Explore Weather Trends

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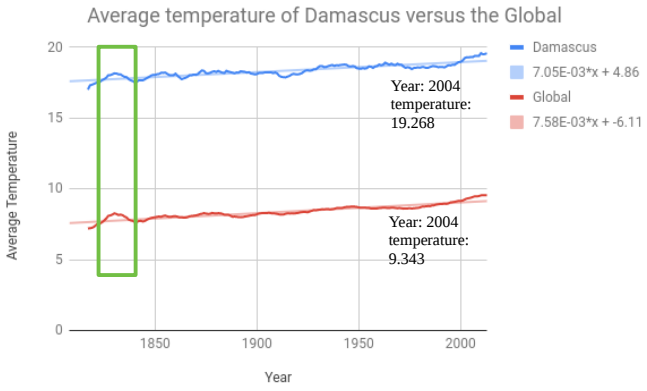
Steps

1. Extract a city data that is the closest to where I live. I choose to extract the data for the city of Damascus. The results of query evaluation were downloaded from csv.I used the following Query:
   SELECT year, avg_temp, city FROM CITY_DATA WHERE city = 'Damascus' ;
2. Extract the global data from the global_data table and downloading the results into a csv. The following Query was used to extract the results:
   SELECT year, avg_temp FROM GLOBAL_DATA;
3. Opened the data in google sheets to start the investigation of the data. I decided to investigate for the temperatures were the city data was present for Damascus which was from the year 1808 till the year 2013.
4. Calculate the moving average for a decade for the city of Damascus and the global temperatures. I used the average function for each chunk of 10 years [AVERAGE(B2:B11)].
5. Used the result of the moving average to compare the city of Damascus versus the global average by plotting the average temperatures across the years for both.
6. Measured the correlation coefficient using the [CORREL(D11:D207,E11:E207)]
7. added the trend-line for each series and labeled it with the equation.
8. Extracted the Data for my favorite cities to observe the trends in the average temperature compared to global average temperature. I used the following SQL query:
   SELECT year, avg_temp, city FROM CITY_DATA WHERE city in ('Cairo','Damascus','Edinburgh','Vienna') ;
9. repeated the steps 4-7 to study the new cities.

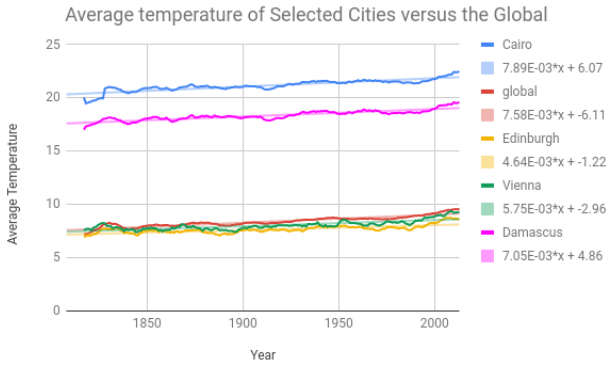
Line Chart



Observations

- Calculated Pearson correlation is 0.95731817. Which means that the average temperature of this city is strongly correlated with the global average temperature.
- The average temperature in Damascus city can be estimated from the global average temperature. And this can inferred from two things: first the trend-line equation above were the difference in the constant in the equation is almost 10 degrees, so we can just add to the average temperature 10 degrees. Also inspection of the average temperature for the two for a certain year. As an example if we take year 2004 for the Damascus the moving average temperature was 19.268 while the global average was 9.343.
- Damascus is following the trend in the global temperature. And we can see from the line chart above how the average temperature is getting higher for both the global average and for the city under investigation. The highlighted green box show that before 1850 there was a peak in temperature in the global temperature and that it exist for Damascus city as well. Also the difference in average temperature between year 2013 and year 1817 is 2.576 for Damascus city while the difference in global average temperature is 2.353 degrees so both exhibit increase of temperature trend.
- The range of the average temperatures for Damascus is 2.578 compared to 2.353 global average.

Extended Observations Against selected cities



In this section I added to comparison 3 cities: Cairo, Edinburgh and Vienna.

- Pearson correlation coefficient against the global average temperature is as follows: Cairo it is 0.9325437122, Damascus it is 0.95731817, Edinburgh it is 0.9009079991 and for Vienna the coefficient is 0.8634020437. This match with the previous conclusion that there is a strong linear correlation between these average temperatures for the cities versus the global average temperatures.
- We can see from the line chart that Edinburgh and Vienna have similar average temperature to the global average temperature line. For example: In year 2004, Edinburgh average temperature was 8.563 degrees, Vienna was 8.919 degrees and the global average temperature was 9.343 degrees, so all are within 1 degree difference. Comparing this with Cairo 2004 degree which was 22 degree which is around 11 degrees difference.
- The cities are following the trend in the increased global temperature. This can be seen from the line chart above how the average temperature is getting higher for both the global average and for the city under investigation. Also the difference in average temperature between year 2013 and year 1817 is

2.576 for Damascus city, 2.991 for Cairo, 1.798 for Edinburgh, 1.955 for Vienna while the difference in global average temperature is 2.353 degrees so all exhibit an overall increase of temperature.