Exploring Weather Trends

Steps

SQL

Initialy we needed to extract the csv files needed for visualization & interpretation.

Thus, I extracted the global data simply as:

```
SELECT * FROM global_data
```

Then I needed to choose my country only, thus I used the below SQL statement:

```
SELECT * FROM city_data
where city = 'Cairo'
```

Then I downloaded the csv files & took a look at them manually to just make sure everything is in place.

Python (Pandas & Matplotlib)

After that, I used pandas to read the csv files for interpretation & matplotlib for visualization.

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:
```
cnt_df = pd.read_csv('country.csv')

cnt_df.head()
```

Out[2]:

	year	city	country	avg_temp
0	1849	Abidjan	Côte D'Ivoire	25.58
1	1850	Abidjan	Côte D'Ivoire	25.52
2	1851	Abidjan	Côte D'Ivoire	25.67
3	1852	Abidjan	Côte D'Ivoire	NaN
4	1853	Abidjan	Côte D'Ivoire	NaN

In [3]:
```
glb_df = pd.read_csv('global.csv')

glb_df.head()
```

Out[3]:

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

In [4]:
```
glb_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 266 entries, 0 to 265
Data columns (total 2 columns):
year        266 non-null int64
avg_temp    266 non-null float64
dtypes: float64(1), int64(1)
memory usage: 4.2 KB
```

In [5]:
```
cairo_df = cnt_df[cnt_df['city'] == 'Cairo']
df_shape = cairo_df.shape
display(df_shape)
display(cairo_df.head())
```

```
(206, 4)
```

	year	city	country	avg_temp
12578	1808	Cairo	Egypt	17.11
12579	1809	Cairo	Egypt	19.87
12580	1810	Cairo	Egypt	19.93
12581	1811	Cairo	Egypt	20.00
12582	1812	Cairo	Egypt	19.93

Moving Average

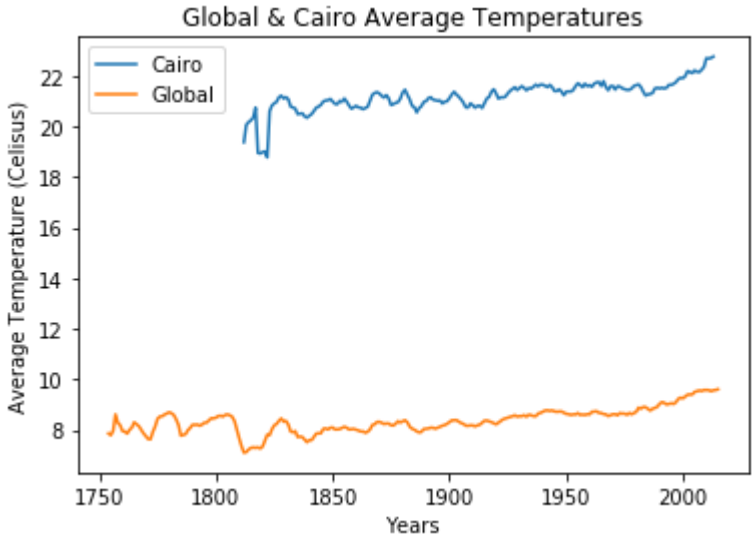
- The average was calculated by the trailing years, 1, 2, 3 etc. We used the cumsum for cummulative sum & just divided by the trailing years using range.
- Moreover, the other method was used using a window of 5 years.

In [6]:
```
def rolling_avg(df):
    df_cumsum = df['avg_temp'].cumsum()
    df_cumsum = df_cumsum / range(1, df.shape[0] + 1)

    return df_cumsum
```

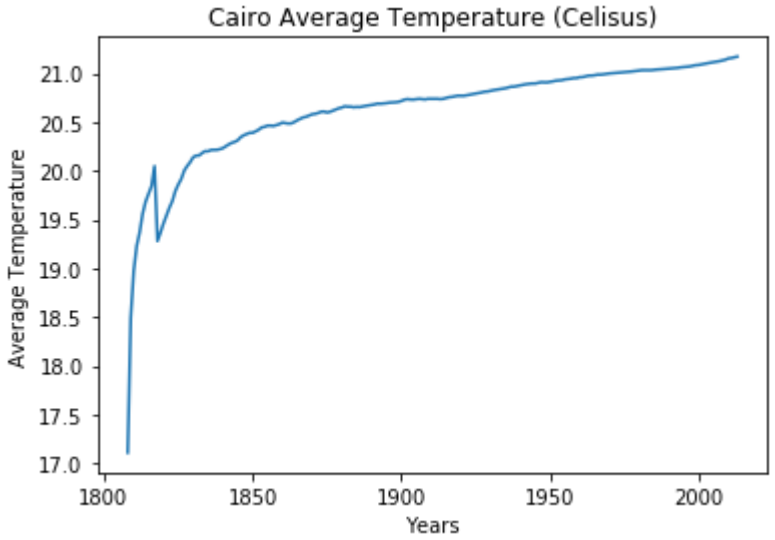
In [21]:
```
plt.xlabel('Years')
plt.ylabel('Average Temperature (Celisus)')
plt.title('Global & Cairo Average Temperatures')
plt.plot(cairo_df['year'], cairo_df.rolling(5)['avg_temp'].mean())
plt.plot(glb_df['year'], glb_df.rolling(5)['avg_temp'].mean())
plt.legend(['Cairo', 'Global'])
```

Out[21]:
```
<matplotlib.legend.Legend at 0x1f9619ed4e0>
```



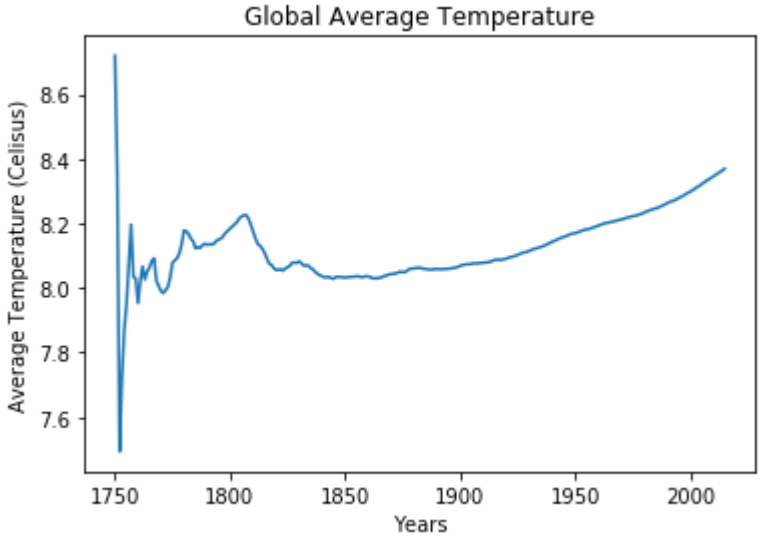
In [22]:
```
plt.xlabel('Years')
plt.ylabel('Average Temperature')
plt.title('Cairo Average Temperature (Celisus)')
plt.plot(cairo_df['year'], rolling_avg(cairo_df))
```

Out[22]:
```
[<matplotlib.lines.Line2D at 0x1f961a43898>]
```



In [23]:
```
plt.xlabel('Years')
plt.ylabel('Average Temperature (Celisus)')
plt.title('Global Average Temperature')
plt.plot(glb_df['year'], rolling_avg(glb_df))
```

Out[23]:
```
[<matplotlib.lines.Line2D at 0x1f961aa36d8>]
```



Interpretations

As shown in the above figures that:

- Cairo is much hotter the average of the global temperatures with a difference in the range of 12 to 14 °C.
- Other than the initial spikes in both the global & Cairo's metrics, the difference is constant.
- The trend is that the world is getting hotter and hotter (Global Warming).

- Cairo's weather started to take an increasing trend after the 1800, while the global measure had some fluctuations.
- Cairo's Temperature data was not recorded from the beginning of 1750 as the global metrics