

Puebla vs Global temperature trends

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1 SQL Data extraction

Check the nearest town using

```
$ SELECT city FROM city-list WHERE country = 'Mexico'
```

It is Puebla city. Then the local avg temp timeline can be downloaded from

```
$ SELECT year, avg-temp FROM city-data WHERE city = 'Puebla'
```

Finally extract global data

```
$ SELECT * FROM global-data
```

2 Pandas code

```
In [1]: import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import numpy as np

In [2]: df_puebla = pd.read_csv('./data/puebla.csv').set_index(['year']).rename(columns={'avg_temp': 'puebla_avg_temp'})
df_global = pd.read_csv('./data/global.csv').set_index(['year']).rename(columns={'avg_temp': 'global_avg_temp'})
df = df_puebla.merge(df_global, left_index=True, right_index=True, how = 'right')

In [3]: def plot_mvq(roller=5):
    df_mvq = df.rolling(roller).apply(np.nanmean).rename(columns={'puebla_avg_temp': 'puebla_20y_mvq_temp',
                                                                    'global_avg_temp': 'global_20y_mvq_temp'})
    fig=plt.figure(figsize=(20,20))

    g = df_mvq.plot(style='.-')

    g.legend(prop={'size': 13})
    plt.rc('xtick', labels=14)
    plt.rc('ytick', labels=14)
    g.set_ylabel("temperature", fontsize=14 )
    g.set_xlabel("year", fontsize=14 )
    fig.savefig('./plots_tables/puebla_vs_global.png')
    return df_mvq

df_mvq = plot_mvq(10)
```

3 Running avg temperature

Observations on Fig. 1:

- Locally (in Puebla city) and globally the temperature seems to be increasing approximately linearly, plus fluctuations. The total temperature change seems to be between 1 and 2 degrees.
- Fluctuations occur over time scales of a 2 to 5 decades.
- The fluctuations in the local and global case are not independent in the sense that they have similar shape and occur simultaneously.

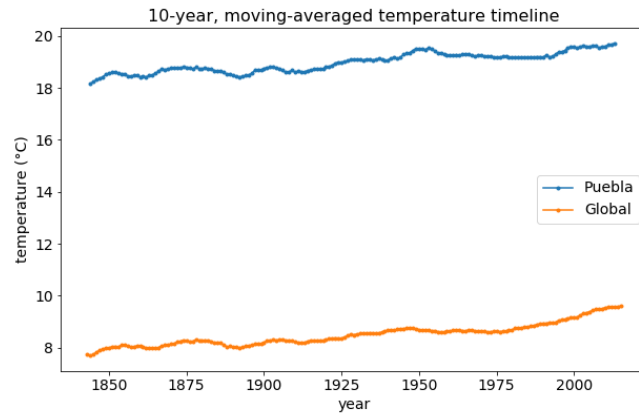


Figure 1: Time series, starting at 1834, of the 10 years running averaged temperature.

- In the last 50 years the global temperature seems to increase slightly faster than before, perhaps another line with a higher slope. This change is also present in the case of puebla but starting more recently, around 1995.