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Exploring Weather Trends

Extract the data

- To extract the data we use two simples queries, one for each table, using the where condition in the city one to select 'Barcelona'
    - SELECT * FROM city_data WHERE city = 'Barcelona';
    - SELECT * FROM global_data;

Open the csv

- To perform the analysis, we use python in jupyter notebook.

```
df_bcn    = pd.read_csv(r'data_sets\results_bcn.csv')
df_global = pd.read_csv(r'data_sets\results_global.csv')
```

- Each one of the data frames needed to be adapted for a proper analyse, we use the *.iloc function* to selected the values between 1750 and 2013.

```
df_bcn_2 = df_bcn.iloc[7:,:].reset_index()
df_global_2 = df_global.iloc[:-2,:]
```

- To do the simple moving average we use the *.rolling function*, combined with the .mean() function. The rolling indicates the number of rows that are going to be involve in the mean operation. Shift do the function for the first on able

```
years_smas = [10,25,50]

for i in years_smas:

   df_bcn_2[f'smas{i}'] = df_bcn_2.avg_temp.rolling(i).mean().shift()
   df_global_2[f'smas{i}'] =  df_global_2.avg_temp.rolling(i).mean().shift()
```

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- Those are the resulting dataframes, for Barcelona and globaly with the sma for 10, 25, 50 years.

	index	year	city	avg_temp	smas10	smas25	smas50
0	7	1750	Barcelona	16.52	NaN	NaN	NaN
1	8	1751	Barcelona	16.78	NaN	NaN	NaN
2	9	1752	Barcelona	13.09	NaN	NaN	NaN
3	10	1753	Barcelona	16.17	NaN	NaN	NaN
4	11	1754	Barcelona	16.09	NaN	NaN	NaN
5	12	1755	Barcelona	15.80	NaN	NaN	NaN
6	13	1756	Barcelona	16.11	NaN	NaN	NaN
7	14	1757	Barcelona	15.88	NaN	NaN	NaN
8	15	1758	Barcelona	15.04	NaN	NaN	NaN
9	16	1759	Barcelona	16.19	NaN	NaN	NaN
10	17	1760	Barcelona	15.91	15.767	NaN	NaN
11	18	1761	Barcelona	16.25	15.706	NaN	NaN
12	19	1762	Barcelona	16.13	15.653	NaN	NaN

	year	avg_temp	smas10	smas25	smas50
0	1750	8.72	NaN	NaN	NaN
1	1751	7.98	NaN	NaN	NaN
2	1752	5.78	NaN	NaN	NaN
3	1753	8.39	NaN	NaN	NaN
4	1754	8.47	NaN	NaN	NaN
5	1755	8.36	NaN	NaN	NaN
6	1756	8.85	NaN	NaN	NaN
7	1757	9.02	NaN	NaN	NaN
8	1758	6.74	NaN	NaN	NaN
9	1759	7.99	NaN	NaN	NaN
10	1760	7.19	8.030	NaN	NaN
11	1761	8.77	7.877	NaN	NaN

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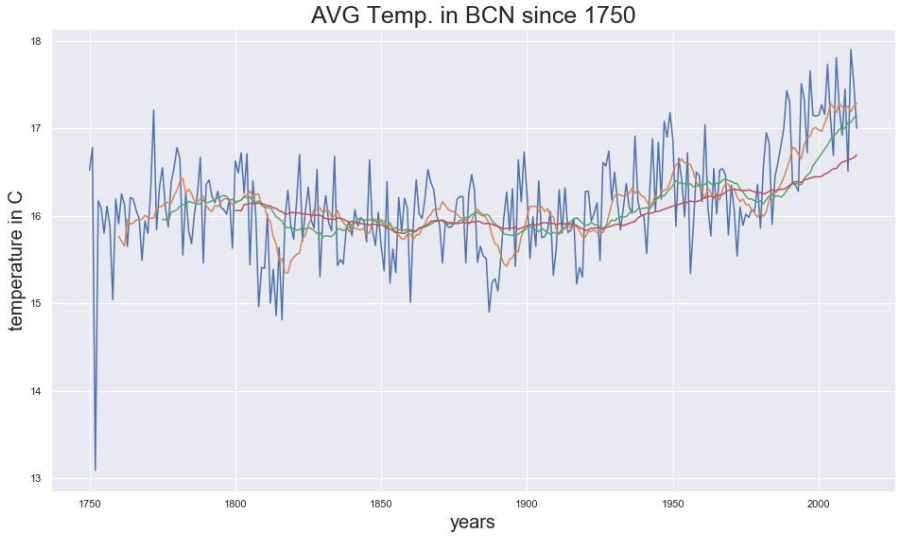
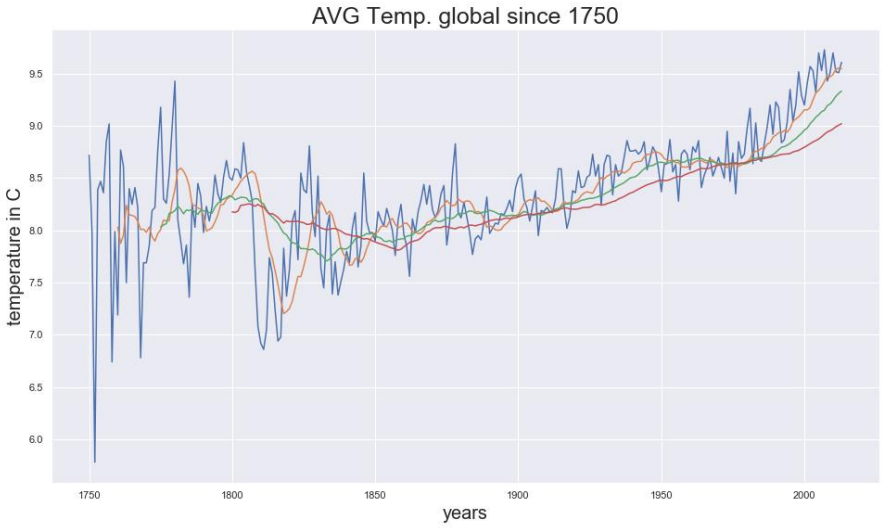
Create a line chart

```
plt.figure(figsize=(16,9))

ax = sns.lineplot(x='year', y='avg_temp', data=df_bcn_2)
ax = sns.lineplot(x='year', y='smas10', data=df_bcn_2)
ax = sns.lineplot(x='year', y='smas25', data=df_bcn_2)
ax = sns.lineplot(x='year', y='smas50', data=df_bcn_2)
ax.set_title('AVG Temp. in BCN since 1750', fontsize=25)
ax.set_xlabel('years', fontsize=20)
ax.set_ylabel('temperature in C', fontsize=20)
plt.savefig('avg_temp_bcn.png')
```





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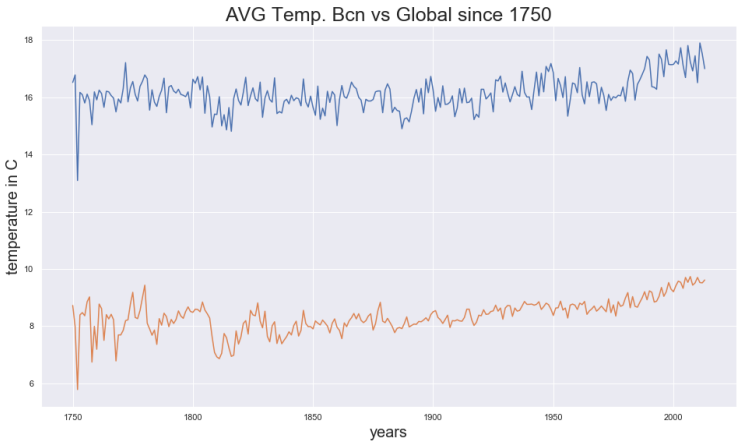
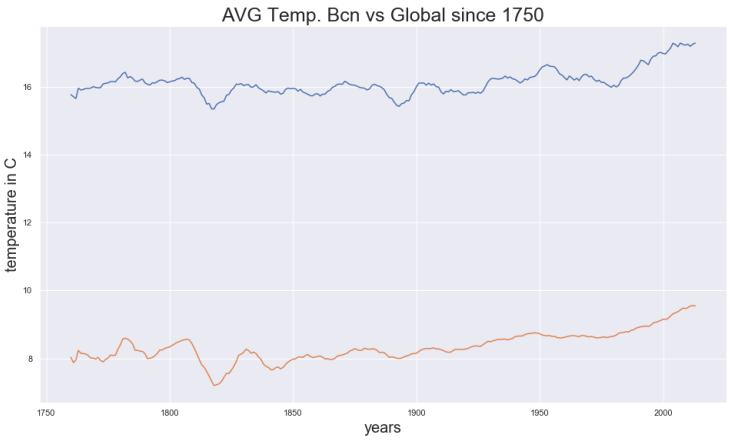
```
curves = ['avg_temp', 'smas10', 'smas25', 'smas50']

for i in curves:

    plt.figure(figsize=(16,9))
    ax = sns.lineplot(x='year', y=i, data=df_bcn_2)
    ax = sns.lineplot(x='year', y=i, data=df_global_2)
    ax.set_title('AVG Temp. Bcn vs Global since 1750', fontsize=25)
    ax.set_xlabel('years', fontsize=20)
    ax.set_ylabel('temperature in C', fontsize=20)
    plt.savefig(f'avg_temp_curves{i}.png')
```





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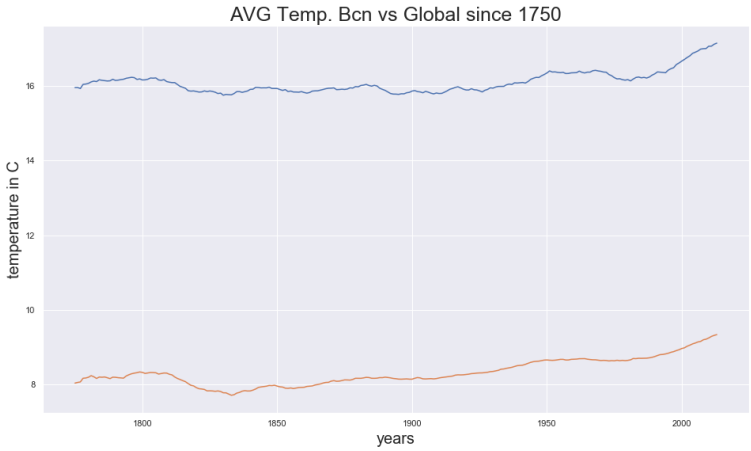

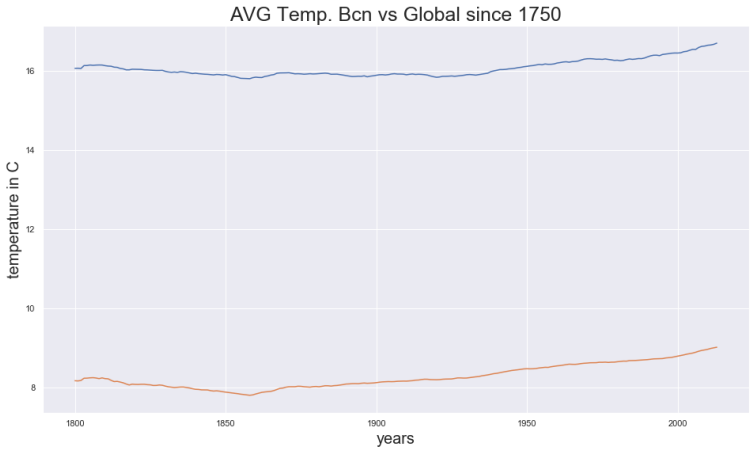

Make observations

- The minimum mean temperature registered in Barcelona are 1309 Cº in the year 1752
- The minimum global mean registered is 5.78 Cº in the year 1752

- The maximum mean temperature registered in Barcelona are 9.73 Cº in the year 2011
- The maximum global mean registered is 9.73 Cº in the year 2007

- The average Barcelona's temperature is 16.14, in the last 40 years only 2 have been below the mean: 1980 – 1984.

	index	year	city	avg_temp	smas10	smas25	smas50
230	237	1980	Barcelona	15.86	16.043	16.1708	16.2640
234	241	1984	Barcelona	15.90	16.257	16.2408	16.2964

- Global registers show a similar scenario: no registers bellow the mean during the las 40 years

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- The curve in the las 30 years. Even if the zoom shows certain volatility. Watching the simple moving average each 50 years, we can see a straight increasing line for Barcelona