

Exploring Weather Trends

Project 1

Analysis Of Local And Global Temperature Data

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Overview

This Project describes similarities and differences between global temperature averages and temperature trends in Tbilisi, Georgia.

Outline

Project consists of following steps :

- Extraction of data from a database using a SQL query.
- Calculation of a moving average in a spreadsheet.
- Creation of a line chart in a spreadsheet.
- Least four observations, about the similarities and/or differences in the trends.

Tooles

- SQL - For data extraction

SQL commands to find city, select and join tables:

- SELECT * FROM city_list WHERE country LIKE 'Georgia'
- SELECT global_data.year, global_data.avg_temp as globavg,

city_data.avg_temp as cityavg

FROM global_data

JOIN city_data

ON global_data.year=city_data.year

WHERE city='Tbilisi'

- Excel - Plotting Line Charts and calculating Moving Average

Moving Average was calculated in columns D-I using formula:

"=AVERAGE(An:An+x-1) "

Where x = 3, x = 7 and x = 11

Below is a part of Excel file for demonstration porpoises.

Excel File

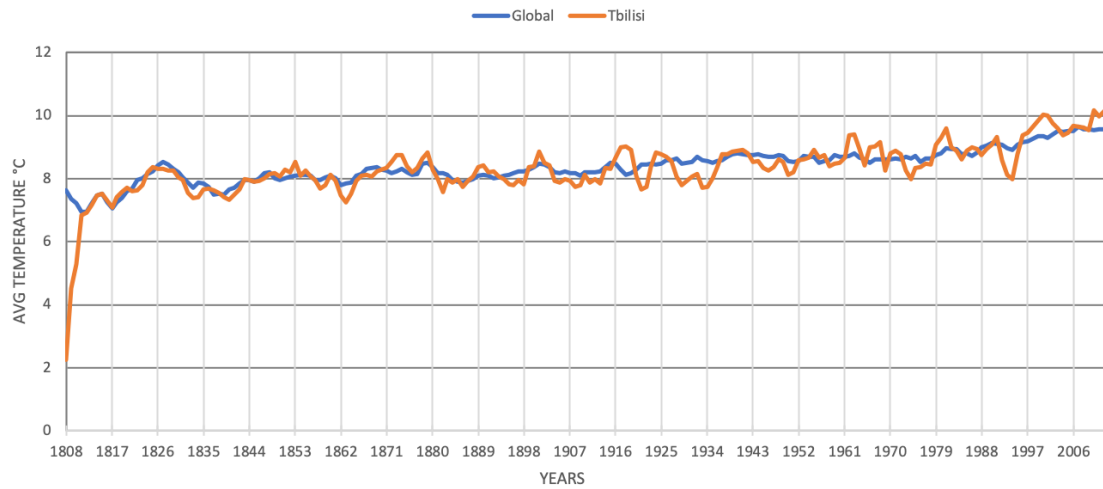
	A	B	C	D	E	F	G	H	I
1	year	globavg	cityavg	Global11	Tbilisi11	Global3	Tbilisi3	Global7	Tbilisi7
2	1808	7,63	2,27	7,63	2,27	7,63	2,27	7,63	2,27
3	1809	7,08	6,75	7,355	4,51	7,355	4,51	7,355	4,51
4	1810	6,92	6,83	7,21	5,283333333	7,21	5,283333333	7,21	5,283333333
5	1811	6,86	6,9	7,1225	5,6875	6,953333333	6,826666667	7,1225	5,6875
6	1812	7,05	7,02	7,108	5,954	6,943333333	6,916666667	7,108	5,954
7	1813	7,74	7,56	7,213333333	6,221666667	7,216666667	7,16	7,213333333	6,221666667
8	1814	7,59	7,79	7,267142857	6,445714286	7,46	7,456666667	7,267142857	6,445714286
9	1815	7,24	7,18	7,26375	6,5375	7,523333333	7,51	7,211428571	7,147142857
10	1816	6,94	6,95	7,227777778	6,583333333	7,256666667	7,306666667	7,191428571	7,175714286
11	1817	6,98	7,12	7,203	6,637	7,053333333	7,083333333	7,2	7,217142857
12	1818	7,83	8,14	7,26	6,773636364	7,25	7,403333333	7,338571429	7,394285714
13	1819	7,37	7,43	7,236363636	7,242727273	7,393333333	7,563333333	7,384285714	7,452857143
14	1820	7,62	7,54	7,285454545	7,314545455	7,606666667	7,703333333	7,367142857	7,45
15	1821	8,09	7,87	7,391818182	7,409090909	7,693333333	7,613333333	7,438571429	7,461428571
16	1822	8,19	7,47	7,512727273	7,460909091	7,966666667	7,626666667	7,574285714	7,502857143
17	1823	7,72	8,06	7,573636364	7,555454545	8	7,8	7,685714286	7,661428571
18	1824	8,55	9,05	7,647272727	7,690909091	8,153333333	8,193333333	7,91	7,937142857
19	1825	8,39	7,96	7,72	7,706363636	8,22	8,356666667	7,99	7,911428571
20	1826	8,36	7,92	7,821818182	7,773636364	8,433333333	8,31	8,131428571	7,981428571
21	1827	8,81	9,08	7,991818182	7,967272727	8,52	8,32	8,301428571	8,201428571
22	1828	8,17	7,8	8,1	8,029090909	8,446666667	8,266666667	8,312857143	8,191428571
23	1829	7,94	7,93	8,11	8,01	8,306666667	8,27	8,277142857	8,257142857
24	1830	8,52	8,35	8,214545455	8,093636364	8,21	8,026666667	8,391428571	8,298571429
25	1831	7,64	7,62	8,216363636	8,100909091	8,033333333	7,966666667	8,261428571	8,094285714
26	1832	7,45	6,65	8,158181818	7,99	7,87	7,54	8,127142857	7,907142857
27	1833	8,01	7,86	8,141818182	8,025454545	7,7	7,376666667	8,077142857	7,898571429
28	1834	8,15	7,73	8,180909091	7,995454545	7,87	7,413333333	7,982857143	7,705714286
29	1835	7,39	7,4	8,075454545	7,845454545	7,85	7,663333333	7,871428571	7,648571429
30	1836	7,7	7,94	8,012727273	7,843636364	7,746666667	7,69	7,837142857	7,65
31	1837	7,38	7,52	7,923636364	7,807272727	7,49	7,62	7,674285714	7,531428571
32	1838	7,51	7,21	7,805454545	7,637272727	7,53	7,556666667	7,655714286	7,472857143
33	1839	7,63	7,51	7,756363636	7,610909091	7,506666667	7,413333333	7,681428571	7,595714286
34	1840	7,8	7,25	7,743636364	7,549090909	7,646666667	7,323333333	7,651428571	7,508571429
35	1841	7,69	7,74	7,668181818	7,493636364	7,706666667	7,5	7,585714286	7,51
36	1842	8,02	7,98	7,702727273	7,526363636	7,836666667	7,656666667	7,675714286	7,592857143
37	1843	8,17	8,22	7,768181818	7,669090909	7,96	7,98	7,742857143	7,632857143
38	1844	7,65	7,69	7,735454545	7,653636364	7,946666667	7,963333333	7,781428571	7,657142857
39	1845	7,85	7,83	7,708181818	7,662727273	7,89	7,913333333	7,83	7,745714286
40	1846	8,55	8,25	7,813636364	7,74	8,016666667	7,923333333	7,961428571	7,851428571
41	1847	8,09	7,96	7,849090909	7,741818182	8,163333333	8,013333333	8,002857143	7,952857143
42	1848	7,98	8,21	7,903636364	7,804545455	8,206666667	8,14	8,044285714	8,02
43	1849	7,98	8,35	7,946363636	7,908181818	8,016666667	8,173333333	8,038571429	8,072857143
44	1850	7,9	7,62	7,970909091	7,918181818	7,953333333	8,06	8	7,987142857
45	1851	8,18	8,88	8,005454545	8,066363636	8,02	8,283333333	8,075714286	8,157142857
46	1852	8,1	8,12	8,042727273	8,100909091	8,06	8,206666667	8,111428571	8,198571429

Graphs

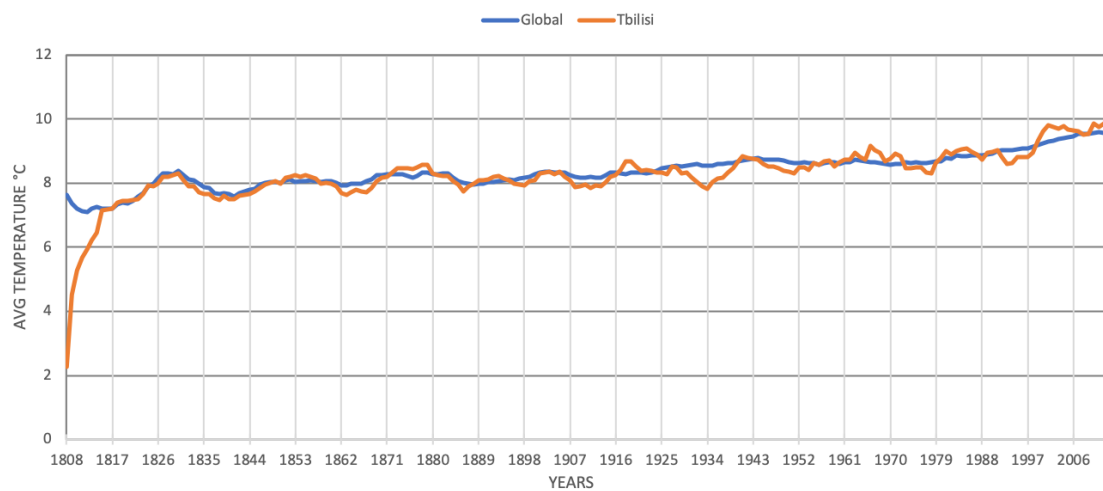
I have plotted global and local graphs together to better demonstrate differences and similarities between the two.

First, Second and third graphs show moving average with windows 3, 7, 11.

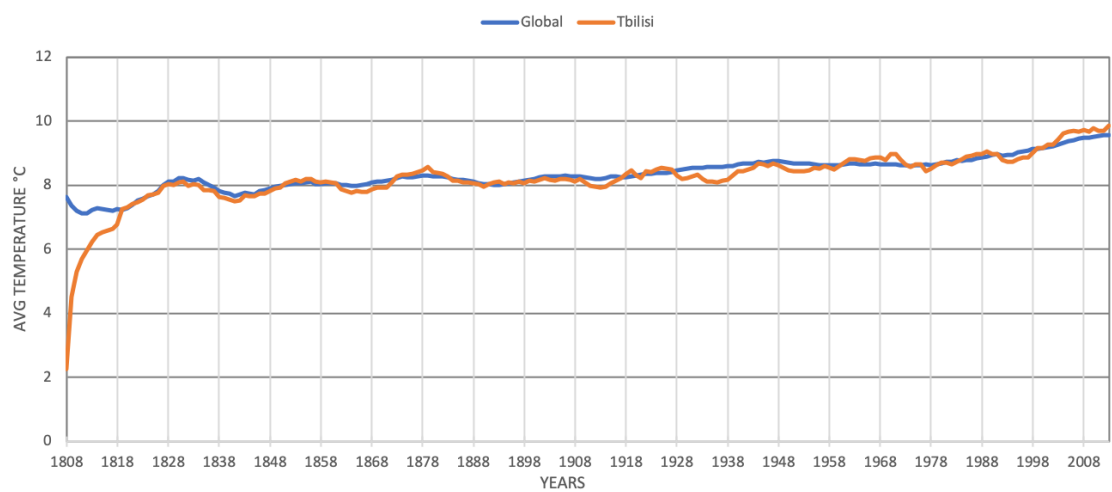
Global and Tbilisi 3 year Moving Average Temperature (1808-2013)



Global and Tbilisi 7 year Moving Average Temperature (1808-2013)



Global and Tbilisi 11 year Moving Average Temperature (1808-2013)



Observations

1. Global average temperature changes between $\sim 7.5^{\circ}\text{C}$ - 9.5°C during ~ 200 years. Showing a (in larger picture) trend of very slow gradual increase over the years 1808 - 2010 of nearly 2°C .
2. Average Tbilisi temperature is very similar to global average. Which has mostly been consistent over time (Especially from year 1820 till 2010).
3. Tbilisi average temperature trend, Just like trend for global average, also shows gradual increase over long period of time.
4. Both averages show consistent type of periodicity, where after temperature increase phase, comes a decrease phase: having peak minimums and maximums in every period. Showing that in smaller periods (~ 10 years) temperature stays nearly consistent.
5. According to above observation [4] and an average temperature graph, we can expect an average temperature decrease soon after 2010 (first a bit of increase possibly, and once it reaches maximum peak, it will start to decrease), for global world and Tbilisi.
6. Having in mind the first observation [1], and larger time lapse, we can also expect a gradual and slow increase of temperature after 2010. For example in every 100 years by $\sim +1^{\circ}\text{C}$. This shows a trend of temperature rising globally. However, this is only a guess, based on small time period, and I don't have nearly enough information from this data, to make any accurate conclusion.