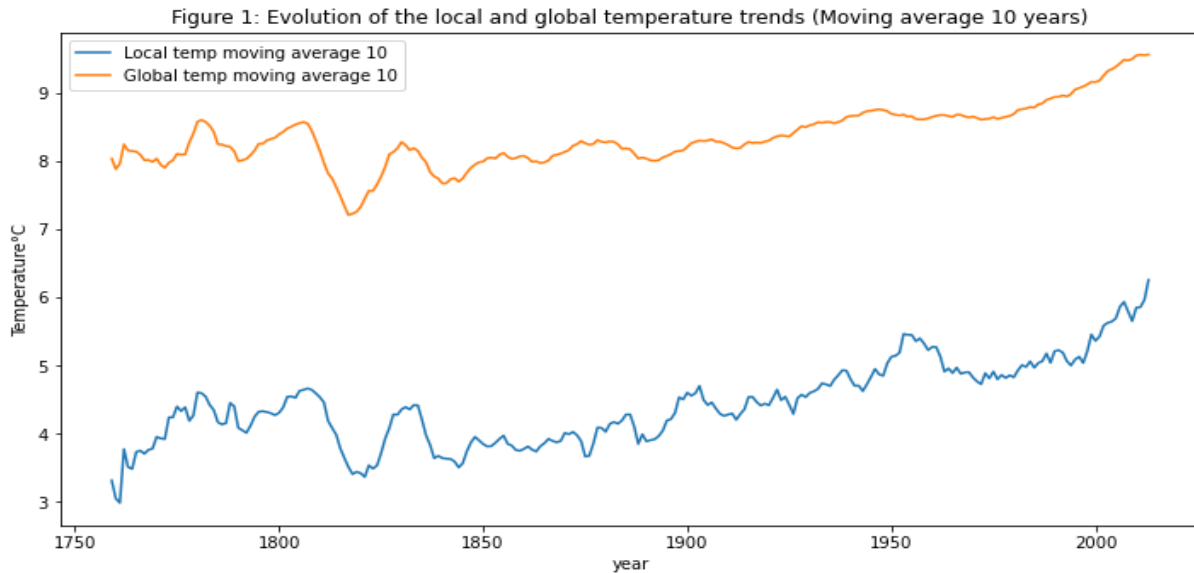


# Exploring Weather Trends

The objective of this paper is to analyse the local (Montreal in my case) and the global temperature data and compare the temperature trends.

First of all, I have extracted the temperature data for the world as well as the closest big city to where I live which is Montreal, from the database by using a SQL query (cf. annex1) and then exported the data to a csv File.

By using python, I have calculated the 10 years moving average (cf. python program in the annex 2) to better smooth out data and to make it easier to observe long term trends.



Overall, it appears that Montreal is cooler on average compared to the global average. Indeed, the average temperature in Montreal, between 1750 and 2013, was 4.44 °C compared to 8.36 °C for the global average temperature.

**Table 1: Summary statistics**

	local temp	global temp
count	264.0000	264.0000
mean	4.440455	8.359394
std	1.069468	0.575184
min	-3.220000	5.780000
25%	3.860000	8.077500
50%	4.420000	8.365000
75%	5.040000	8.700000
max	7.860000	9.730000

However, the temperature data in Montreal and in the world are highly and positively correlated, with a correlation coefficient of 0.72 and have the same trend, as it appears from the figure 1.

In particular, an upward trend has been observed both in Montreal and globally, and has intensified in recent years, most notably in Montreal with a temperature peak of 7.86 °C in 2013 compared to an average of 5.01 °C between 1900 and 2013, and the global temperature increased to 9.61 °C in 2013 compared to an average of 8.75 °C between 1900 and 2013.

As a conclusion the world is getting hotter, and the rate of warming in Montreal is going faster. Indeed, the temperature in Montreal has risen by 3.20 °C between 1900 and 2013, about triple the global rate (increase of 1.11°C over this same period).

## ANNEX 1: The SQL query

```
select city_data.year as "year", city_data.avg_temp as "local temp", global_data.avg_temp
as "global temp"
from city_data
join global_data
on
city_data.year= global_data.year
where
city_data.city= 'Montreal'
```

## ANNEX2: The Python Program

```
import pandas as pd
import matplotlib.pyplot as plt

df=pd.read_csv('results_.csv', index_col='year')
print(df)

df[['local temp','global temp']].describe()
df[['local temp','global temp']].corr()

df['Global temp moving average 10']=df['global temp'].rolling(window=10).mean()
df['Local temp moving average 10']=df['local temp'].rolling(window=10).mean()

df['Local temp moving average 10'].plot(figsize=(12,6))
df['Global temp moving average 10'].plot(figsize=(12,6))
plt.title("Figure 1: Evolution of the local and global temperature trends (Moving average 10
years)")
plt.legend()
plt.ylabel('Temperature°C')
```