Exploring Weather Trends

Step 1

For project I used SQL query to extract the data:

query was used to look for list of Russia's cities
```
select * from city_list
WHERE country='Russia';
```

query was used to look for list of Canada's cities
```
select * from city_list
WHERE country='Canada';
```

query was used to extract data for Moscow
```
SELECT * FROM city_data
WHERE city='Moscow';
```

query was used to extract data for Toronto
```
SELECT * FROM city_data
WHERE city='Toronto';
```

query was used to extract data for Ottawa
```
SELECT * FROM city_data
WHERE city='Ottawa';
```

query was used to extract Global data
```
SELECT * FROM global_data;
```

Step 2

I used Google Sheets to work with data, where I have calculated 10 Year Moving Averages because Moving Averages helps to smooth out data to make it easier to observe long term trends.
I did it using the formula AVERAGE by dragging it down and applying it for all years.

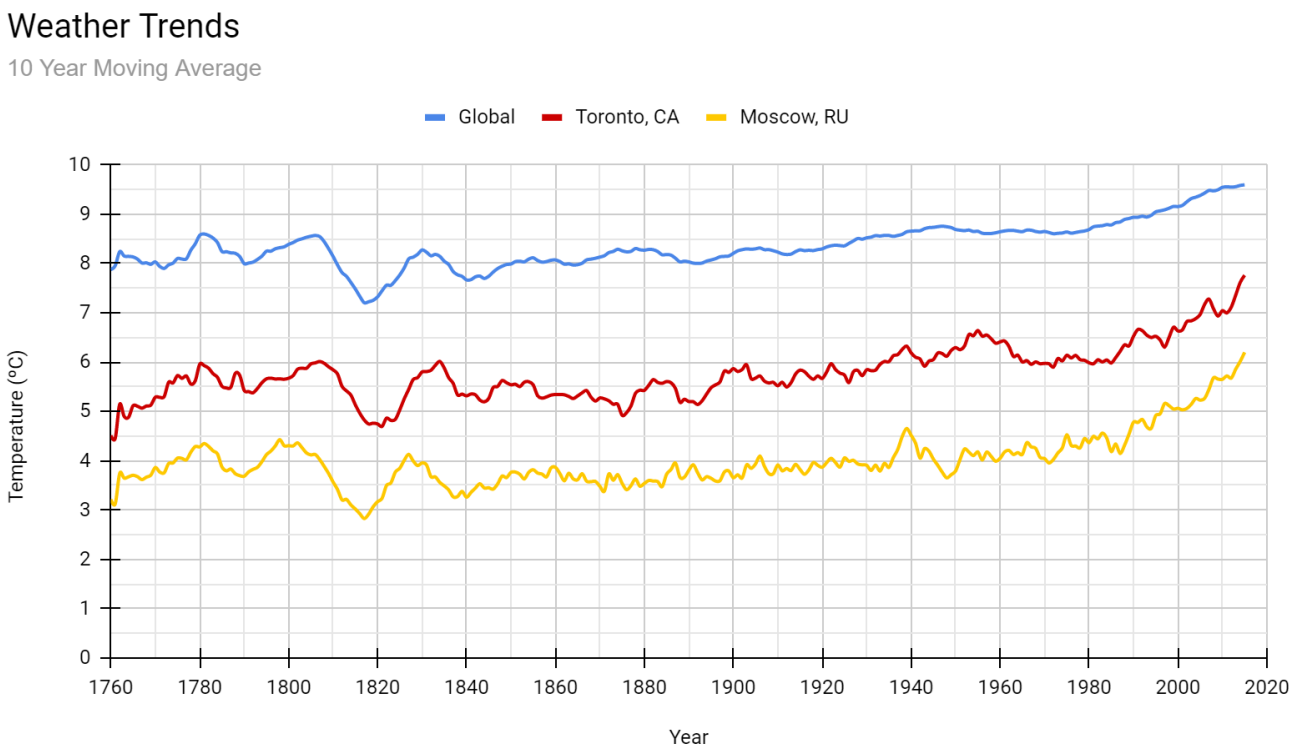
Example

=AVERAGE(D2:D11)

A	B	C	D	E
year	city	country	avg_temp	10Y MA
1750	Toronto	Canada	6.29	
1751	Toronto	Canada	6.84	
1752	Toronto	Canada	-1.1	
1753	Toronto	Canada	5.76	
1754	Toronto	Canada	5.94	
1755	Toronto	Canada	2.81	
1756	Toronto	Canada	6.37	
1757	Toronto	Canada	5.13	
1758	Toronto	Canada	4.37	
1759	Toronto	Canada	5.27	4.77
1760	Toronto	Canada	3.74	4.51

Step 3

Smooth line chart was created based on 10 Year Moving Averages data.



At first glance trends look pretty much similar but if we look at some specific periods we are able to see the differences.

1760 - 1780

Toronto's temperature is increasing by almost 1.5ºC from 4.5ºC to 6ºC, similar to temperature in Moscow from 3.0ºC to 4.5ºC, when Global temperature changes by 0.5ºC from 8.0ºC to 8.5ºC.

1780 - 1800

These two decades begin with decreasing by 0.5ºC but end with rising back Global, Toronto and Moscow temperatures. The exception is that Toronto also has a fast rise and down of temperature in the middle of decades.

1800 - 1840

The most fluctuating decades. From 1800 to 1820 temperatures fell almost by 1.5ºC globally as in Toronto and Moscow. After 1820 temperatures grew fast for almost 1.5ºC back and then dropped by 0.75ºC by 1840.

1840 - 1940

During this century Global temperature more or less smoothly grows for 1.0ºC from 7.75ºC to 8.75ºC as temperature in Toronto from 5.25ºC to 6.25ºC and Moscow from 3.5ºC to 4.5ºC. The temperature in Toronto fluctuates more than Moscow's, but just before 1940 temperature rose sharply in Moscow by more than 0.5ºC.

1940 - 1980

During these decades Global temperature doesn’t change much, when temperature in Toronto increases by 0.5ºC from 6.0ºC to 6.5ºC but then goes back to 6.0ºC after 1960. First decade after 1940 temperature in Moscow decreased by 1.0ºC from 4.5ºC to 3.5ºC but after that started to grow back to 4.5ºC by 1980.

1980 - 2020

During the last 4 decades global temperature and temperatures in Toronto and Moscow have been increasing almost by 1.5ºC. Global from 8.5ºC to 9.5ºC, Toronto from 6.0ºC to 7.5ºC and Moscow from 4.5ºC to 6.0ºC

To conclude, trends of global temperature and cities temperatures may differ during a short period of time, nevertheless the main trend is the same and it is temperature increasing. Since 1760 Global temperature has grown by 1.5ºC from 8.0ºC to 9.5ºC, temperature in Toronto has grown by 3.0ºC from 4.5ºC to 7.5ºC, and temperature in Moscow has grown by 3.0ºC from 3.0ºC to 6ºC.