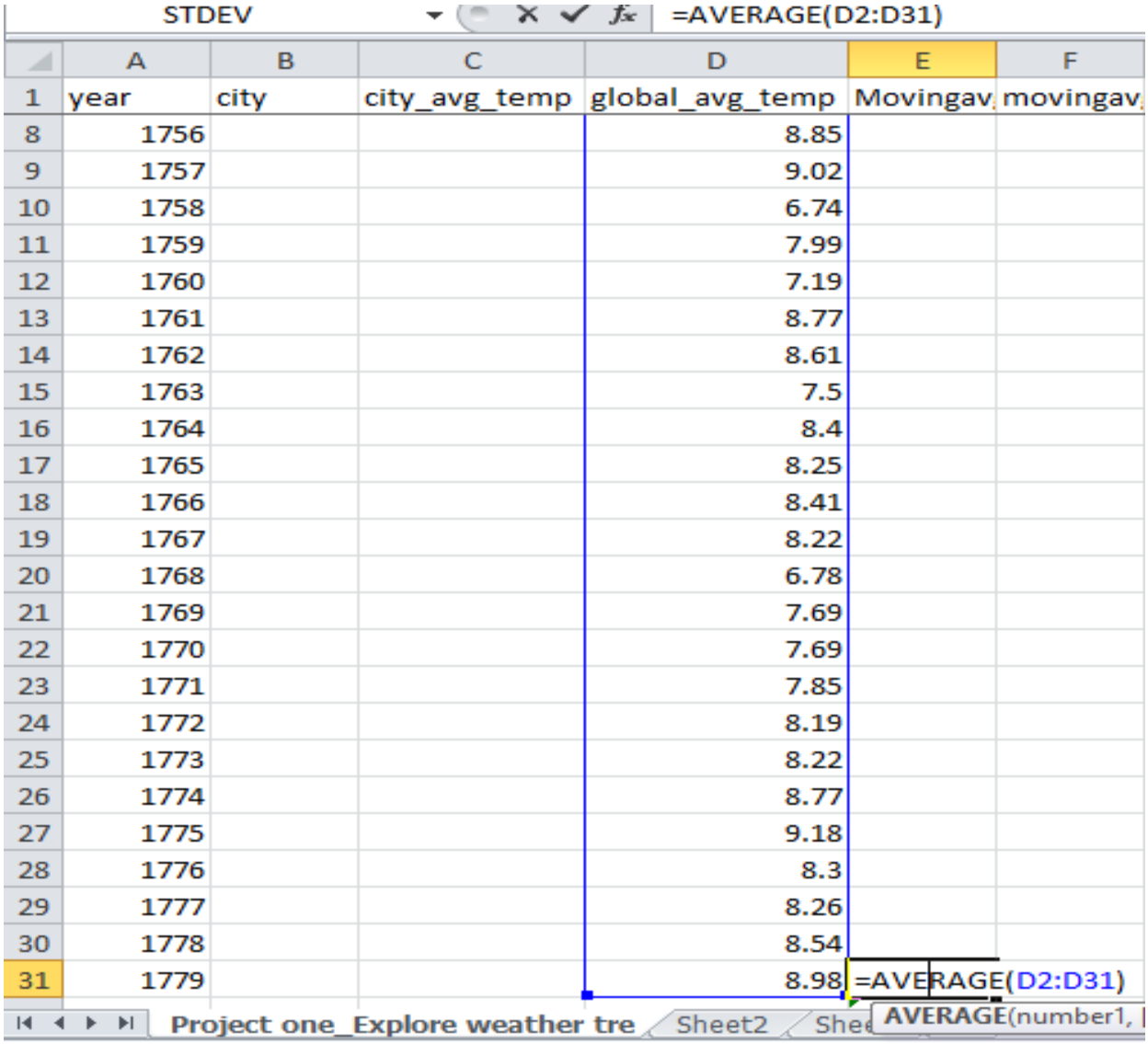


2. Calculation of the moving average using excels.

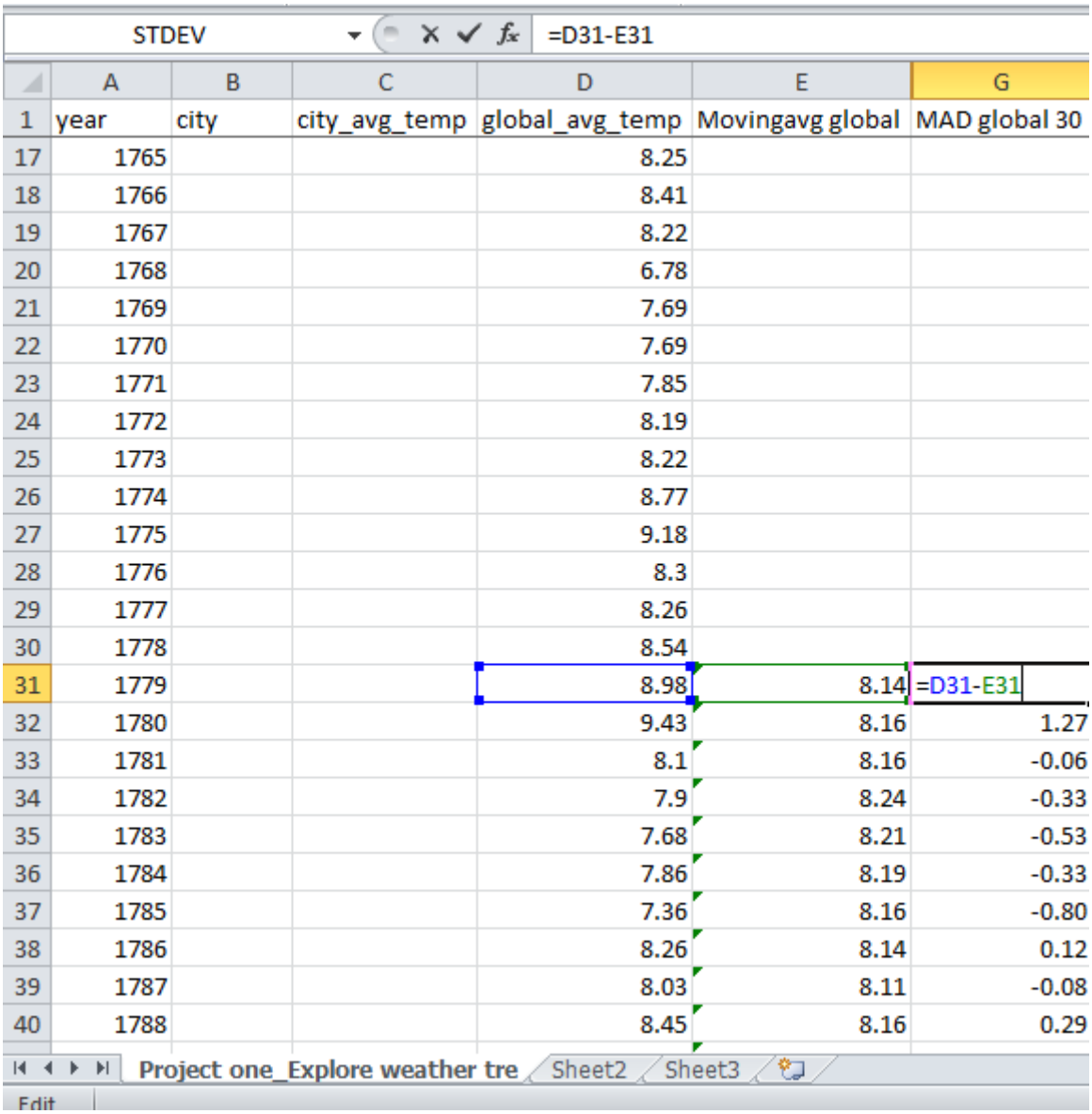
Since scientists evaluate how temperature is changing over time based on the long-term average over a 30-year period[1]. I will use the 30-year period as the period for moving average.

[1] Reference: ROZ PIDCOCK, January, 16th, 2015, *Explainer: How do scientists measure global temperature?* CarbonBrief clear on climate, retrieved on Thursday 29th, April, 2021 using the URL: https://www.carbonbrief.org/explainer-how-do-scientists-measure-global-temperature

The moving average was calculated using the excel 2013. Then I calculate the mean absolute deviation (MAD).



	A	B	C	D	E	F
1	year	city	city_avg_temp	global_avg_temp	Movingav	movingav
8	1756			8.85		
9	1757			9.02		
10	1758			6.74		
11	1759			7.99		
12	1760			7.19		
13	1761			8.77		
14	1762			8.61		
15	1763			7.5		
16	1764			8.4		
17	1765			8.25		
18	1766			8.41		
19	1767			8.22		
20	1768			6.78		
21	1769			7.69		
22	1770			7.69		
23	1771			7.85		
24	1772			8.19		
25	1773			8.22		
26	1774			8.77		
27	1775			9.18		
28	1776			8.3		
29	1777			8.26		
30	1778			8.54		
31	1779			8.98	=AVERAGE(D2:D31)	



STDEV =D31-E31

	A	B	C	D	E	G
1	year	city	city_avg_temp	global_avg_temp	Movingavg global	MAD global 30
17	1765			8.25		
18	1766			8.41		
19	1767			8.22		
20	1768			6.78		
21	1769			7.69		
22	1770			7.69		
23	1771			7.85		
24	1772			8.19		
25	1773			8.22		
26	1774			8.77		
27	1775			9.18		
28	1776			8.3		
29	1777			8.26		
30	1778			8.54		
31	1779			8.98	8.14	=D31-E31
32	1780			9.43	8.16	1.27
33	1781			8.1	8.16	-0.06
34	1782			7.9	8.24	-0.33
35	1783			7.68	8.21	-0.53
36	1784			7.86	8.19	-0.33
37	1785			7.36	8.16	-0.80
38	1786			8.26	8.14	0.12
39	1787			8.03	8.11	-0.08
40	1788			8.45	8.16	0.29

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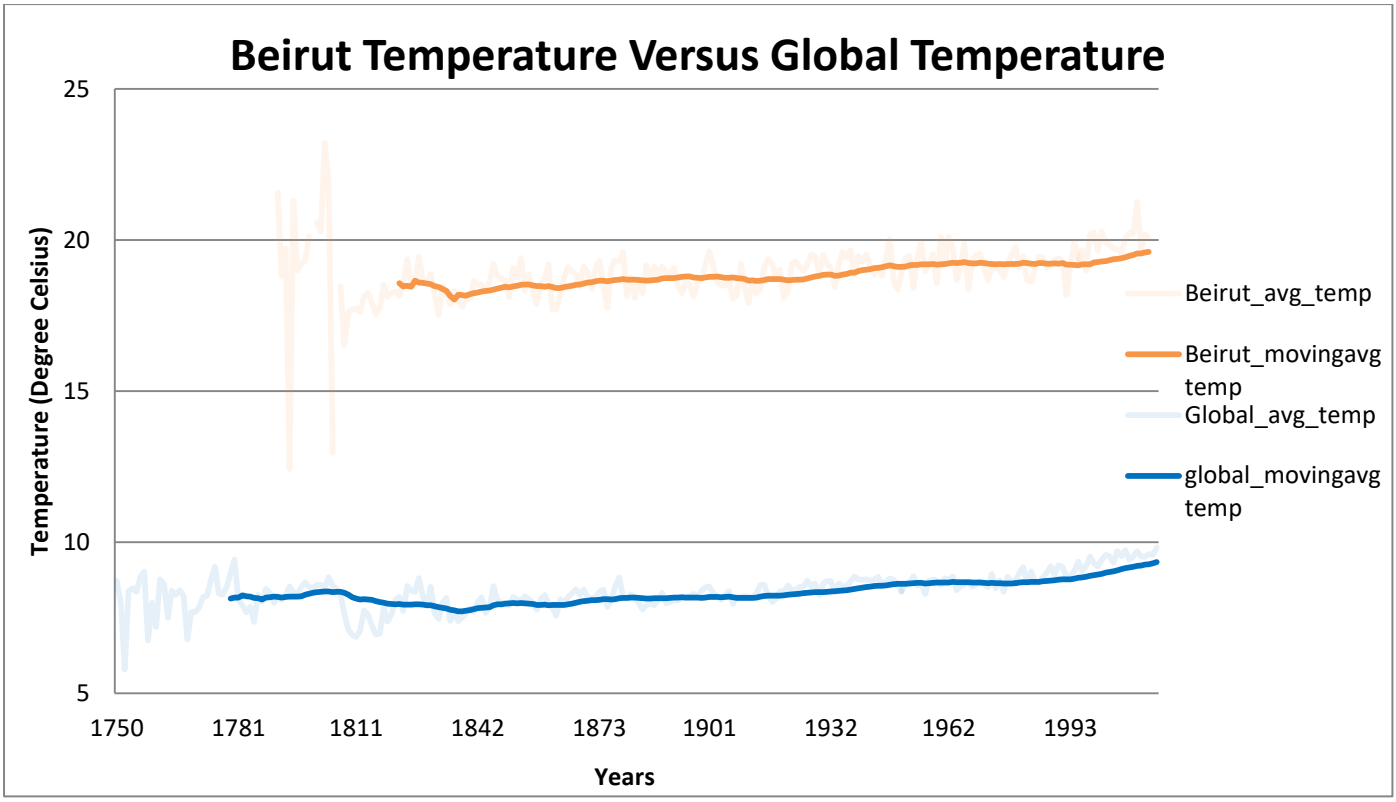
3. Choosing the appropriate chart

Since we treat 2 quantitative variables, the better chart for visualization is the scatter plot but since we need to compare the progression of these two variables over time, the best choice for this is the line chart.

The line chart is created using excel.



4. Observations:

1. Measurement of average global temperature started on 1750, 41 years before the data collection of average Beirut temperature which started on 1791.

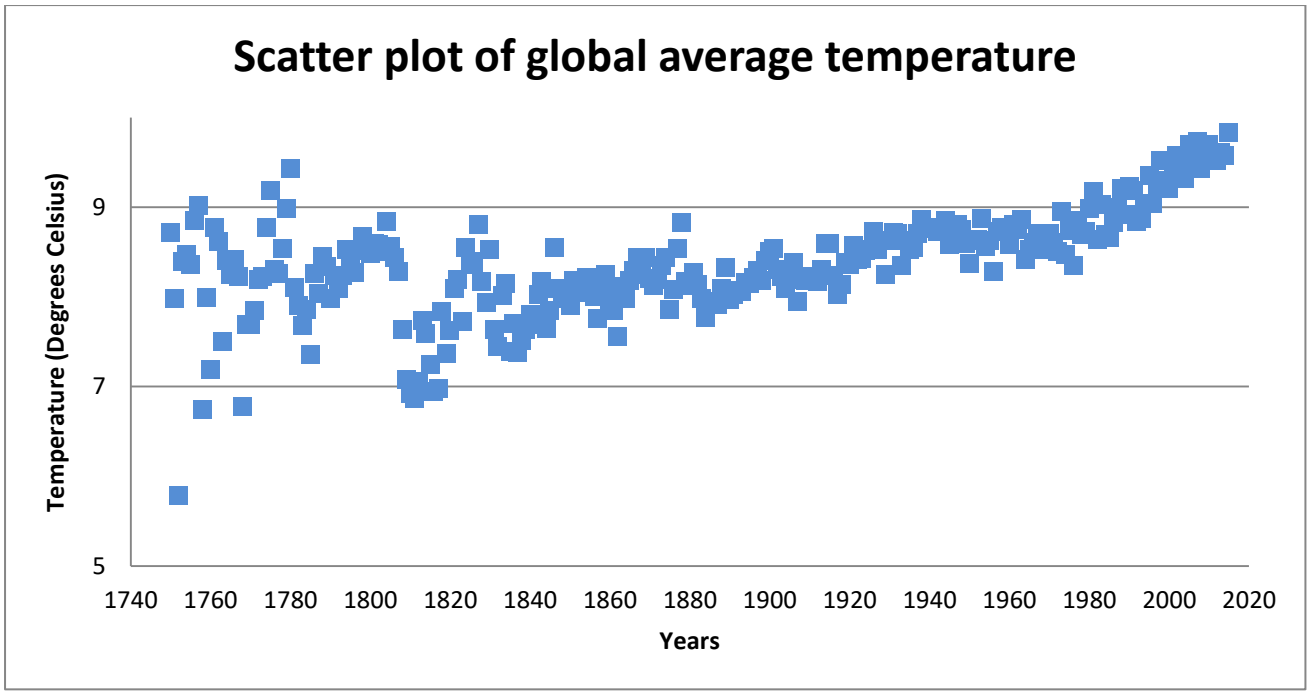
2. The mean of the global average temperature is 8.37 ±0.58 degrees Celsius. The mean of Beirut average temperature is 18.93 ±0.99 degrees Celsius. Beirut city is twice hotter on average then the global average.

3. The world in general becomes hotter with 0.08 average temperatures in the last 266 years. Beirut city becomes 1.6 fast hotter (+0.13) than the global average in the last 223 years.

4. The global average temperature tends to increase consistently in the 20^{th} and 21^{st} centuries comparing to a state of fluctuation in the 18^{th} and 19^{th} centuries.

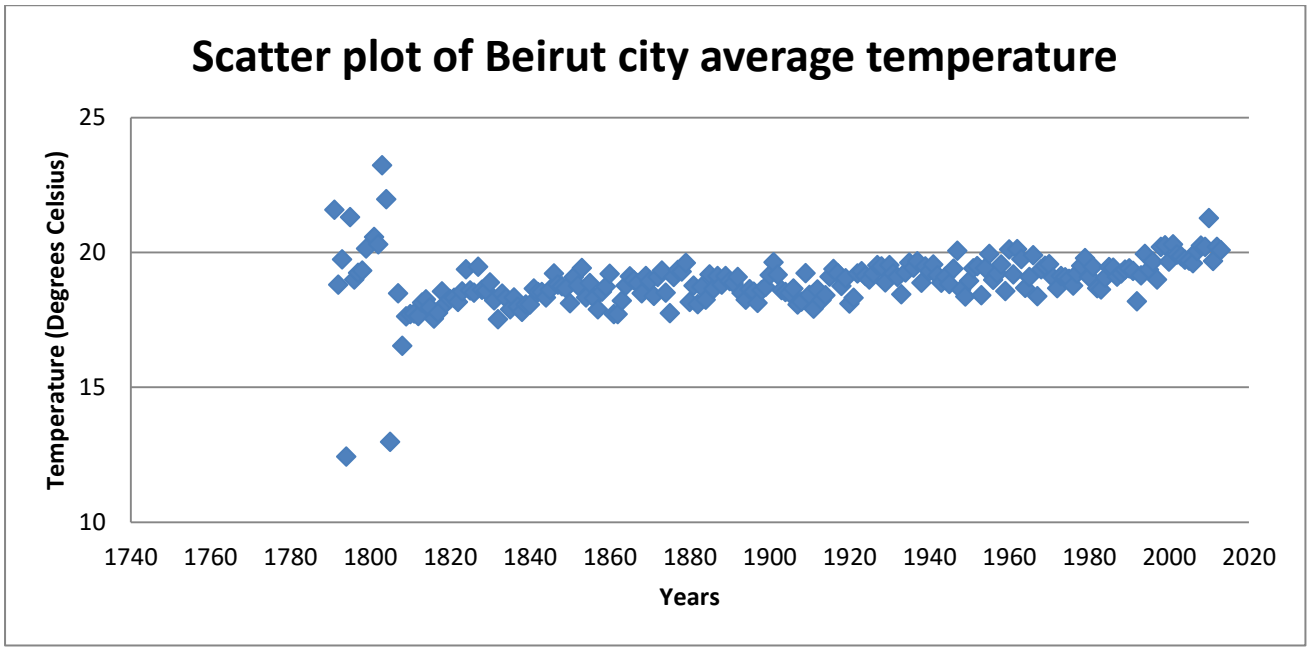
5. Since 1985, global temperature tends to be warmer with an average temperature of 0.35 degrees Celsius above the long-term average. Beirut city like the global temperature tends to become warmer the last 30 years with an average temperature of 0.38 degrees Celsius above the long-term average.

5. Correlation coefficient



Conclusion:

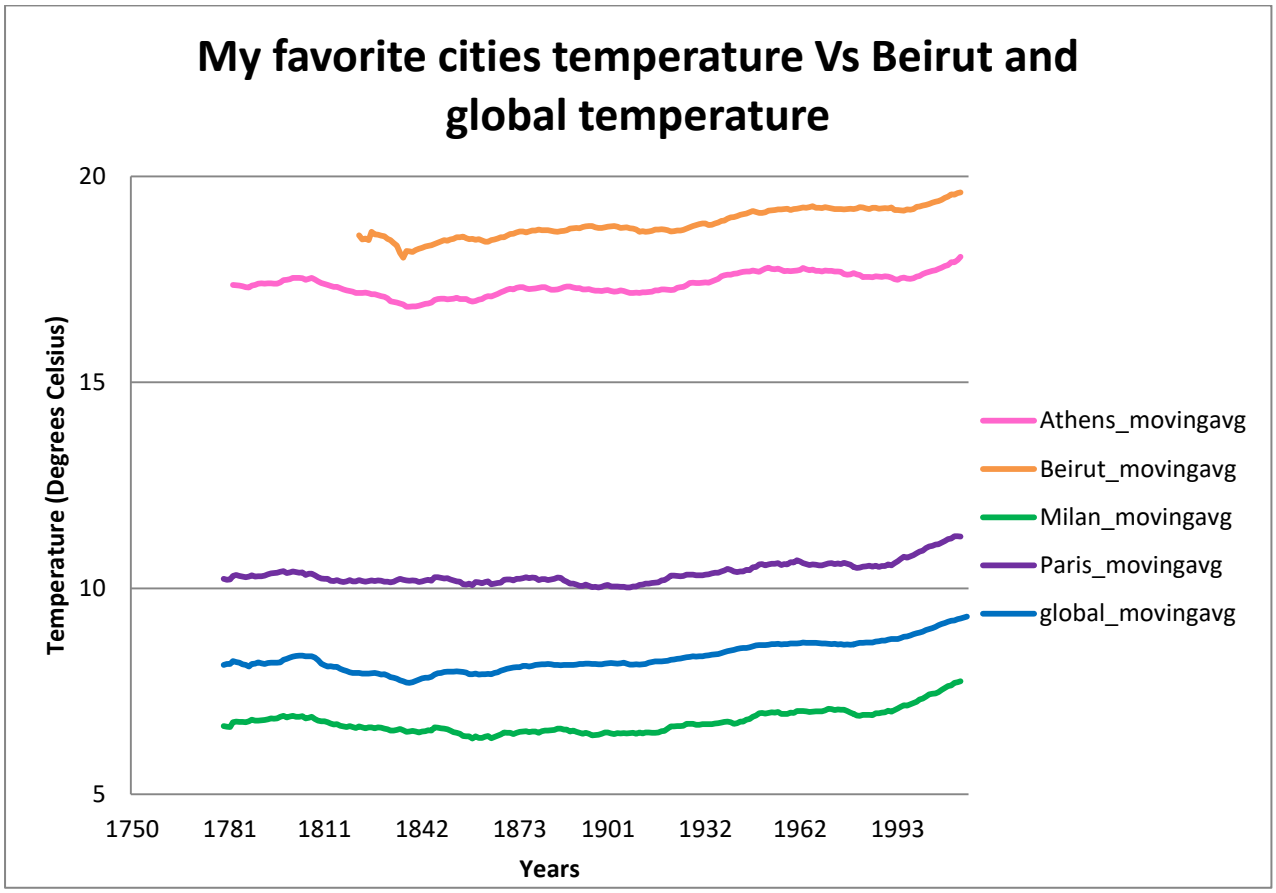
The relationship between years and global temperature is positive and moderate with correlation coefficient=0.62. This scatter plot reveals that this correlation become stronger and more linear in the last few years.



Conclusion:

The relationship between years and Beirut average temperature is positive but poorly moderate with correlation coefficient=0.36

6. Some observations on favorite cities



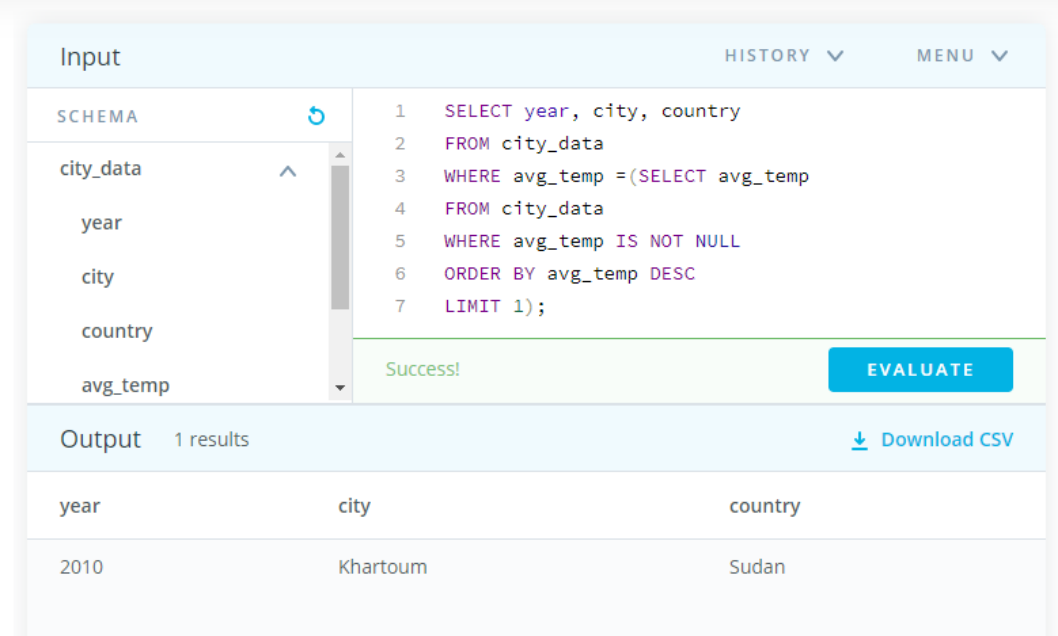
My observations:

1. My favorite cities are: Athens, Milan and Paris.
2. All my favorite cities are cooler then Beirut.
3. Milan is cooler in average then the global average temperature but Paris and Athens are hotter in average then the global temperature.
4. All cities tend to become hotter in the last 30 years similar as the global temperature.

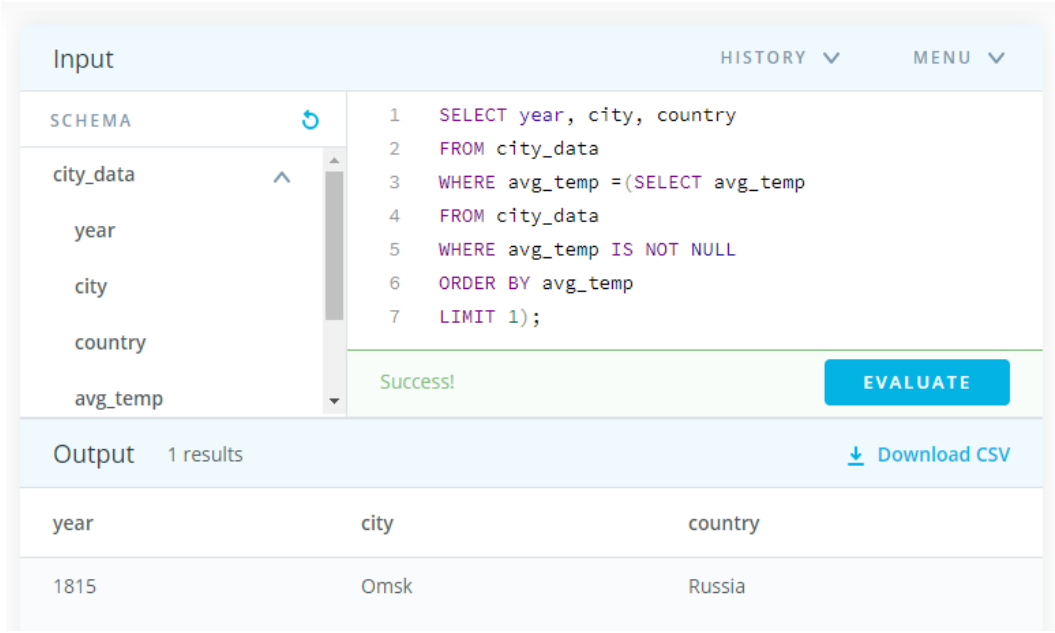
7. **Some general observations:**

a. What is the city which has registered the highest average temperature worldwide? And in which year?

The Khartoum is the city which had registered the highest average temperature in the worldwide and that was in the 2010.



b. What is the city which has registered the lowest average temperature worldwide? And in which year?



The Omsk is the city which had registered the lowest average temperature in the worldwide and that was in the 1815.