Tools used to compare the global temperature against my local city(Patna)

I used SQL command to extract the data from the datasource and imported it as csv files

To check the nearest city I viewed the city_list table:

SELECT CITY FROM CITY_LIST WHERE COUNTRY LIKE 'India';

To extract the global data i used the following command:

SELECT * FROM global_data;

To extract the local data i used the following command:

SELECT * FROM CITY_DATA WHERE CITY LIKE 'Patna';

Importing all the necessary libraries

In [193]:
```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import numpy as np
from sklearn.impute import SimpleImputer

%matplotlib inline
%config InlineBackend.figureformat='retina'
```

Reading local and global data from excelsheet using pandas

In [194]:
```
local_temp = pd.read_csv('results.csv')
global_temp = pd.read_csv('global_data.csv')
```

Displaying the data

In [195]:
```
local_temp.drop('MOVING_AVG',axis=1,inplace=True)
```

In [196]:
```
global_temp.drop('MOVING_AVG',axis=1,inplace=True)
```

In [197]:
```
local_temp.head()
```

Out[197]:

	year	city	country	avg_temp
0	1796	Patna	India	24.99
1	1797	Patna	India	26.49
2	1798	Patna	India	24.27
3	1799	Patna	India	25.25
4	1800	Patna	India	25.20

In [198]:
```
global_temp.head()
```

Out[198]:

	year	avg_temp
0	1750	8.72
1	1751	7.98
2	1752	5.78
3	1753	8.39
4	1754	8.47

Calculating the moving average for both the data sets using window of 10, 15 and 20 days

In [199]:
```
local_temp['MOVING_AVG_5'] = local_temp['avg_temp'].rolling(5).mean()
local_temp['MOVING_AVG_10'] = local_temp['avg_temp'].rolling(10).mean()
local_temp['MOVING_AVG_15'] = local_temp['avg_temp'].rolling(15).mean()
```

In [200]:
```
global_temp['MOVING_AVG_5'] = global_temp['avg_temp'].rolling(5).mean()
global_temp['MOVING_AVG_10'] = global_temp['avg_temp'].rolling(10).mean()
global_temp['MOVING_AVG_15'] = global_temp['avg_temp'].rolling(15).mean()
```

In [201]:
```
local_temp
```

Out[201]:

	year	city	country	avg_temp	MOVING_AVG_5	MOVING_AVG_10	MOVING_AVG_15
0	1796	Patna	India	24.99	NaN	NaN	NaN
1	1797	Patna	India	26.49	NaN	NaN	NaN
2	1798	Patna	India	24.27	NaN	NaN	NaN
3	1799	Patna	India	25.25	NaN	NaN	NaN
4	1800	Patna	India	25.20	25.240	NaN	NaN
...	...	...	...	...	...	...	...
213	2009	Patna	India	26.31	25.940	25.868	25.822667
214	2010	Patna	India	26.54	26.026	25.964	25.884667
215	2011	Patna	India	25.48	25.896	25.930	25.866667
216	2012	Patna	India	25.98	25.974	25.922	25.901333
217	2013	Patna	India	26.79	26.220	26.018	25.962667

218 rows × 7 columns

In [202]:
```
global_temp
```

Out[202]:

	year	avg_temp	MOVING_AVG_5	MOVING_AVG_10	MOVING_AVG_15
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	7.868	NaN	NaN
...	...	...	...	...	...
261	2011	9.52	9.578	9.554	9.477333
262	2012	9.51	9.534	9.548	9.498000
263	2013	9.61	9.570	9.556	9.504000
264	2014	9.57	9.582	9.581	9.522667
265	2015	9.83	9.608	9.594	9.564667

266 rows × 5 columns

Replacing all the nan values in both the datasets using backfill padding

Before that we check the number of nan values

In [203]:
```
local_temp.isna().sum()
```

Out[203]:
```
year            0
city            0
country         0
avg_temp        8
MOVING_AVG_5   20
MOVING_AVG_10  35
MOVING_AVG_15  48
dtype: int64
```

In [204]:
```
global_temp.isna().sum()
```

Out[204]:
```
year            0
avg_temp        0
MOVING_AVG_5    4
MOVING_AVG_10   9
MOVING_AVG_15  14
dtype: int64
```

In [205]:
```
local_temp.fillna(method='backfill',inplace=True,axis=0)
```

In [206]:
```
global_temp.fillna(method='backfill',inplace=True,axis=0)
```

In [207]:
```
local_temp.isna().sum().sum()
```

Out[207]:
```
0
```

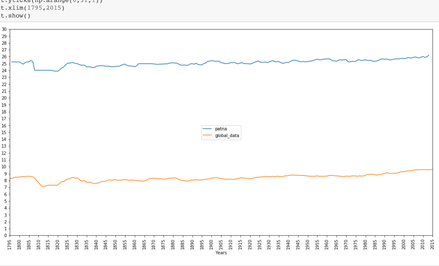
In [208]:
```
global_temp.isna().sum().sum()
```

Out[208]:
```
0
```

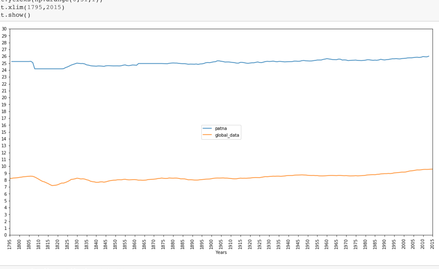
Plotting the curves of year vs moving average in both three cases of moving average(5, 10, 15) on different graphs

I have limited the year in the range from 1795 till 2015 because my city, Patna, data was available 1796 onwards. I took this step for a better visualization

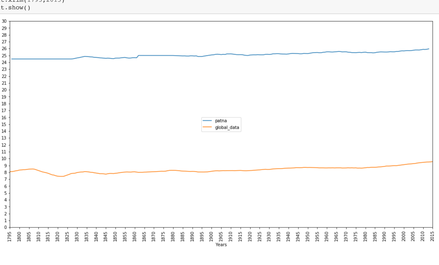
In [209]:
```
figure = plt.figure(figsize=(18,9))
plt.plot(local_temp['year'],local_temp['MOVING_AVG_5'], label='patna')
plt.plot(global_temp['year'],global_temp['MOVING_AVG_5'],label='global_data')
plt.legend(loc = 'center')
plt.xlabel('Years')
plt.ylabel('Temperature(celsius)')
plt.xticks(np.arange(1750,2020,5),rotation=90)
plt.yticks(np.arange(0,31,1))
plt.xlim(1795,2015)
plt.show()
```



In [210]:
```
figure = plt.figure(figsize=(18,9))
plt.plot(local_temp['year'],local_temp['MOVING_AVG_10'], label='patna')
plt.plot(global_temp['year'],global_temp['MOVING_AVG_10'],label='global_data')
plt.legend(loc = 'center')
plt.xlabel('Years')
plt.ylabel('Temperature(celsius)')
plt.xticks(np.arange(1750,2020,5),rotation=90)
plt.yticks(np.arange(0,31,1))
plt.xlim(1795,2015)
plt.show()
```



In [211]:
```
figure = plt.figure(figsize=(18,9))
plt.plot(local_temp['year'],local_temp['MOVING_AVG_15'], label='patna')
plt.plot(global_temp['year'],global_temp['MOVING_AVG_15'],label='global_data')
plt.legend(loc = 'center')
plt.xlabel('Years')
plt.ylabel('Temperature(celsius)')
plt.xticks(np.arange(1750,2020,5),rotation=90)
plt.yticks(np.arange(0,31,1))
plt.xlim(1795,2015)
plt.show()
```



OBSERVATIONS

- Patna city is hotter than global temperature in the years ranging from 1796 to 2015(clearly shown in the graphs).
- The difference in the moving average temperature trend seems to be constant throughout the given period.
- The local(Patna) as well the global temperatures are increasing in the given period.
- From the visual it is clear that their is more fluctuation in the moving average temperature of local city than the global average.
- Eventhough there is a drop in global temperture(moving average), the local temperature tends to increase constantly.

In [ ]:
```

```

In [ ]:
```

```