Project 1

Exploring Weather Trends

Hanna Kondrashova

SQL Queries

1. Query to extract global data:

```
SELECT *
FROM global_data;
```

2. Query to view city list data:

```
SELECT *
FROM city_list
ORDER BY country, city;
```

Note: Actual city is Helmond, Netherlands, and the closest is Amsterdam, Netherlands.

3. Query to extract city of residence data:

```
SELECT *
FROM city_data
WHERE city = 'Amsterdam' AND country = 'Netherlands';
```

Note: Global data in the given database are represented with an interval of 1750-2015 years, and Amsterdam data are from 1743-2013. For the purposes of this research project an interval of 1750-2013 years was chosen.

Specified data from *global_data* and *city_data* databases based on queries as above were downloaded in CSV format and then exported to Google spreadsheet, which was used for the purposes of data manipulations and line chart creation, as specified in the project requirements.

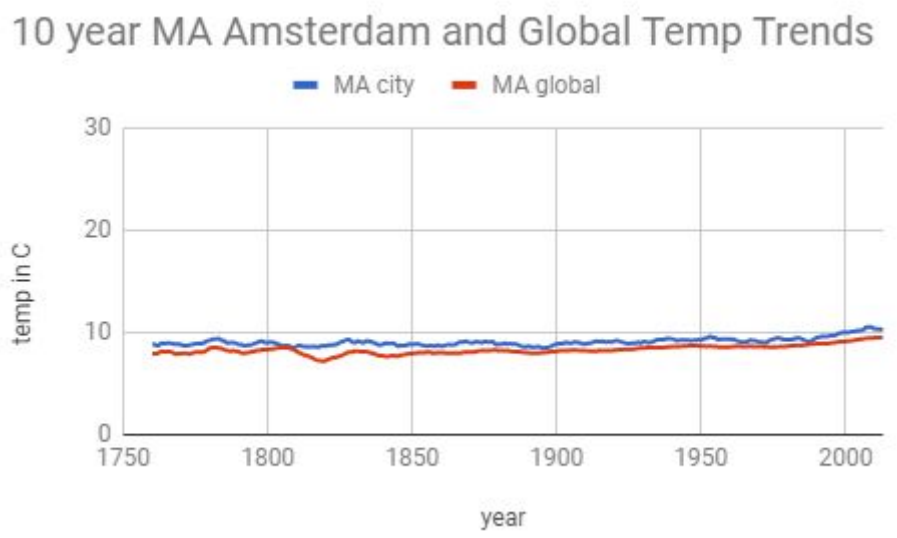
Moving averages

Since moving averages were supposed to be used, data of interest was organized in two tables on two spreadsheet pages — to be analyzed for 10 years and 100 years period.

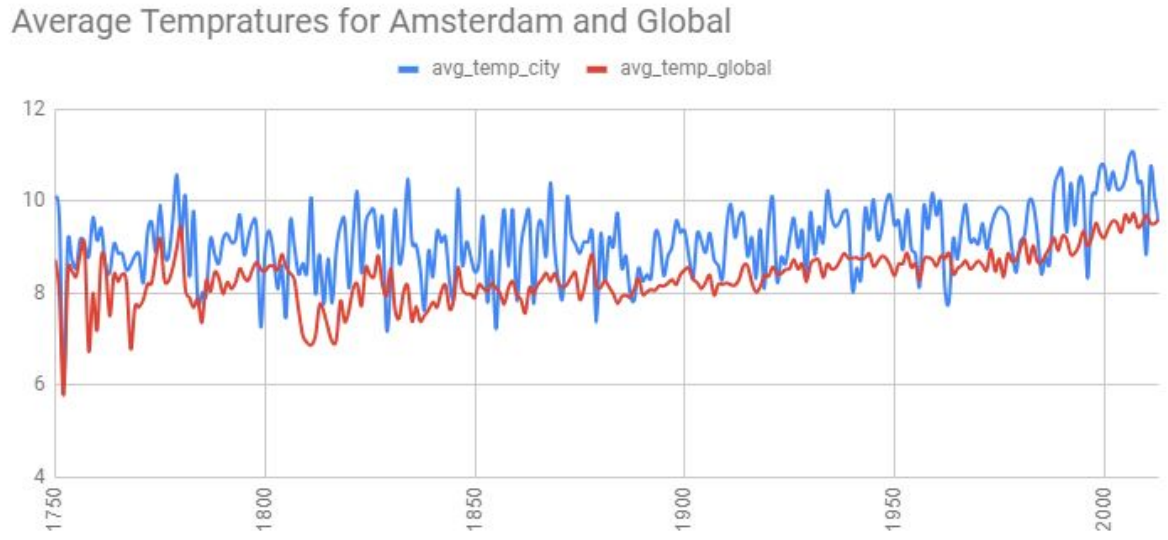
An abstract from the original table of 265 rows is shown below.

year	avg_temp_city	avg_temp_global	MA city	MA global
1750	10,04	8,72		
1751	9,63	7,98		
1752	5,97	5,78		
1753	9,08	8,39		
1754	8,72	8,47		
1755	8,55	8,36		
1756	9,17	8,85		
1757	9,05	9,02		
1758	8,79	6,74		
1759	9,64	7,99		
1760	9,14	7,19	8,889090909	7,953636364
1761	9,41	8,77	8,831818182	7,958181818
1762	8,58	8,61	8,736363636	8,015454545
1763	8,44	7,5	8,960909091	8,171818182
1764	9,07	8,4	8,96	8,172727273
1765	8,87	8,25	8,973636364	8,152727273
1766	8,85	8,41	9,000909091	8,157272727
1767	8,5	8,22	8,94	8,1
1768	8,61	6,78	8,9	7,896363636
1769	8,81	7,69	8,901818182	7,982727273

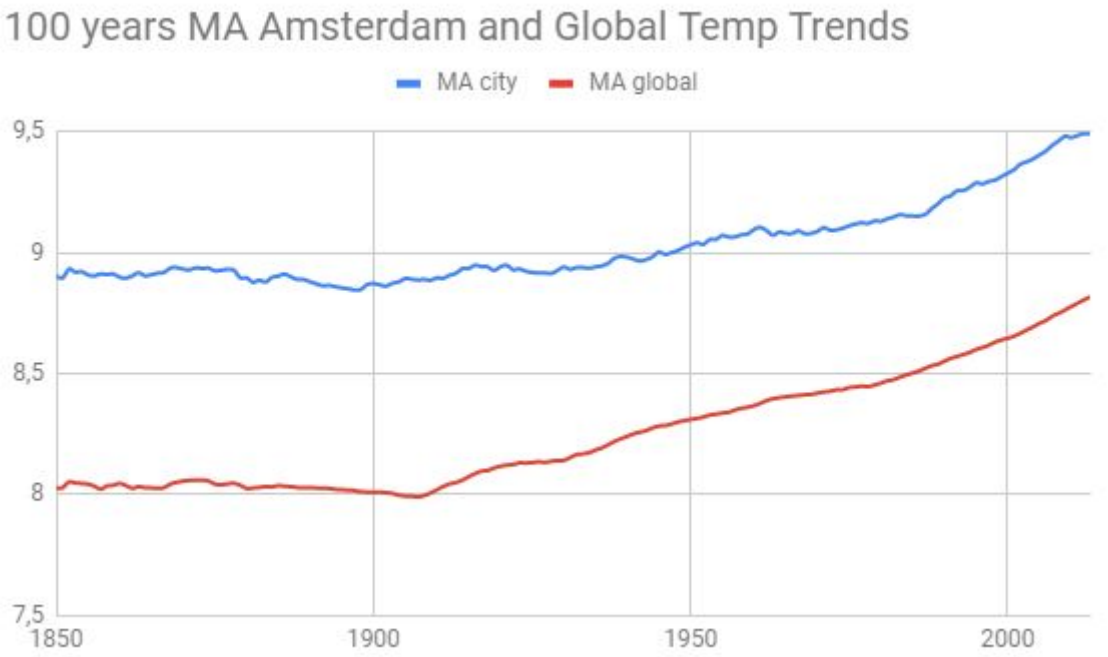
The resultant line charts are presented below.



MA Avg Ams	9,118299928
MA Avg Global	8,34250179



Avg T Ams	9,131287879		Avg T Global	8,359393939



Observations:

1. In comparison with global average temperature, the city of Amsterdam is observed to be clearly warmer, which appeared to be true both for 10 years and 100 years moving averages plots. This can be explained by its geographical location and therefore oceanic climate, strongly influenced by the North Sea and the Atlantic Ocean.

2. On the 100 years chart, Amsterdam temperatures seem to be more volatile than global — the first shows more deviation peaks. This is due to the fact that average temperature in the world is calculated with the respect for all the available samples which makes the standard deviation of it lower than the city average, which is only one sample, according to the law of big numbers.

3. In general, both global and Amsterdam temperatures show a consistent trend of rising temperature through time. It is widely believed that the possible cause of this long-term rise might be global warming, which affects all the Earth's climate system.

4. Notwithstanding volatility of Amsterdam temperature, it is still strongly correlated to the global average temperature — the charts show how they rise and fall together every year through the history of observations. This trend can be used in weather prediction with reasonable accuracy.