Explore Weather Trends Project

In this project, we will analyze local and global temperature data and compare the temperature trends to overall global temperature trends. For this project, we will use London, United Kingdom as the city to examine such trends.

In addition, and for purposes of this project, all temperatures are recorded in Celsius (ºC).

First, we select London, United Kingdom from the list of cities available. To do that, we perform an SQL query using the following context:

```sql
SELECT * FROM city_list
```

Next, we select the actual city of London from the city_data and United Kingdom as country:

```sql
SELECT * FROM city_data WHERE city = 'London' AND
 country = 'United Kingdom'
```

Finally, we obtain the global temperature data:

```sql
SELECT * FROM global_data
```

After saving the appropriate CSV files and uploading them to the data repository in our Jupyter notebook, we have the data we need.

Global.csv   London.csv

CALCULATE THE MOVING AVERAGE

In our Jupyter notebook, we import the following Python libraries:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

Next, we load the CSV files from our data repository into the Pandas dataframes:

```python
globaltemp = pd.read_csv('/resources/data/Global.csv')
```

```
localtemp = pd.read_csv('/resources/data/London.csv')
```

After loading the Pandas dataframes, we calculate the Moving Averages (we'll use 15 years, but there was no missing data for the CSV files used for this exercise):

```
global_moving_average = globaltemp['avg_temp'].rolling(15).mean()
local_moving_average = localtemp['avg_temp'].rolling(15).mean()
```

Finally, we visualize the data using matplotlib:

```
plt.figure(figsize=(12,9))
plt.title("Average Temperature in London, United Kingdom versus
Global Temperatures")
plt.xlabel("Year")
plt.ylabel("Temperature (°C)")
plt.plot(globaltemp['year'], global_moving_average, label='Global')
plt.plot(localtemp['year'], local_moving_average, label='London')
plt.legend()
plt.show()
```
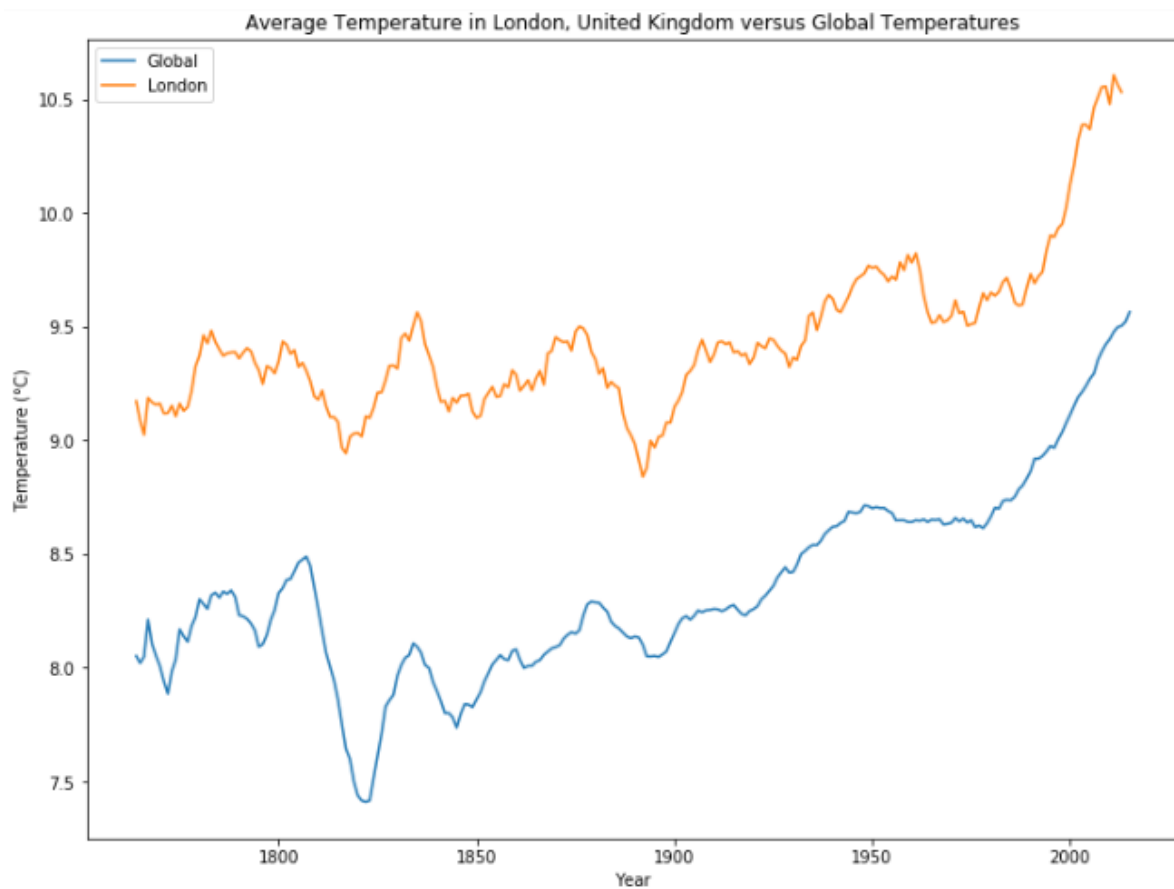
Now display the charts individually.

London:

```
plt.figure(figsize=(12,9))
plt.title("London, United Kingdom")
plt.xlabel("Year")
plt.ylabel("Temperature (°C)")
plt.plot(localtemp['year'], local_moving_average)
plt.show()
```


London, United Kingdom
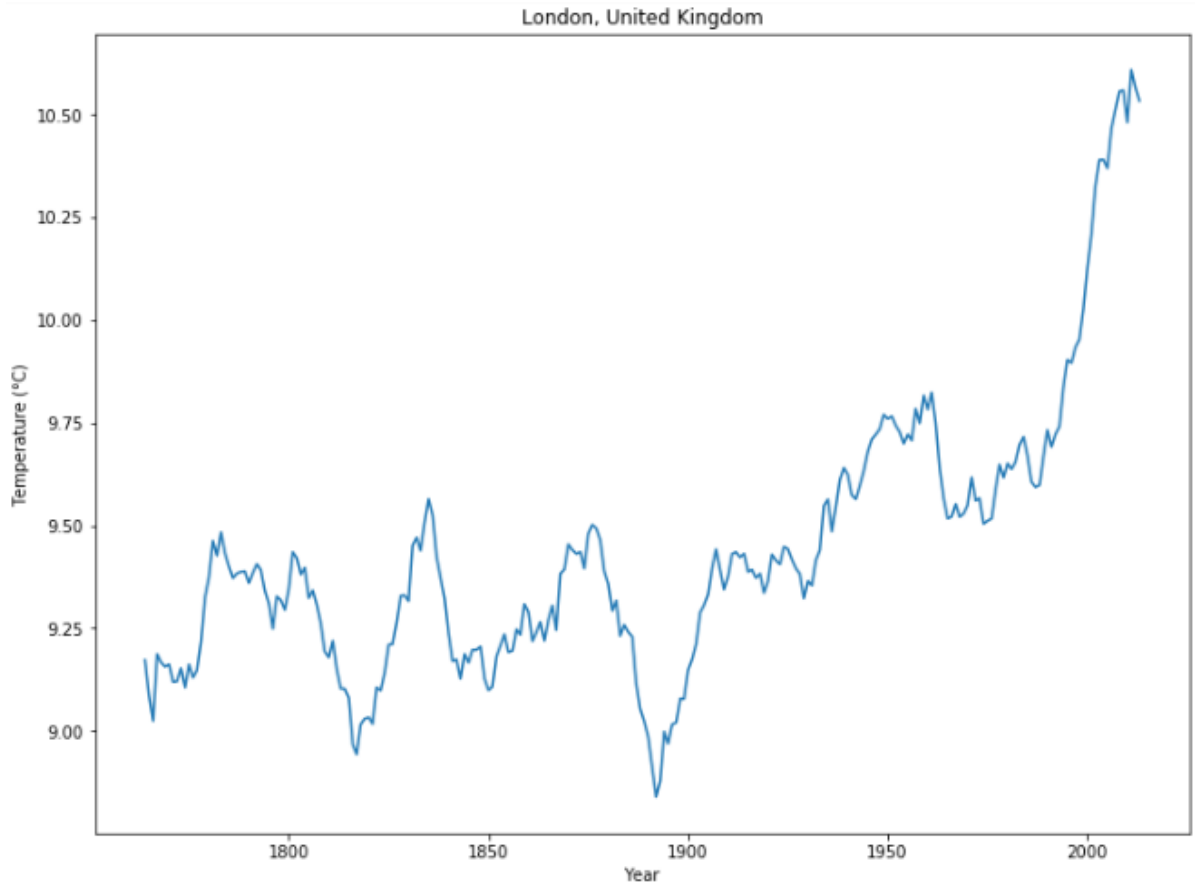
Global:

```python
plt.figure(figsize=(12,9))
plt.title("Global")
plt.xlabel("Year")
plt.ylabel("Temperature (°C)")
plt.plot(globaltemp['year'], global_moving_average)
plt.show()
```
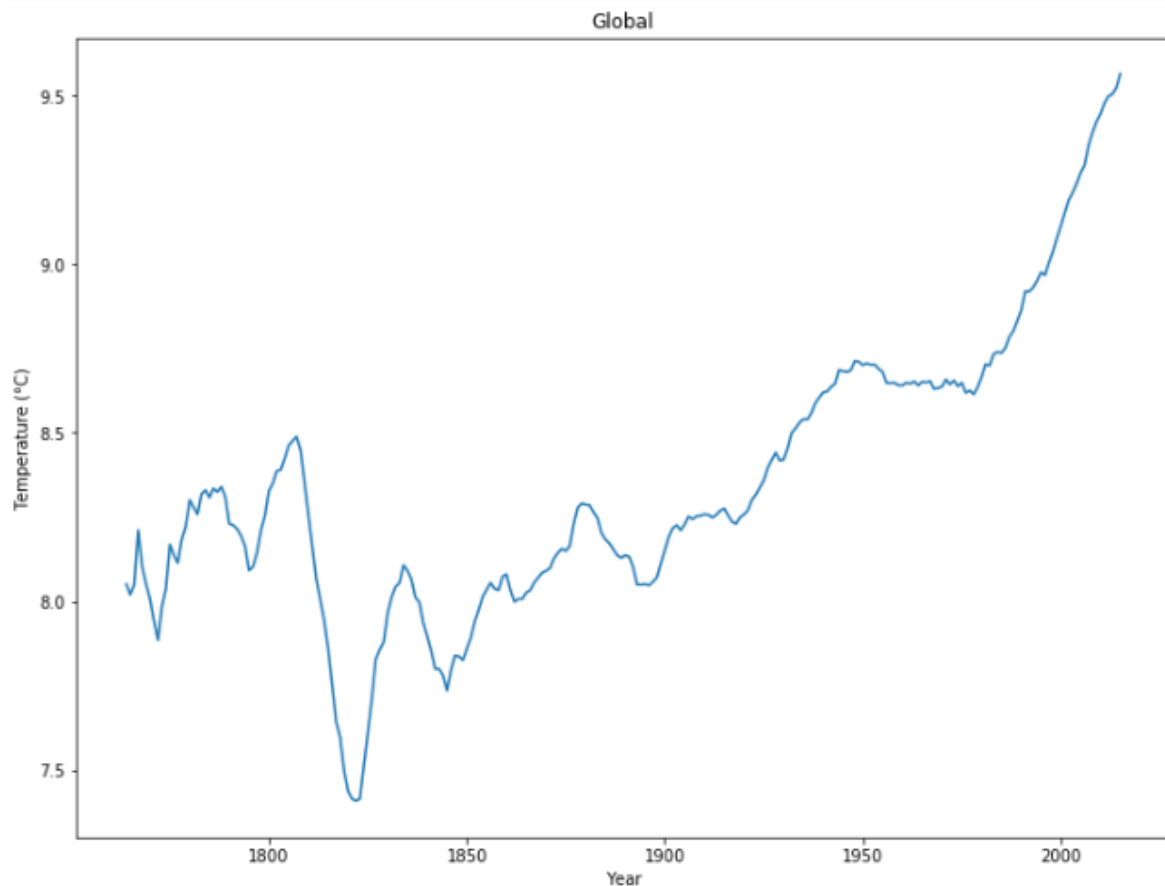

Calculate the mean averages. London was still hotter than Global:

```python
mean_local_average = localtemp['avg_temp'].mean()
mean_global_average = globaltemp['avg_temp'].mean()
difference = mean_local_average - mean_global_average
print("Mean Local Average: ", mean_local_average)
print("Mean Global Average: ", mean_global_average)
print("The temperature of London, United Kingdom is ", difference,
"hotter (°C) than Global")
```

```
Mean Local Average:  9.435880149812734
Mean Global Average:  8.369473684210526
The temperature of London, United Kingdom is 1.066406465602208 (°C)
hotter than Global
```

OBSERVATIONS

1. Temperatures in London are hotter than Global temperatures. 1.07 degrees Celsius may not sound like a large temperature difference, but when converted to degrees Fahrenheit, it is 33.93 degrees hotter!
2. Between the years of 1800 and 1825, there was a dip in temperatures, before temperatures started increasing again from 1825 to 1840 (then temperatures dipped again until 1850).
3. From the year 1900 onward, temperatures have been increasing at a steady pace, fluctuating between increasing and decreasing, before increasing rapidly after year 1980.
4. Lowest temperature for London was around 1890, at slightly less than 8.5 degrees Celsius.
5. Lowest temperature for Global was around 1825, at around 7.4 degrees Celsius.
6. Global temperatures around the world are increasing. This, unfortunately, is irreversible.