PROJECT: EXPLORE WEATHER TRENDS

Outline of Steps for Data Preparation and Analysis:

- SQL query for extracting the data from the Database:

```
select a.year, a.city, a.country, a.avg_temp as "Kanpur_temp" ,
b.avg_temp as "Global_temp"
from city_data a
inner join global_data b
on a.year=b.year
where a.city='Kanpur'
and a.avg_temp is NOT NULL;
```

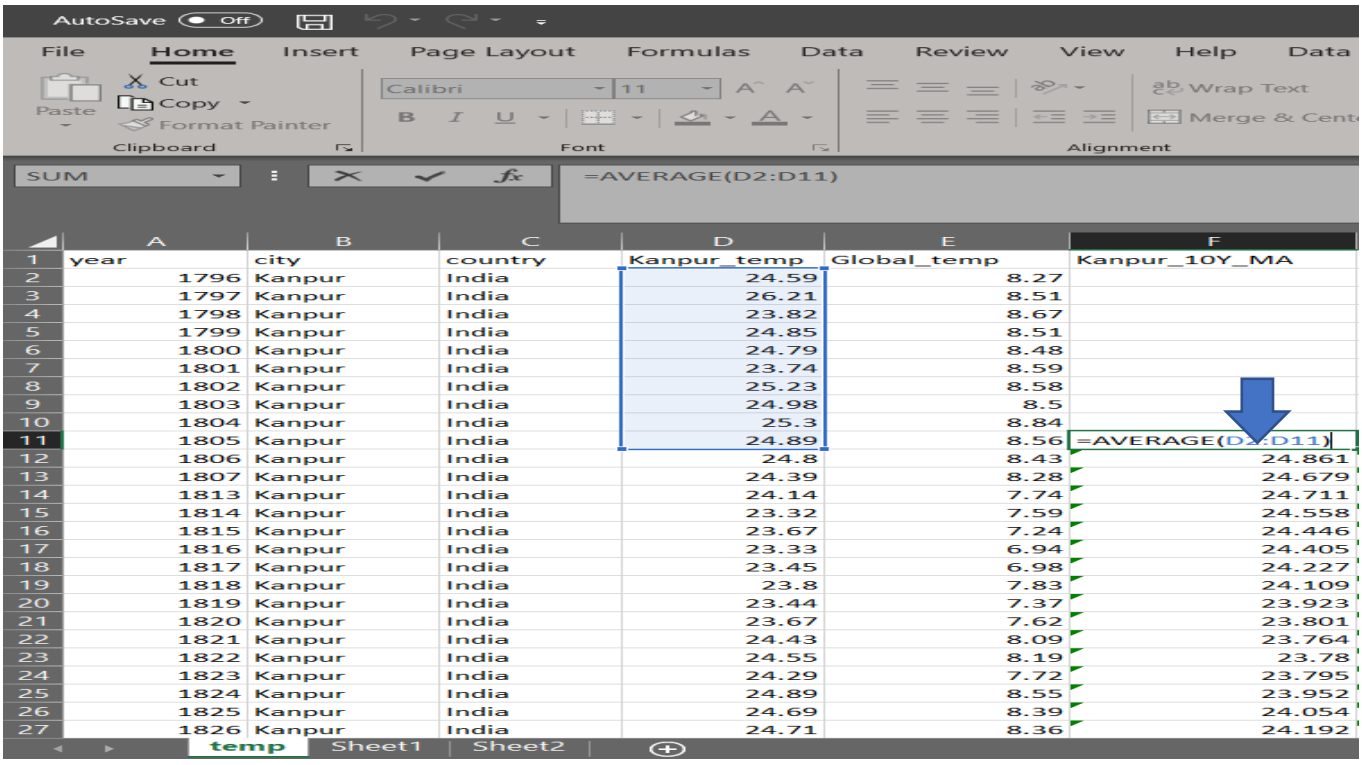
- The queried data contains Year, City, Country, Kanpur_temp and Global_temp as column headers.
- Exported the queried data to a .csv file for further analysis.

Tools Used:

- SQL is used to extract the required data from the database.
- Microsoft Excel is used for calculation of moving average and plotting of line charts.

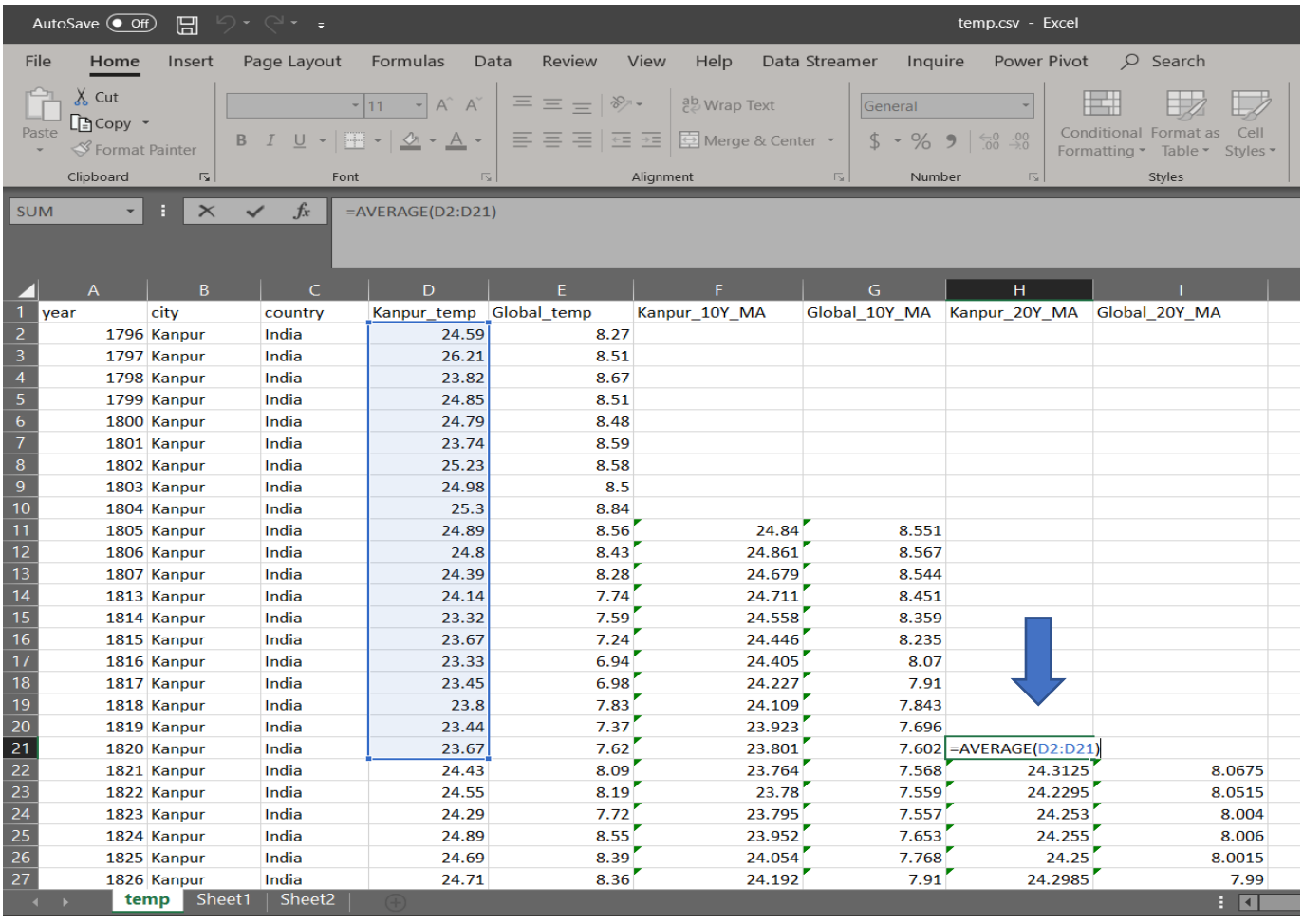
Calculation of Moving Average:

I calculated 10 Year and 20 Year moving averages of city temperature and global temperatures rather than the yearly averages in order to smooth out the plot and make trends more observable. To achieve this task, I have used built in excel function- AVERAGE() which is demonstrated below:



	A	B	C	D	E	F
1	year	city	country	Kanpur_temp	Global_temp	Kanpur_10Y_MA
2	1796	Kanpur	India	24.59	8.27	
3	1797	Kanpur	India	26.21	8.51	
4	1798	Kanpur	India	23.82	8.67	
5	1799	Kanpur	India	24.85	8.51	
6	1800	Kanpur	India	24.79	8.48	
7	1801	Kanpur	India	23.74	8.59	
8	1802	Kanpur	India	25.23	8.58	
9	1803	Kanpur	India	24.98	8.5	
10	1804	Kanpur	India	25.3	8.84	
11	1805	Kanpur	India	24.89	8.56	=AVERAGE(D2:D11)
12	1806	Kanpur	India	24.8	8.43	24.861
13	1807	Kanpur	India	24.39	8.28	24.679
14	1813	Kanpur	India	24.14	7.74	24.711
15	1814	Kanpur	India	23.32	7.59	24.558
16	1815	Kanpur	India	23.67	7.24	24.446
17	1816	Kanpur	India	23.33	6.94	24.405
18	1817	Kanpur	India	23.45	6.98	24.227
19	1818	Kanpur	India	23.8	7.83	24.109
20	1819	Kanpur	India	23.44	7.37	23.923
21	1820	Kanpur	India	23.67	7.62	23.801
22	1821	Kanpur	India	24.43	8.09	23.764
23	1822	Kanpur	India	24.55	8.19	23.78
24	1823	Kanpur	India	24.29	7.72	23.795
25	1824	Kanpur	India	24.89	8.55	23.952
26	1825	Kanpur	India	24.69	8.39	24.054
27	1826	Kanpur	India	24.71	8.36	24.192

Calculation of 10 Year Moving Average

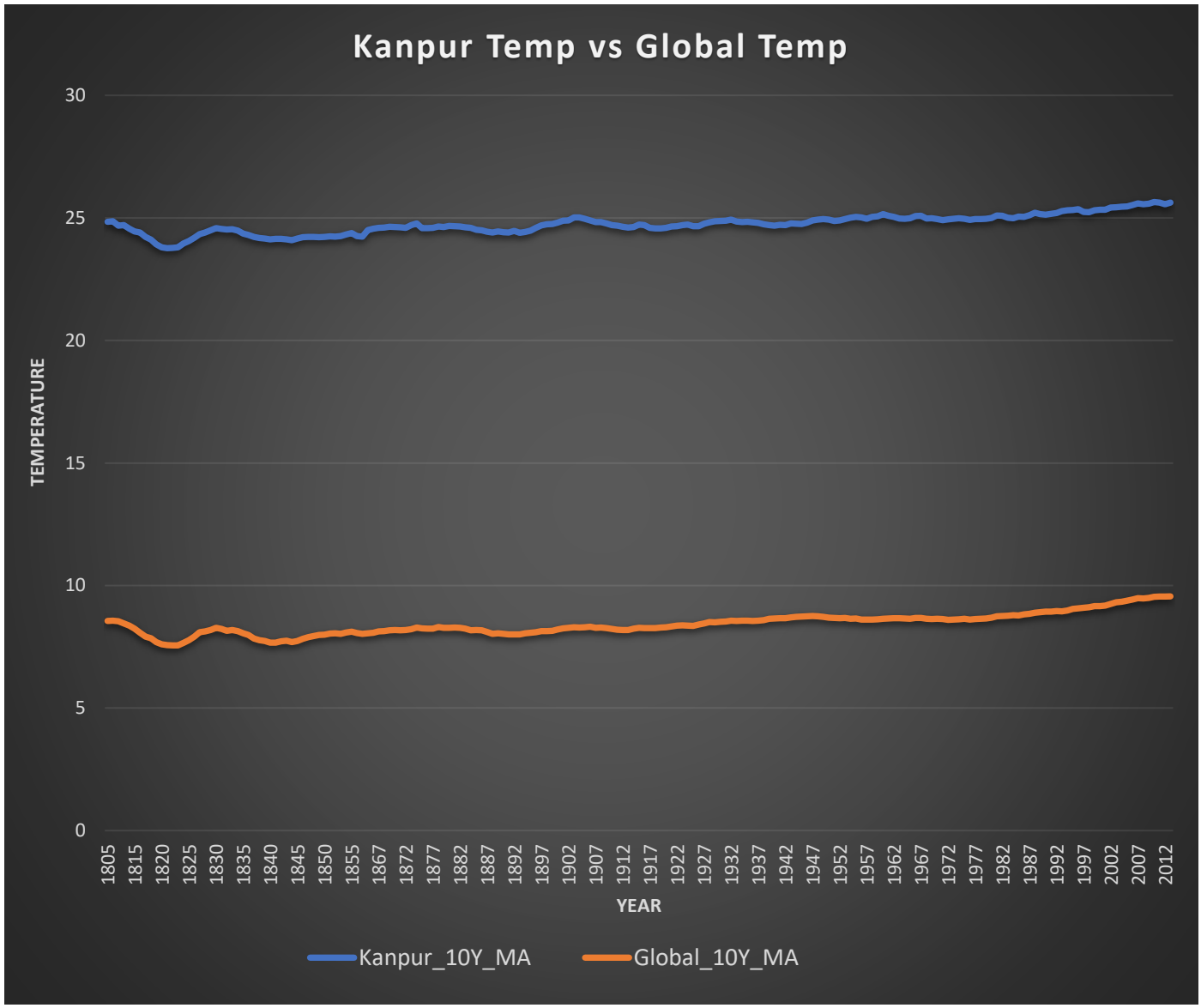


	A	B	C	D	E	F	G	H	I
1	year	city	country	Kanpur_temp	Global_temp	Kanpur_10Y_MA	Global_10Y_MA	Kanpur_20Y_MA	Global_20Y_MA
2	1796	Kanpur	India	24.59	8.27				
3	1797	Kanpur	India	26.21	8.51				
4	1798	Kanpur	India	23.82	8.67				
5	1799	Kanpur	India	24.85	8.51				
6	1800	Kanpur	India	24.79	8.48				
7	1801	Kanpur	India	23.74	8.59				
8	1802	Kanpur	India	25.23	8.58				
9	1803	Kanpur	India	24.98	8.5				
10	1804	Kanpur	India	25.3	8.84				
11	1805	Kanpur	India	24.89	8.56	24.84	8.551		
12	1806	Kanpur	India	24.8	8.43	24.861	8.567		
13	1807	Kanpur	India	24.39	8.28	24.679	8.544		
14	1813	Kanpur	India	24.14	7.74	24.711	8.451		
15	1814	Kanpur	India	23.32	7.59	24.558	8.359		
16	1815	Kanpur	India	23.67	7.24	24.446	8.235		
17	1816	Kanpur	India	23.33	6.94	24.405	8.07		
18	1817	Kanpur	India	23.45	6.98	24.227	7.91		
19	1818	Kanpur	India	23.8	7.83	24.109	7.843		
20	1819	Kanpur	India	23.44	7.37	23.923	7.696		
21	1820	Kanpur	India	23.67	7.62	23.801	7.602	=AVERAGE(D2:D21)	
22	1821	Kanpur	India	24.43	8.09	23.764	7.568	24.3125	8.0675
23	1822	Kanpur	India	24.55	8.19	23.78	7.559	24.2295	8.0515
24	1823	Kanpur	India	24.29	7.72	23.795	7.557	24.253	8.004
25	1824	Kanpur	India	24.89	8.55	23.952	7.653	24.255	8.006
26	1825	Kanpur	India	24.69	8.39	24.054	7.768	24.25	8.0015
27	1826	Kanpur	India	24.71	8.36	24.192	7.91	24.2985	7.99

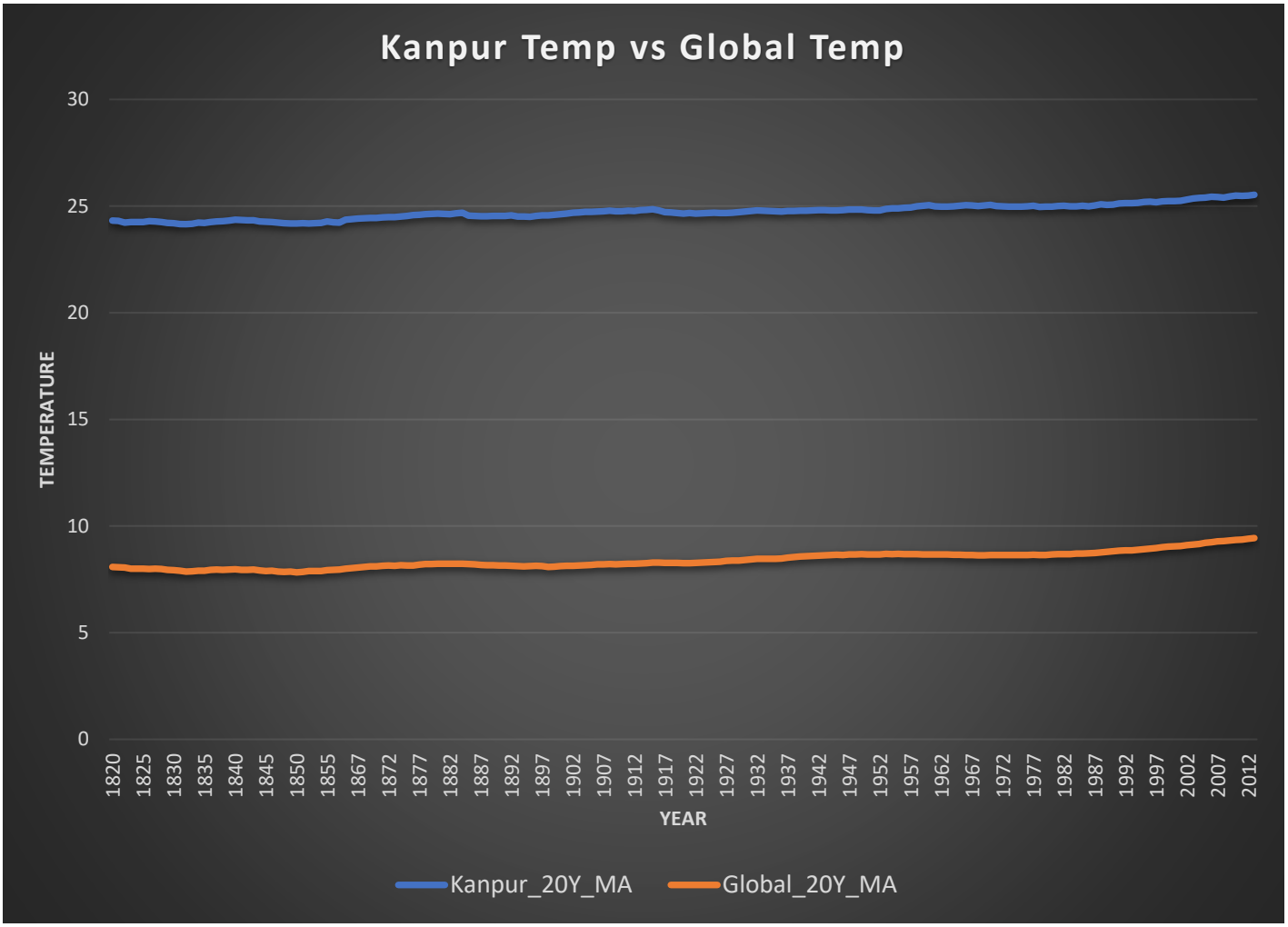
Calculation of 20 Year Moving Average

Steps:

- Observing the extracted data.
- Calculating the 10 Year and 20 Year Moving Average of temperatures of nearest city i.e. (Kanpur) and of the Global Temperature.
- Plotting the Line Chart to visually assess the data.
- Trend observations.



10 Year Moving Average Trend



20 Year Moving Average Trend

Key Observations:

- Global average temperatures are much lower when compared to average temperatures in Kanpur.
- From the 10 Year Moving Average chart, we can derive that there was sudden fall in temperature of Kanpur city after 1813 to 1821 and then it is increasing gradually.
- Quite similar trend was observed in the global temperature as well during 1813 to 1821 as first it decreases and then it is increasing gradually.
- Between 1897 and 1917, temperatures at Kanpur first increase reach a local maximum and then decrease again as evident from the 10 Year Moving Average chart. However, no such trend is observed in Global temperatures.
- When we analyze the trend in the past few years i.e. (for instance between 1982 to 2012), Global Temperature is increasing at a more rapid rate than temperatures at Kanpur as visible from steepness in the curve of Global Temperature in both the charts.