Extracting Data from Database using SQL
The following lines of clauses were used to extract the data from the SQL workspace.

1. To extract the city level data:

```
select year, avg_temp
from city_data
where city IN ('New York');
```

2. To extract the global level data:

```
select year, avg_temp
from global_data;
```

Moving Average
The moving average was calculated for 14 years, given that New York City had about 4 years missing in the data at the very beginning. Furthermore, if 7-year average is used, it's possible that the results returned maybe spurious. This was done in Excel.

Line Charts
To display the line charts, Python was utilised for this purpose. First packages were imported; the major packages used were pandas and Matplotlib. Then the data was read into python as a CSV file. The data was however viewed to ensure that it's in the right format. The display below shows the codes written in Jupyter notebook.

```
import pandas as pd
```

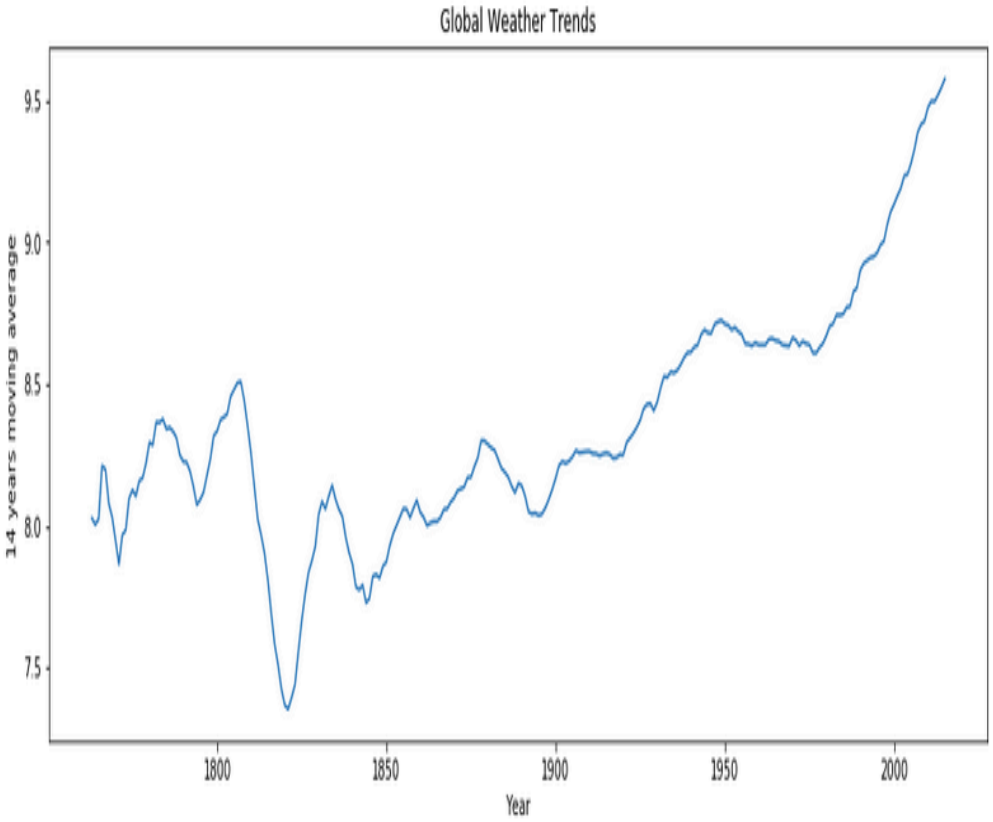
```
Global_data = pd.read_csv('Global data.csv')
```

```
NYC_data = pd.read_csv('New York city data.csv')
```

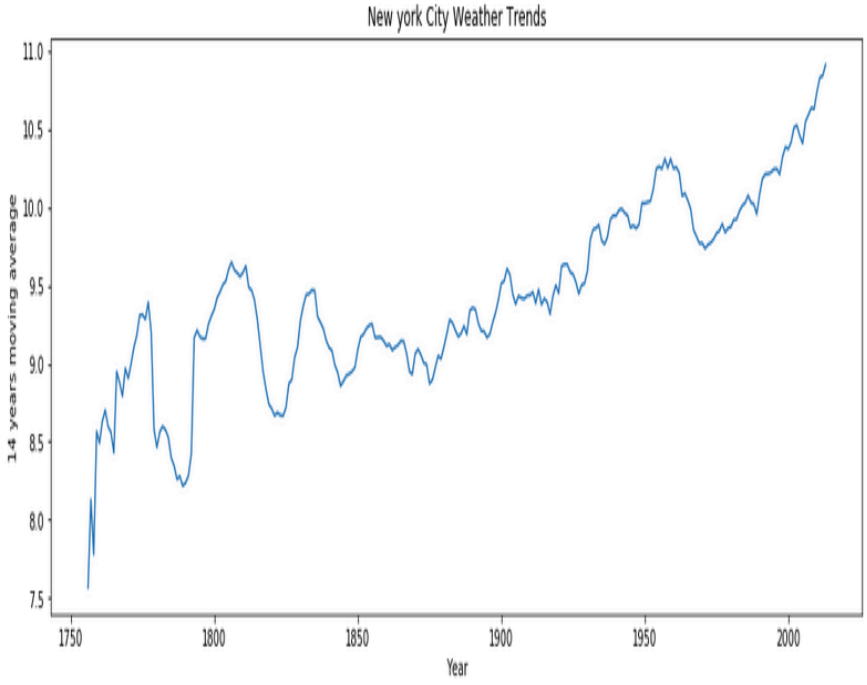
```
Data = pd.merge(Global_data, NYC_data, how='outer', sort=True, on=['year'])
```

```
Data.head(5)
```

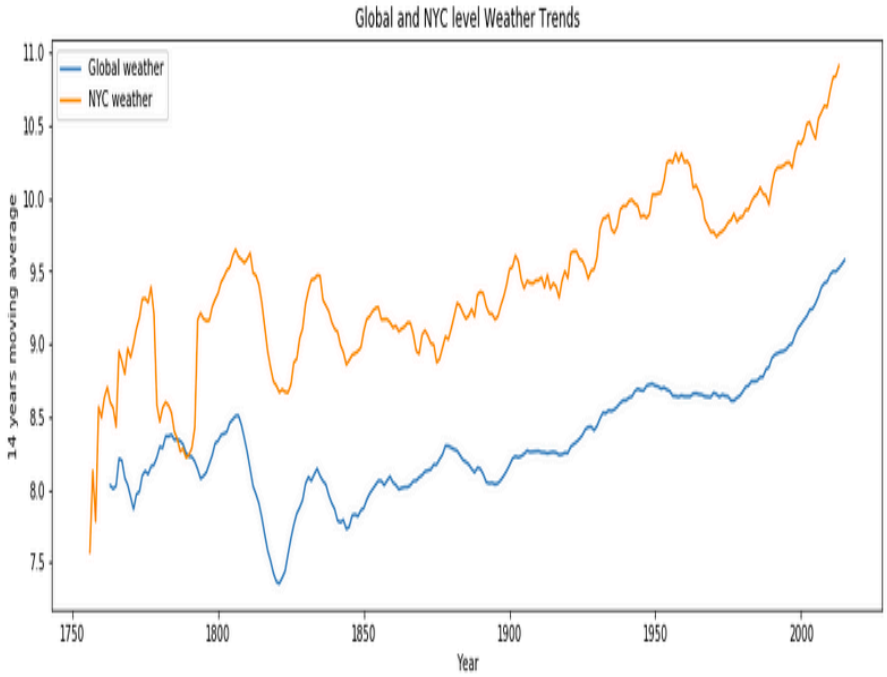
The graph display below shows the global weather trends against the years using the 14-year moving average rather than the yearly average. However, there is still the presence of volatility.



The next graph display below shows the city (New York) level weather trends, with years on the x-axis and the 14 years moving average on the y-axis. This has more volatility than the global weather trend line.



The display graph below shows the combined global and city (New York) level weather trend line.



The codes below were used to run the three plots displayed above in Jupyter notebook.

```
import matplotlib.pyplot as plt
```

```
plt.rcParams['figure.figsize'] = (15, 5)
```

```
plt.plot(Global_data['year'], Global_data['14-years MA global'])
plt.title('Global Weather Trends')
plt.xlabel('Year')
plt.ylabel('14 years moving average')
plt.show()
```

```
plt.plot(NYC_data['year'], NYC_data['14-years MA city'])
plt.title('New york City Weather Trends')
plt.xlabel('Year')
plt.ylabel('14 years moving average')
plt.show()
```

```
plt.plot(Global_data['year'], Global_data['14-years MA global'], label = "Global weather")
plt.plot(NYC_data['year'], NYC_data['14-years MA city'], label = "NYC weather")
plt.title('Global and NYC level Weather Trends')
plt.xlabel('Year')
plt.ylabel('14 years moving average')
plt.legend()
plt.show()
```

Observations

The following were observed from the visualisation displayed above;

1. The New York City weather is seen to be full of volatility in the data than the global weather data. This can be attributed to the fact that the weather conditions in New York City fluctuates, it could be really cold and

get to the minus degree Celsius with snow accompanying this weather, compared to some parts of the world like in West Africa that never gets snow or get as low as minus degree Celsius.

2. Both the global weather trend and New York City weather trend followed the same pattern between 1800 and 1850 with a pike that dropped the weather trend line causing a major fall in both trends. This fall definitely affected not just New York City but the entire global weather was affected as it can be observed from the chart above. However, the previous pike in the New York city trend line in 1800, did not reflect in the global data trend line; this means that NYC was only affected in 1800. But both NYC and the global weather were affect between 1800 and 1850.
3. The other drops in New York City weather trend line don't affect the global trend line; this is due to the fact that New York City is just a small part of the global weather data and does not constitute the major part of the global data.
4. Both the global weather trend line and the New York City trend line follows an upward rising curve. It is not necessarily like a linear regression line/demand curve given the volatility involved but it follows an upward rising pattern. This can be interpreted to be that over the years, the global weather and New York city weather has gotten better and it's improving in the 21st century compared to the 1700's and 1800's.