Project: Exploring Weather Trends

1. Outline
- I used SQL queries to extract the desired data in CSV format from the database (ie local and global temperature data). Then I used MS Excel to process and analyse the gathered data.
- I calculated the average by averaging the current year with the past four years, resulting in a moving average over a five-year range. This resulted in a smoothing of the data to be analysed.
- My key considerations when visualising the tends was to identify local and global temperature trends, and determine any correlation between both local and global data sets.

2. Extract Data
Firstly, I checked what cities in my country of residence were available with the following SQL instructions:

SELECT *
FROM city_list
WHERE country LIKE 'United Arab Emirates'

Temperature data on my current city of residence, Abu Dhabi, is indeed available.
Secondly, I submitted a query to access all temperature data on Abu Dhabi and for global tempeatures

SELECT *
FROM city_data
WHERE city LIKE 'Abu Dhabi'

SELECT *
FROM global_data

Finally, I downloaded both CSV data sets for processing in MS Excel.

3. CSV files processing in MS Excel
Temperature data ranges for Abu Dhabi are available from 1843 to 2013. Since we are comparing local temperature and global temperature data, calculated moving averages that falls outside of the years [1843, 2013] are not to be considered.

Also, data for some years between 1845 and 1860 is missing. Hence, calculated moving average results of ZERO are to be dismissed for the comparison. Also, if due to missing information a 5-year average could not be determined, yearly temperature data was used instead (as is the case between 1843 and 1860).
In all other cases, a moving average over a five-year range was chosen.
Finally, all data to formatted to present three decimals to visualise and capture all data in a consistent fashion, as shown in the screenshot below:

	A	B	C	D	E	F	G	H	I
1	year	avg_temp	Glob_Mov_avg		year	city	country	avg_temp	Loc_Mov_avg
94	1842	8.020							
95	1843	8.170	7.862		1843	Abu Dhabi	United Arab Emirates	26.040	26.040
96	1844	7.650	7.866		1844	Abu Dhabi	United Arab Emirates	26.260	26.260
97	1845	7.850	7.876		1845	Abu Dhabi	United Arab Emirates		
98	1846	8.550	8.048		1846	Abu Dhabi	United Arab Emirates		
99	1847	8.090	8.062		1847	Abu Dhabi	United Arab Emirates		
100	1848	7.980	8.024		1848	Abu Dhabi	United Arab Emirates	25.830	25.830
101	1849	7.980	8.090		1849	Abu Dhabi	United Arab Emirates	26.010	26.010
102	1850	7.900	8.100		1850	Abu Dhabi	United Arab Emirates	25.690	25.690
103	1851	8.180	8.026		1851	Abu Dhabi	United Arab Emirates	26.250	26.250
104	1852	8.100	8.028		1852	Abu Dhabi	United Arab Emirates		
105	1853	8.040	8.040		1853	Abu Dhabi	United Arab Emirates		
106	1854	8.210	8.086		1854	Abu Dhabi	United Arab Emirates		
107	1855	8.110	8.128		1855	Abu Dhabi	United Arab Emirates		
108	1856	8.000	8.092		1856	Abu Dhabi	United Arab Emirates		
109	1857	7.760	8.024		1857	Abu Dhabi	United Arab Emirates		
110	1858	8.100	8.036		1858	Abu Dhabi	United Arab Emirates		
111	1859	8.250	8.044		1859	Abu Dhabi	United Arab Emirates		
112	1860	7.960	8.014		1860	Abu Dhabi	United Arab Emirates		
113	1861	7.850	7.984		1861	Abu Dhabi	United Arab Emirates	25.100	25.100
114	1862	7.560	7.944		1862	Abu Dhabi	United Arab Emirates	25.340	25.220
115	1863	8.110	7.946		1863	Abu Dhabi	United Arab Emirates	23.620	24.687
116	1864	7.980	7.892		1864	Abu Dhabi	United Arab Emirates	26.000	25.015
117	1865	8.180	7.936		1865	Abu Dhabi	United Arab Emirates	26.260	25.264
118	1866	8.290	8.024		1866	Abu Dhabi	United Arab Emirates	26.090	25.462
119	1867	8.440	8.200		1867	Abu Dhabi	United Arab Emirates	26.440	25.682

4. Line chart of temperature data moving averages

A line chart with the plotted moving averages was created and is shown below:

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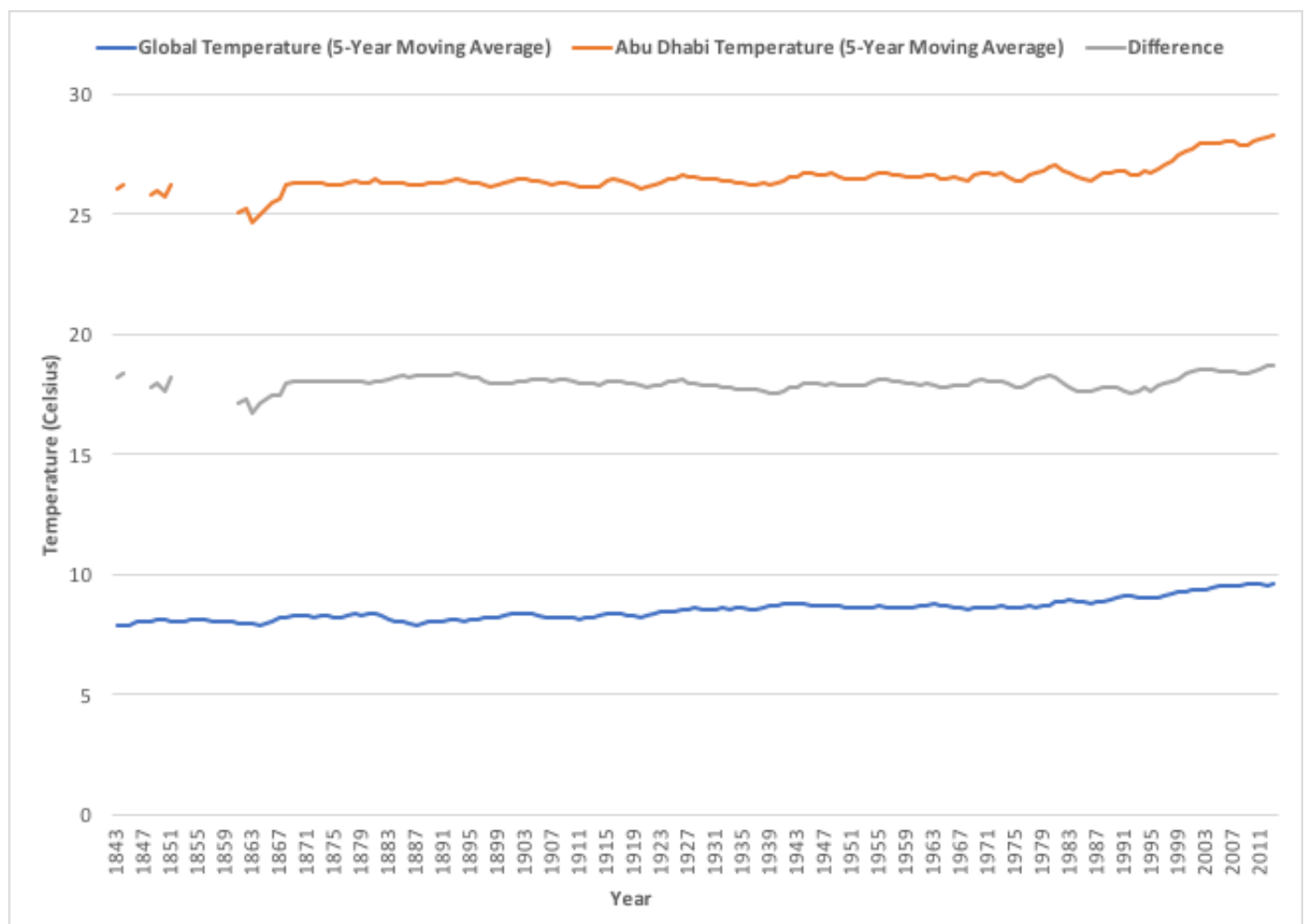
5. **Observations**
   - From the line chart, one can see that the local temperate for Abu Dhabi is on average higher than global temperature. Indeed, the city of Abu Dhabi is on average 18 degrees Celsius hotter compared to global temperature data.

   - The difference between moving averages (plotted in the graph above) shows a consistent difference Δ between both moving averages. Indeed, the calculated standard deviation was calculated to be 0.3 hence showing a consistent delta between both data sets.

   - Between 1843 and 2011, recorded yearly temperatures in Abu Dhabi rose by 1.970 degree Celsius, while globally recorded yearly temperature rose 1.708 degree Celsius. Which corresponds to increase of 8% in temperature between 1843 and 2011 for the city of Abu Dhabi, compared to an increase of 21% globally. Hence, Abu Dhabi's temperature has risen a non-negligible amount but a slower pace than global trends. This may be due to the already high temperature present in the Arabic Gulf.

   - Overall, according to yearly temperature averages, the globe is clearly getting hotter and this trend spans from the early 1800s to recent years. A particular increase in global temperature was noted from 1980s to 2011 which can be explained by globalisation and the increase in global industrial activity.

   - This trend applies to both Abu Dhabi and Globally as both data sets show a correlation factor of +0.88 and hence show a strong positive relationship between yearly average temperature data and Abu Dhabi yearly temperature data.