Project:1 Explore Weather Trends

City under consideration: The City considered in this Project for analysis is **“Haora”** from **“India”**.

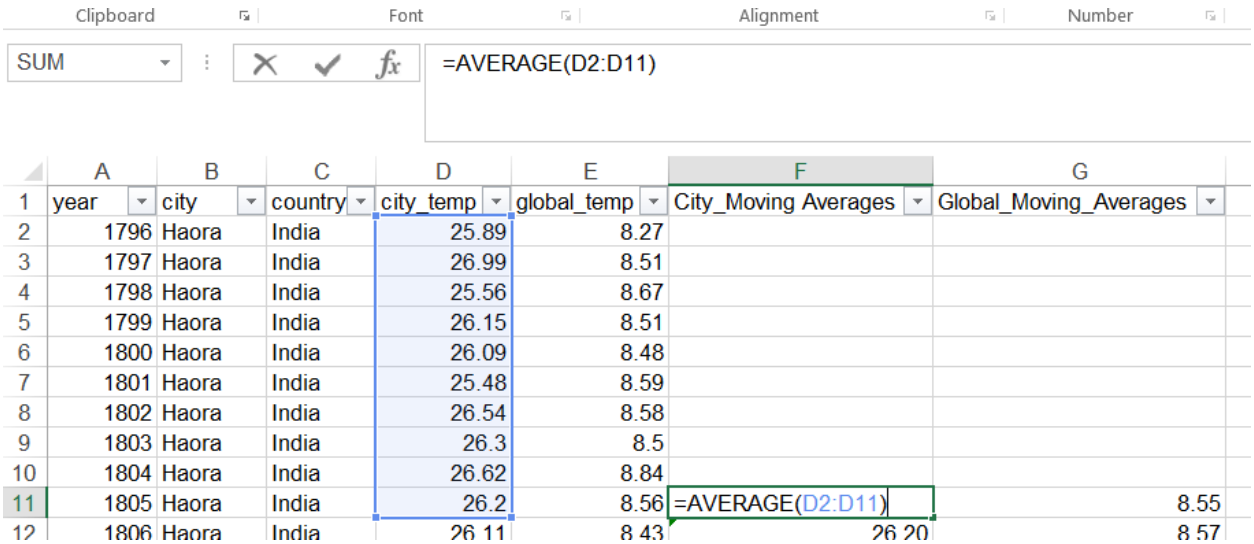
Data Extraction: SQL query is used to extract the data:

- **To extract City data:** select * from city_data where city = ‘Haora’
- **To extract Global data:** select * from global_data

Once we extract the data, Global Temperatures corresponding to the City Temperature across years are populated using a VLOOKUP function in Excel.

Missing values treatment: The City Temperature contains some missing values from 1808 to 1812. The missing values are being imputed by using moving average of previous 5 years. Eg., for 1808, missing values are being imputed by taking average of 1803 to 1807. For 1809, average temperature of 1804 to 1808 is considered and so on.

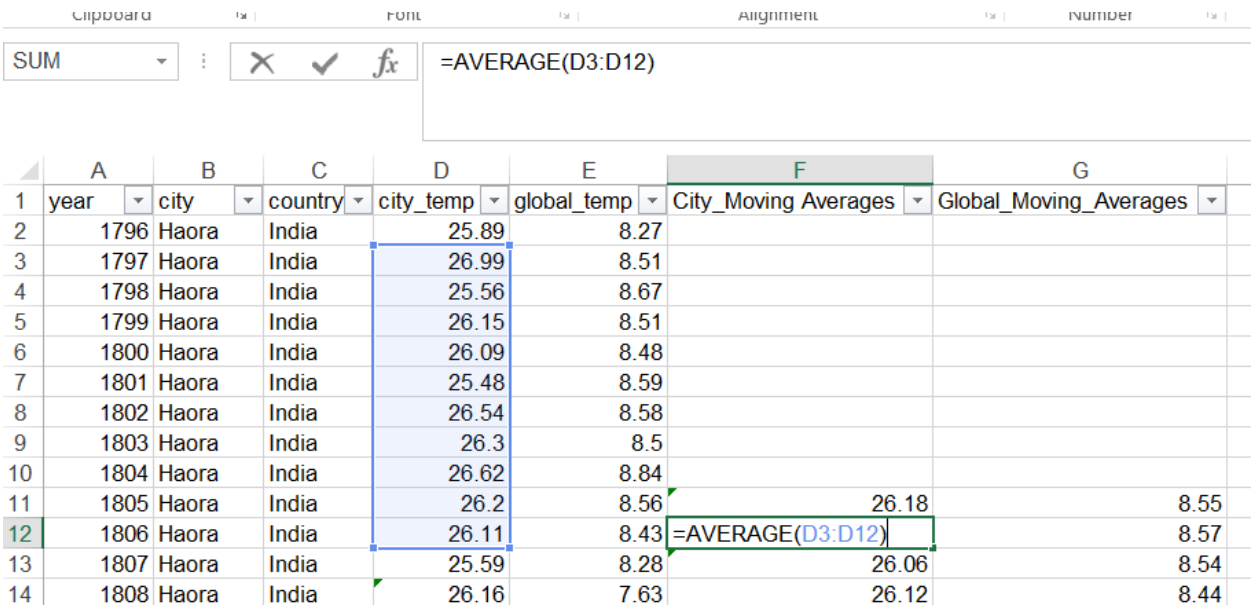
Moving average calculation: To smoothen out the temperature trends, 10 years of moving average is used i.e. temperature corresponding to year 1805, is the average of the temperatures from 1796 to 1805. Similarly the moving average for 1806, is the average from 1797 to 1806 and so on. The detailed illustrations are shown below.



	A	B	C	D	E	F	G
1	year	city	country	city_temp	global_temp	City_Moving Averages	Global_Moving_Averages
2	1796	Haora	India	25.89	8.27		
3	1797	Haora	India	26.99	8.51		
4	1798	Haora	India	25.56	8.67		
5	1799	Haora	India	26.15	8.51		
6	1800	Haora	India	26.09	8.48		
7	1801	Haora	India	25.48	8.59		
8	1802	Haora	India	26.54	8.58		
9	1803	Haora	India	26.3	8.5		
10	1804	Haora	India	26.62	8.84		
11	1805	Haora	India	26.2	8.56	=AVERAGE(D2:D11)	8.55
12	1806	Haora	India	26.11	8.43	26.20	8.57

Figure 1: 10 year Moving Average calculation of City Temperature for the year 1805

In Figure 1, we can see Moving Average of City Temperature for the year 1805, is the average of City Temperatures from 1796 to 1805.



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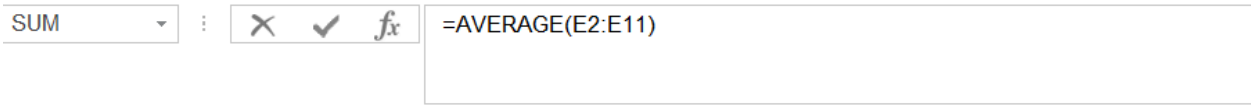
8	1802	Haora	India	26.54	8.58		
9	1803	Haora	India	26.3	8.5		
10	1804	Haora	India	26.62	8.84		
11	1805	Haora	India	26.2	8.56	26.18	8.55
12	1806	Haora	India	26.11	8.43	=AVERAGE(D3:D12)	8.57
13	1807	Haora	India	25.59	8.28	26.06	8.54
14	1808	Haora	India	26.16	7.63	26.12	8.44

Figure 2: 10 year Moving Average Calculation of City Temperature for the year 1806

The Moving Average for City Temperature is 1806, id the average of City Temperature from 1797 to 1806.



	A	B	C	D	E	F	G
1	year	city	country	city_temp	global_temp	City_Moving Averages	Global_Moving_Averages
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9	1803	Haora	India	26.3	8.5		
10	1804	Haora	India	26.62	8.84		
11	1805	Haora	India	26.2	8.56	26.18	=AVERAGE(E2:E11)
12	1806	Haora	India	26.11	8.43	26.20	8.57

Figure 3: 10 year Moving Average Calculation of Global Temperature for 1805

Thus, Moving Average for Global Temperature for 1805, is the average of Global Temperature from 1796 to 1805.

Tool used: Excel based visualization is used to compare the trends.

Note: Chart below is being populated by using Moving Averages of City and Global Temperatures

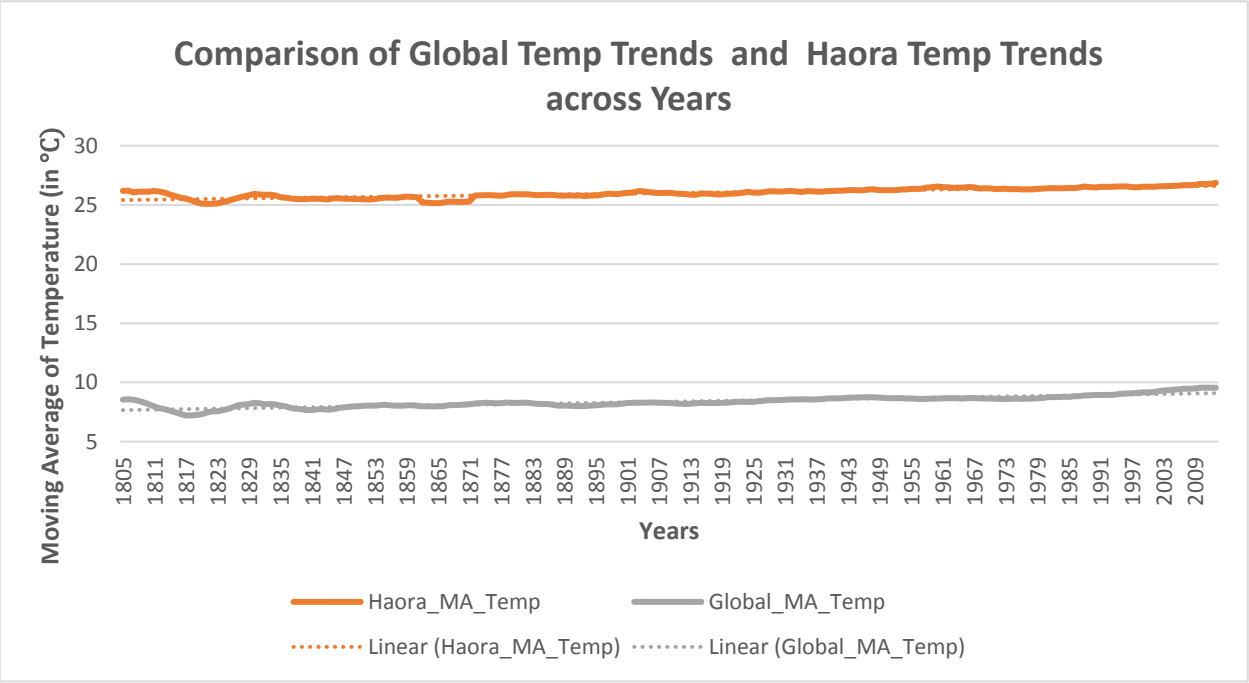

Figure: 4 – Comparison of City and Global Temperature

Key takeaways:

- The average city temperature is much higher than that of global temperature throughout the entire duration
- 1810 to 1820 shows drop (11% decrease) in Global Temperature from 8.1°C to 7.3°C similarly City Temperature shows a drop (4% decrease) from 1810 to 1820 from 26.1°C to 25.1°C. It seems that Global Temperature has higher decrease rate than that of City Temperature
- From 1821 to 1830 City Temperature shows an increasing pattern from 25.1°C to 25.9°C (3% increase), similar increasing pattern is also observed in case of Global Temperature 7.4°C to 8.2°C (10% increase). Thus, higher increasing rate is observed in Global Temperature
- City Temperature shows a drop (2% decrease) from 25.9°C to 25.5°C from 1831 to 1840, while the Global Temperature also shows a drop (8% decrease) from 8.3°C to 7.7°C. Decrease rate in temperature is higher in Global Temperature
- From 1860 to 1865, there is a drop (2% decrease) in City Temperature from 25.6°C to 25.1°C but there is no such drop in Global Temperature as it remains almost constant at 8°C
- In the initial years, 1805 – 1850, increasing and decreasing patterns are quite prominent for Global and City Temperature

- From 1900 both City and Global Temperature shows an increasing trend. City Temperature increases (3% increase) from 26°C to 26.9°C and Global Temperature increases (17% increase) from 8.2°C to 9.6°C. Thus looking at Figure 4, it is seen that the rate of increase of Global Temperature is much higher than that of City Temperature
- From 2000, both Global Temperature shows higher increasing trend than that of City Temperature, the increase in City Temperature is from 26.5°C to 26.9°C (1% increase), while Global Temperature increases from 9.1°C to 9.6°C (4% increase)