Introduction:

For the following, I used SQL to extract the needed data from the database, and then exported it using the export function of the workspace, after that, I used Google Sheet to prepare the extracted data, calculate the moving averages and make charts out them, to finally, make some observations.

SQL Queries:

1. Extracting the city's data:

```
SELECT year , city, avg_temp

FROM city_data

WHERE city LIKE 'Algiers'
```

2. Extracting the global data:

```
SELECT *

FROM global_data
```

Moving Averages:

Before calculating the moving averages, a little change had to be done to the data and that is making dots (.) into commas (,) so that "Google Sheets" could recognize the values as decimal numbers.

More than that, I noticed that the data concerning "Algiers" goes from 1753 to 2013, unlike the global data which goes from 1950 to 2015, so either, I consider global data (from 1950 to 1952 , 2014 and 2015) as additional data that is going to be ignored and only use the matching data, or consider the those as missing data from the Algiers column and try to estimate them ,which I did by calculating the average of the 10 (next/previous)closest years .

(example: temp (2014) = AVERAGE ({temp(2004), …, temp(2013) }))

where temp(i) is the average temperature of the year "i".

Then, calculating the moving averages was done as shown in the lesson, and that is by:

1. Selecting the 5 first cells and calculating their average.
2. Applying the same formula on the rest of rows by dragging the formula down.

city	years	Algiers_avg_temp	global_avg_temp	Global_5MA	Algiers_5MA	temperature difference	Increase
Algiers	1750	16,248	8,72			7,528	0
Algiers	1751	16,189	7,98			8,209	-0,74
Algiers	1752	16,197	5,78			10,417	-2,94
Algiers	1753	16,44	8,39			8,05	-0,33
Algiers	1754	16,48	8,47	7,868	16,3108	8,01	-0,25
Algiers	1755	16,19	8,36	7,796	16,2992	7,83	-0,36
Algiers	1756	16,58	8,85	7,97	16,3774	7,73	0,13
Algiers	1757	16,37	9,02	8,618	16,412	7,35	0,3
Algiers	1758	15,18	6,74	8,288	16,16	8,44	-1,98
Algiers	1759	16,31	7,99	8,192	16,126	8,32	-0,73
Algiers	1760	15,87	7,19	7,958	16,062	8,68	-1,53
Algiers	1761	16,55	8,77	7,942	16,056	7,78	0,05
Algiers	1762	16,51	8,61	7,86	16,084	7,9	-0,11
Algiers	1763	15,85	7,5	8,012	16,218	8,35	-1,22
Algiers	1764	16,56	8,4	8,094	16,268	8,16	-0,32
Algiers	1765	16,54	8,25	8,306	16,402	8,29	-0,47
Algiers	1766	16,49	8,41	8,234	16,39	8,08	-0,31
Algiers	1767	16,31	8,22	8,156	16,35	8,09	-0,5
Algiers	1768	15,53	6,78	8,012	16,286	8,75	-1,94
Algiers	1769	16,25	7,69	7,87	16,224	8,56	-1,03
Algiers	1770	16,13	7,69	7,758	16,142	8,44	-1,03
Algiers	1771	16,65	7,85	7,646	16,174	8,8	-0,87
Algiers	1772	17,45	8,19	7,64	16,402	9,26	-0,53
Algiers	1773	16,21	8,22	7,928	16,538	7,99	-0,5

Note: the values in red are estimated values.

And then, selecting both columns and choosing a chart to plot them.

Line Chart:

Algiers 5MA temperatures VS Global 5MA temperatures
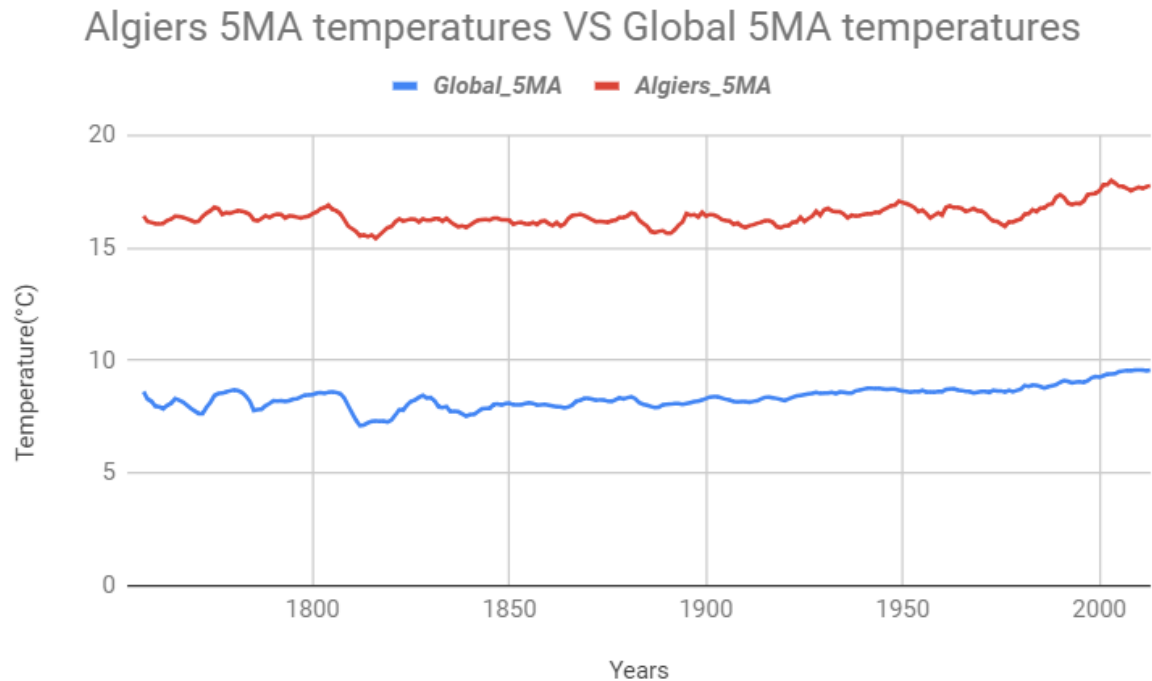
Observations:

1. Algiers average temperature is always higher than the global
   average temperature with a difference equal to 8.07°C in average,
   as shown in this line chart this difference is stable and consistent.

temperature difference (Algiers vs Global)
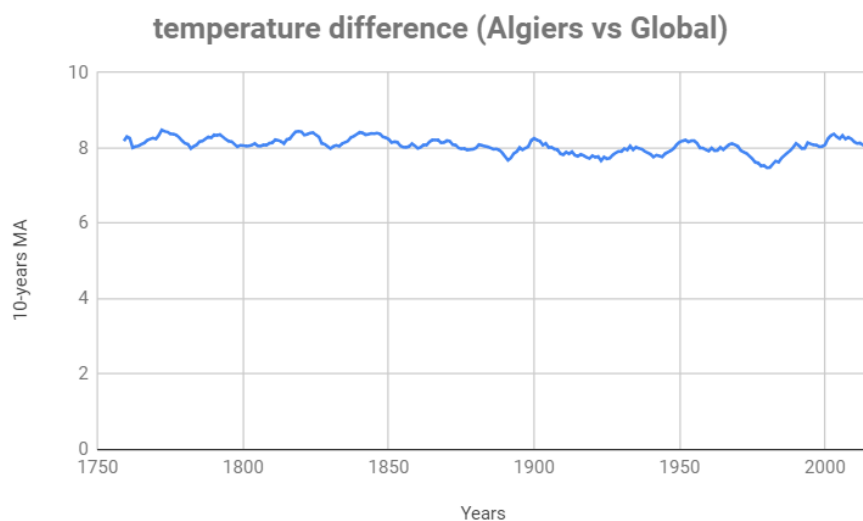
2. The changes in temperature seem similar in the 2 cases, and by
   calculating the correlation coefficient (which is equal to 0.719), I

notice that they have a strong positive correlation which explains why they behave in similar ways.

3. The global temperature has known an important increase since 1972 where it went from 8.5°C to 9.83°C in 2015 which makes it an increase of 1.33°C in 44 years (0.03°C/year).

Temperature Increase (10-years MA)
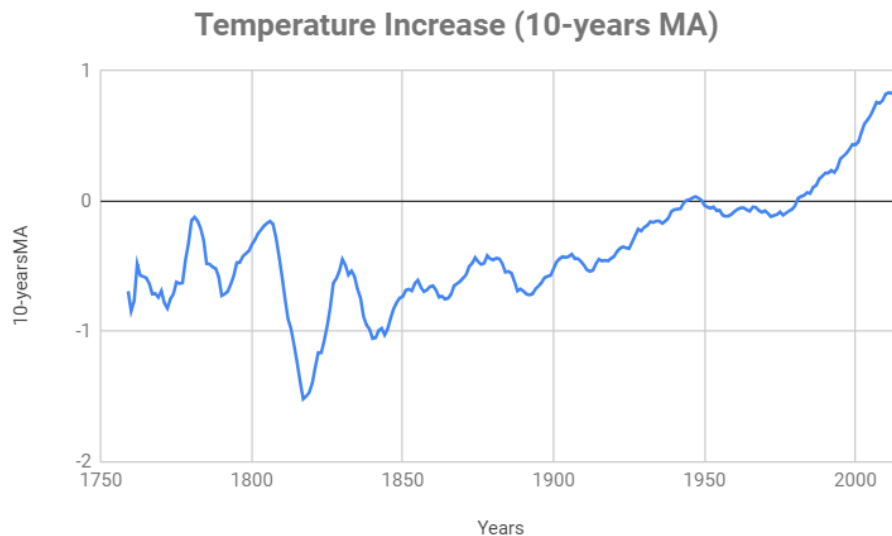
4. The global temperature has also known another important increase between 1890 and 1950, where it went from 7.97°C to 8.37°C which makes 0.4°C in 60 years, though this increase was approximately 5 time slower than the previous one (~0.0066°C/year).

5. The global temperature in the period before 1870 was not stable enough to make accurate deductions.

Link to the spreadsheet:

https://docs.google.com/spreadsheets/d/1O4GrL0ouwHmJB9cggJoH-yUmh3gkKIs37eEDa77UNsk/edit?usp=sharing