

Project 1: Exploring Weather Trends

Jörg Rechinger

Extracting the data via SQL

First I used a generic SQL statement to get an overview of the data structure and how column values, like country, are written (with capital letter or without):

```
SELECT *  
FROM city_list  
LIMIT 1;
```

After that I searched for the nearest city in Germany:

```
SELECT *  
FROM city_list  
WHERE country='Germany';
```

As Munich is the city where I live, I took Munich to extract the city level data:

```
SELECT *  
FROM city_data  
WHERE city='Munich'  
ORDER BY year;
```

After that I extracted the global weather data:

```
SELECT *  
FROM global_data  
ORDER BY year;
```

Visualizing the data in Microsoft Excel

I opened both csv files with Microsoft Excel. The first thing I noticed was that the time spans for which we have measures varies for both data sets. Munich started in 1743, global data only in 1750. On the other hand global measurements had data until 2015, whereas Munich data was only available until 2013.

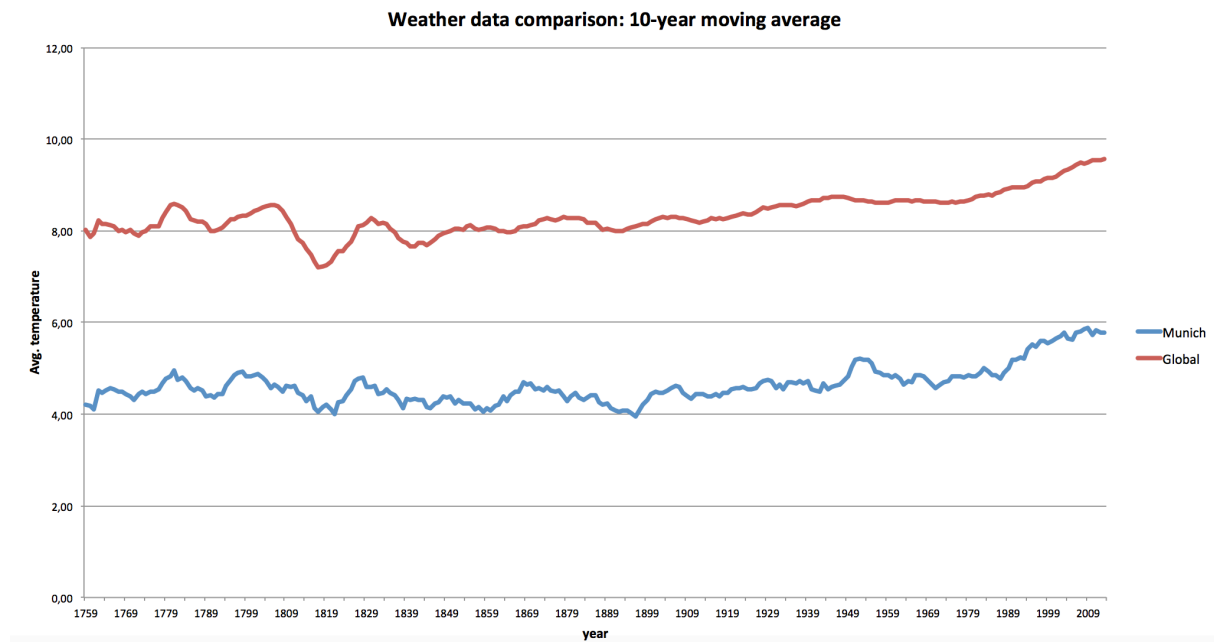
To make both comparable, I limited the years of my comparison from 1750 – 2013.

As weather phenomena are often explored in decades, I decided to use a 10 year moving average, which I calculated like:

=AVERAGE(D9:D18)

Starting with the row of year 1759 (row 18 in my excel file) and then copied downwards until year 2013.

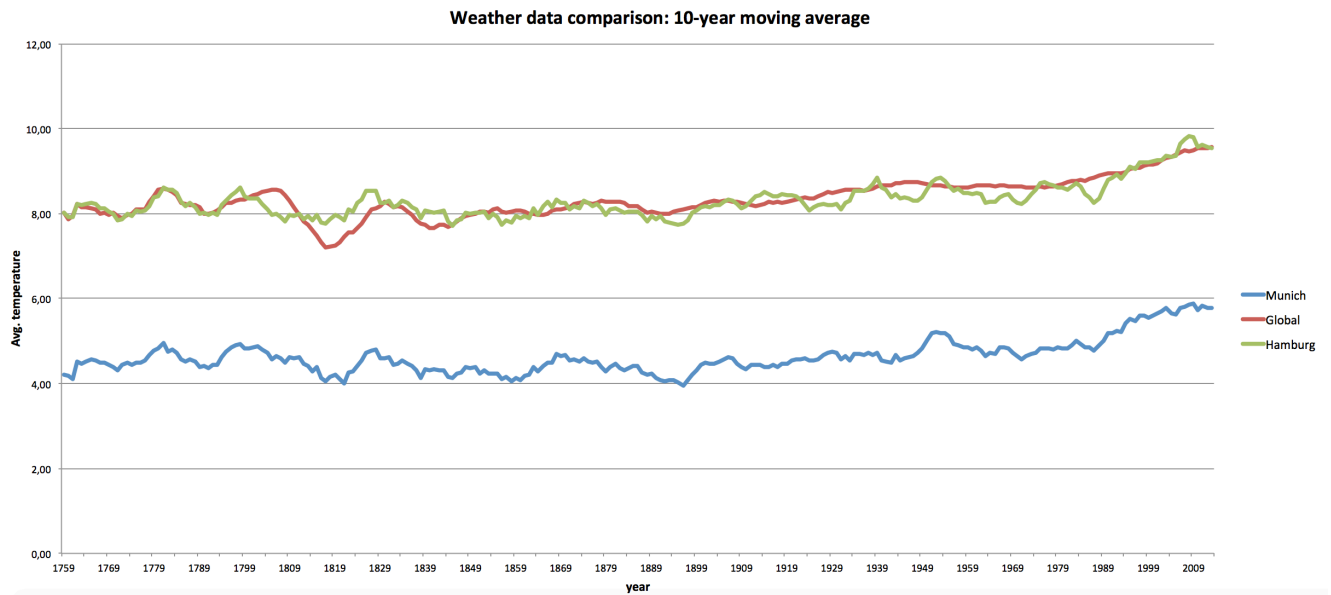
From this moving average I created the following line chart.



Observations

- Munich is on average around 4 degrees cooler than the global average. This difference has been pretty consistent over time, slightly decreasing within the last few years.
- Some ups and downs aside, the average temperature has been rather consistent for both global and Munich temperatures for the first 150 years of measuring. Starting around 1900 we can spot the start of a slight but constant increase of the moving average temperature. Between 1980 and 1990 this increase has gained even more momentum. The world is getting hotter.
- Compared to the global average, the avg. temperature for Munich has increased faster in the last 40 years, the curve showing a steeper gradient.
- Until around 1850 the variation in global average temperatures was greater than Munich's average temperature, the ups and downs being less drastic for Munich. However, since 1850 this has turned around: the global average temperature graph shows a very smooth line whereas Munich still has maintained its minor variations and shows more minor movements within the average temperature graph.

After that I was curious to see how Hamburg would behave in comparison. The climate and weather of Hamburg being quite different to the one for Munich, I added another line with Hamburg's moving 10-year average to the chart:



- Hamburg's average temperature is very close to the global average temperature graph.
- Hamburg, being close to the coast, is generally warmer in yearly average temperatures than Munich which has more weather variations and a colder winter which explains a lower all-year temperature curve.
- In the minor up and down movements, Munich and Hamburg look very much alike, which is not that surprising as overall weather trends are more or less affecting all of Germany.