Outline

1) SQL Commands

A) Data from the cities in order to make the best choice (“Bern”): SQL code

```
SELECT country, city
FROM city_list
ORDER BY country, city ASC
```

B) Data only for Bern with “Bern”, the year and the average temperature (avg_temp). SQL code:

```
SELECT year, city, avg_temp
FROM city_data
WHERE city='Bern'
```

C) Global data with the year and the average temperature (avg_temp). SQL code:

```
SELECT year, avg_temp
FROM global_data
```

2) Tools to visualize the data:

Excel: I needed to open the file with OpenOffice first, because Excel automatically changed the average temperature format to date when I upload the .csv file in Excel and when I copy-pasted the data. OpenOffice enabled me to create a .xls file that I could open in Excel without the raised problem.

3) Graphics

I designed 3 line charts because it was easier to observe the trends with these diagrams and there are only two trends to compare: Bern and Global.

4) Moving average

To get different visualizations, I designed three chart lines:

I) Raw data

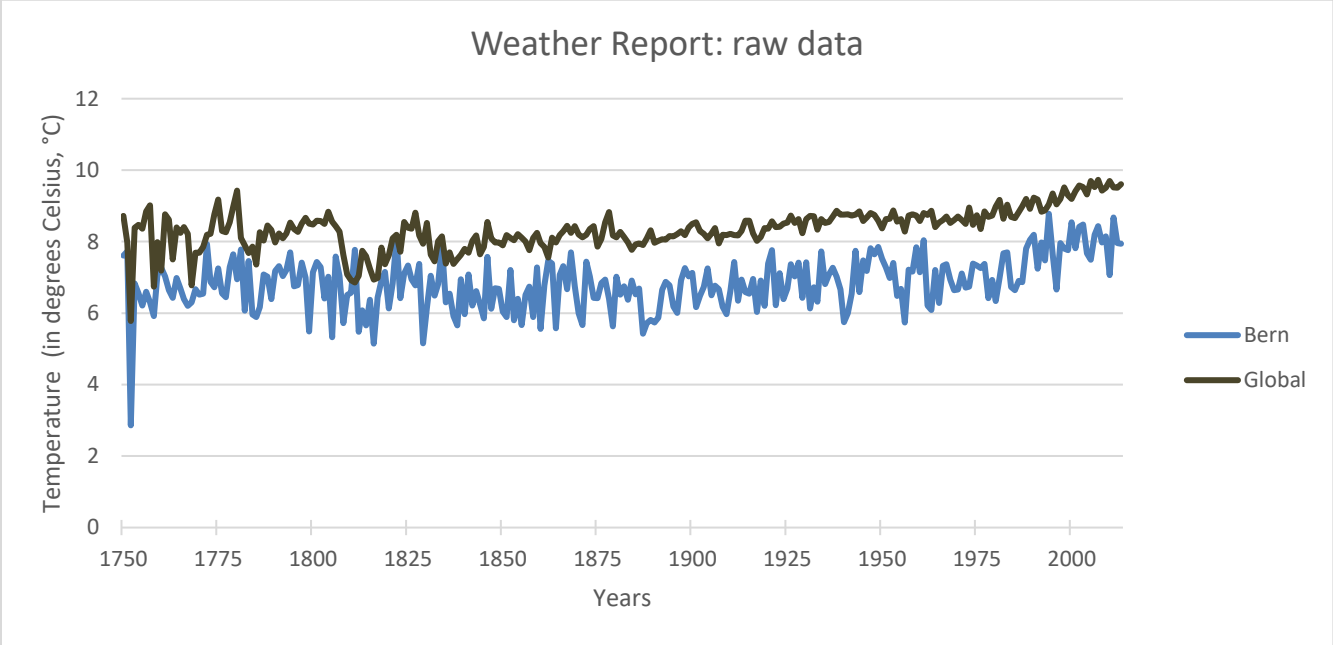
II) 7 years Moving average: the preceding 6 years are also used to calculate the moving average for each year (by example: the data of 1775 is used by taking the average from 1769 to 1775). Excel formula:
“=AVERAGE(B2:B8)” (and I dragged the formula to the bottom of my data)

III) Moving average: 14 years: the preceding 13 years are also used to calculate the moving average for each year (by example: 1775 is used by taking the average from 1762 to 1775).
“=AVERAGE(B2:B15)” (and I dragged the formula to the bottom of my data)

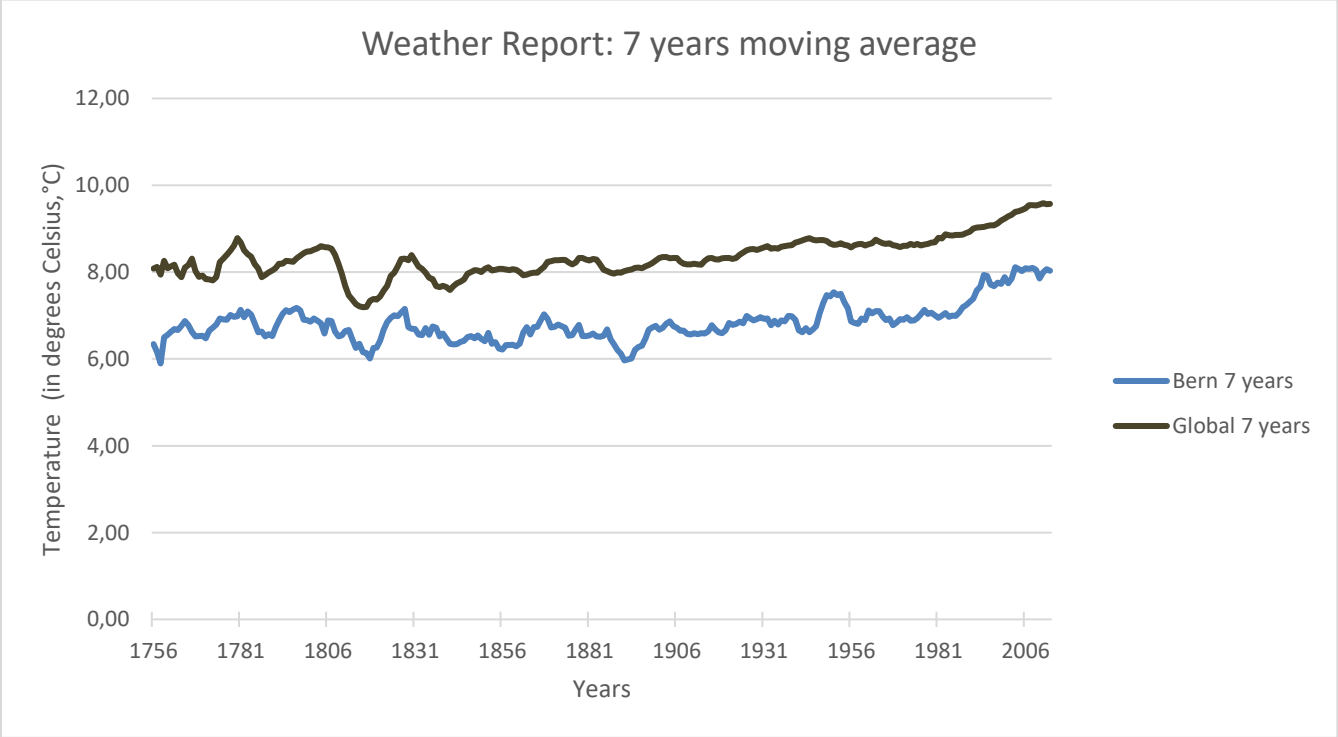
IV) The temperature data before 1750 have been removed as there wasn’t any Global Weather data for these years. 2014 and 2015 data have also been removed as there wasn’t any Bern data for these years. If I kept data from one trend and not another, the comparison would have been wrong.

Line Charts

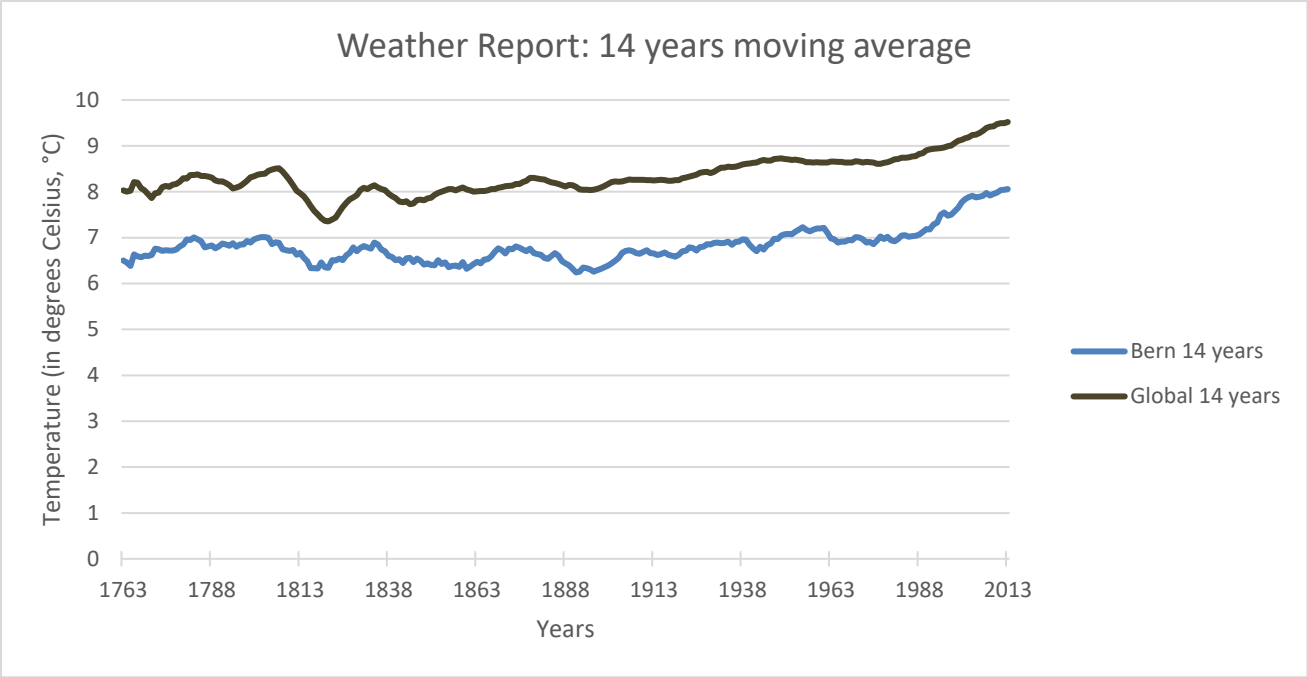
1) Raw data



2) 7 years moving average



3) 14 years moving average



Observed trends

1) Bern temperature is lower than global temperature

Even if the difference is changing through the years, Bern seems relatively colder than the rest of the earth if we take Bern and Global Weather trends. Taken year by year, the differences of temperature between Bern and Global have changed a lot: from '-0.91' to '3.23').

But there is a part of individual variations. Because if we take the 14-years moving average, the difference varies between 0.8 and 2.17 (from about one time to about two times).

2) There is a general trend, even if Bern and global temperatures contains uncorrelated fluctuations

If we see the 7-days moving average, it happens that Bern temperature is hotter and not Global temperature (as in 1949-1954). As well, it happens that Bern temperature is colder and not Global temperature (as in 1893). That can explain the changes of temperature difference between Bern and Global data.

But if we take 14 years trend, it seems like when there is a hotter trend in Bern, there is a hotter trend in the Earth (as since 1860), and where there is a colder trend in Bern, there is a colder trend in the Earth (as in 1819 and 1893).

Even both evolutions are evolving differently, as from 1960 to 2000 where Bern temperature is doesn't ascend as much as Global trend (which can explain the differences of temperature between Bern and Global data in the 14 years moving average).

3) The temperature evolution of Bern is more irregular than the global trend

If we take the 14-years moving temperature. The Global temperature evolution is clear because the temperature evolution is smooth, and we can see temperature trends more clearly. Bern temperature seems more to contain more fluctuations, as in 1876.

The average of all the cities make the global temperature evolution easier to read, because it contains less variation.

4) There is global warming

As explained before, the global and Bern temperatures have become higher from 1860 to 2013: 6.32 to 8.05 for Bern, and from 8.05 in to 9.5 for the global trend (when we take the 14 years moving average). It consists of a 1,74 Celsius degree difference for Bern and a 1,47 Celsius degree difference for the Global trend.

In the line chart, we can see that its evolution is steady in the 14-years moving average evolution since 1860.