Exploring Weather Trends

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Summary

In this project, I extracted the essential data via SQL and used python3 to analyze and compare the temperature trends in Boston and the overall global temperature trends. Since I want to compare the overall trend, I chose a 15-year moving average, which can show the trend without losing too much detail.

Missing data

There are five missing data in Boston's average temperature from the year 1746 to 1749 and 1780. Due to the global dataset start in the year 1750, I cut off the data before 1750 of Boston's average temperature. For the year 1780, I simply use the average of the previous and the next year, which gives the littlest impact of the data and makes the most sense.

```
In [3]: B[B.isnull().values==True]
```

Out[3]:

	year	city	avg_temp
3	1746	Boston	NaN
4	1747	Boston	NaN
5	1748	Boston	NaN
6	1749	Boston	NaN
37	1780	Boston	NaN

Found the year that temp are missing.

```
In [8]: mean = (7.61-2.31)/2
        B2['avg_temp'] = B2['avg_temp'].fillna(mean)
```

```
In [9]: B2.loc['1779':'1781']
```

Out[9]:

	city	avg_temp
year		
1779	Boston	-2.31
1780	Boston	2.65
1781	Boston	7.61

The queries

SQL query:

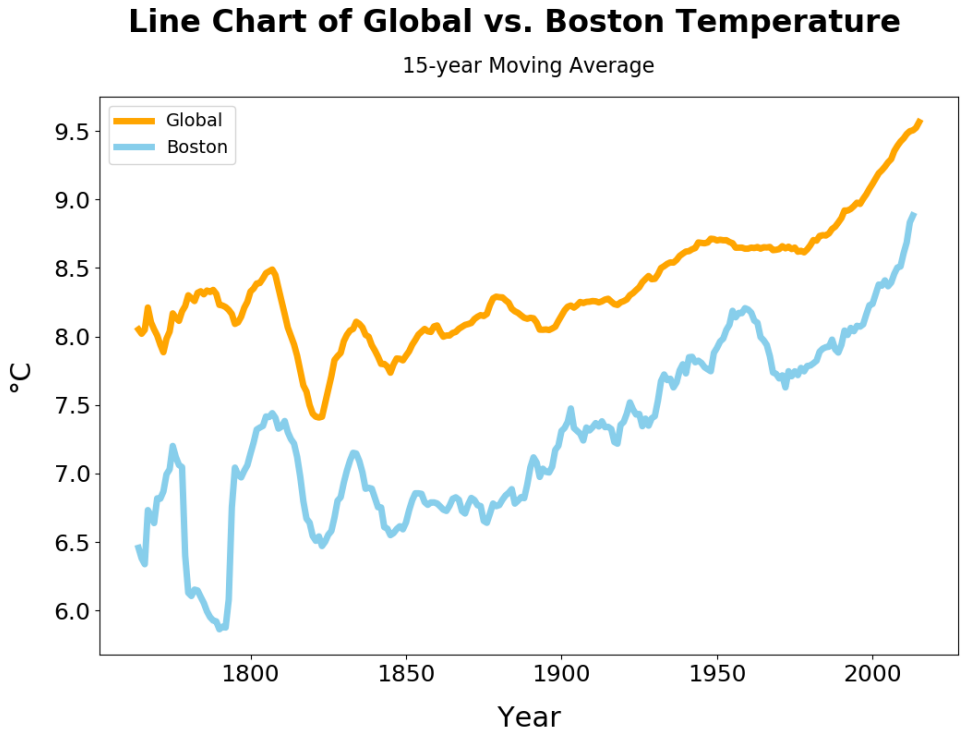
SELECT * FROM city_data WHERE city = 'Boston';

SELECT * FROM global_data;

Python query for moving average:

```
In [17]: rolling_mean_G20 = G.avg_temp.rolling(window=15).mean()
         rolling_mean_B20 = B.avg_temp.rolling(window=15).mean()
```

Figure



Observations

- Compared with the global average, the average temperature in Boston is lower, but the difference has not been consistent over time.
- The range of average temperature in Boston (3 ˚C) are wider than Global(2˚C).
- The fluctuation of average temperature in Boston are greater than the global which means the yearly temperature difference in Boston are greater.
- Both lines show the same general trend, which has increased since the 1850s and increased rapidly after the 1970s.
- Unlike the global average which continued to increase in the late 18th century, Boston remained cold or even colder on average.
- Compared with the slow rise in the world in the 1850s to 1900s, Boston has remained cold for about 30 years, and then began to soar rapidly in the 1880s.
- When the global remain flat in 1950s -70s, Boston has a drop around 0.5˚C.