Analysis of Trends In Global Average Temperature As Compared To Trends In Houston's Average Temperature

By: Hasan Rizvi
Term 1, Project 1, Data Analysis
March 2018 Cohort

1.0 Data Acquisition

The Data was acquired through a SQL query from the Udacity in-class environment. Two sets of data were obtained.

The first query was to obtain global data as shown in Figure 1. Please refer to appendix to access text version of code.

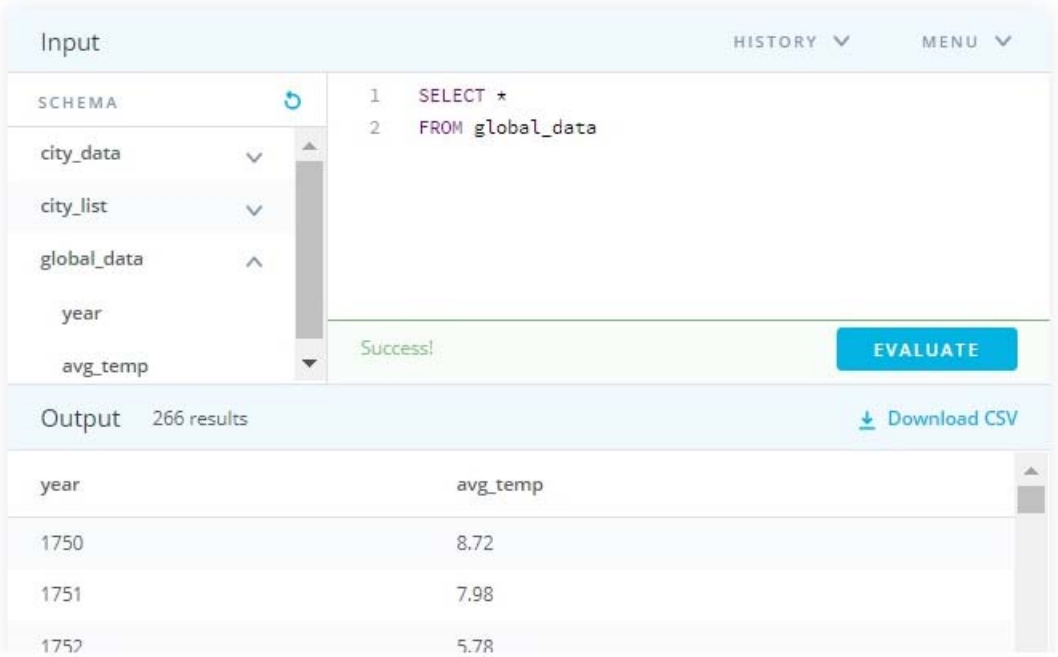


Figure 1: Querying For Global Data

The second query was to obtain Houston Data. Before this was done, it was first verified that Houston data was listed in the database, as shown in Figure 2.

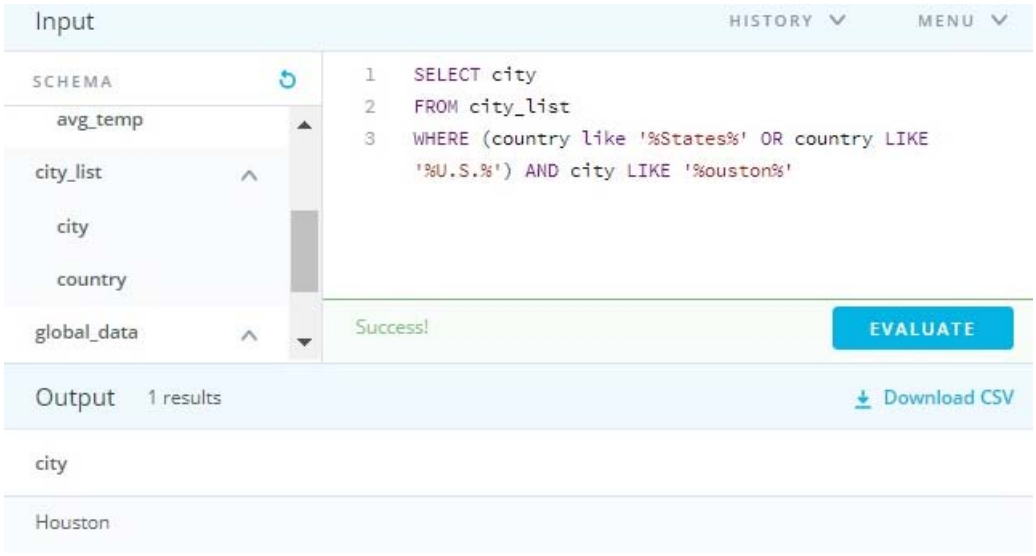


Figure 2: Checking Database for Houston

Once verified, Houston Data was obtained, as shown in Figure 3.

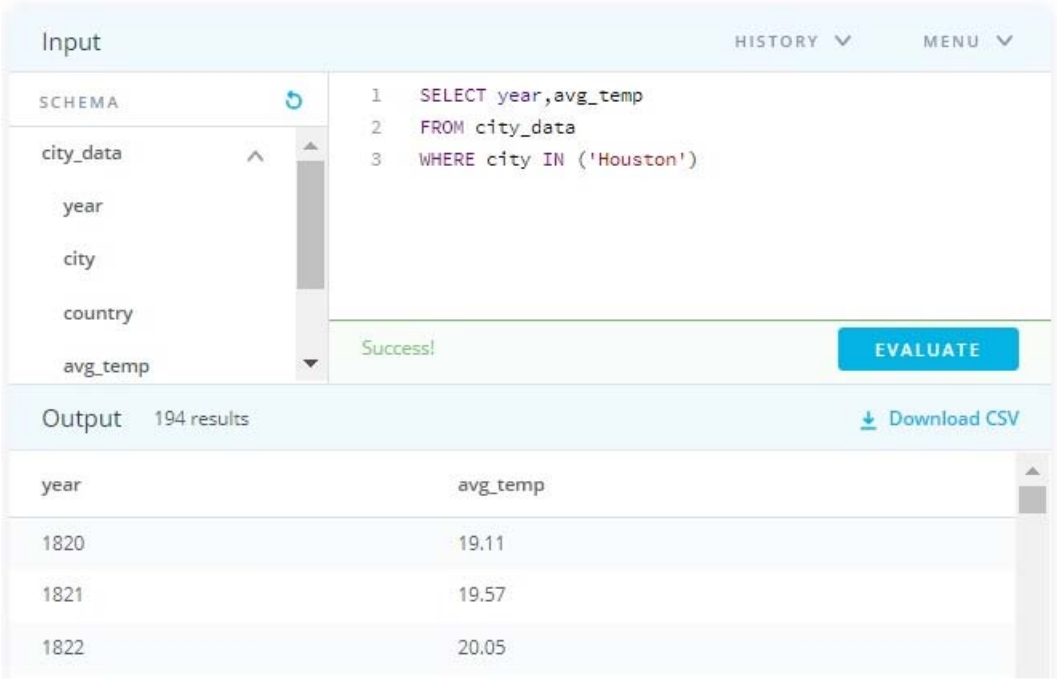


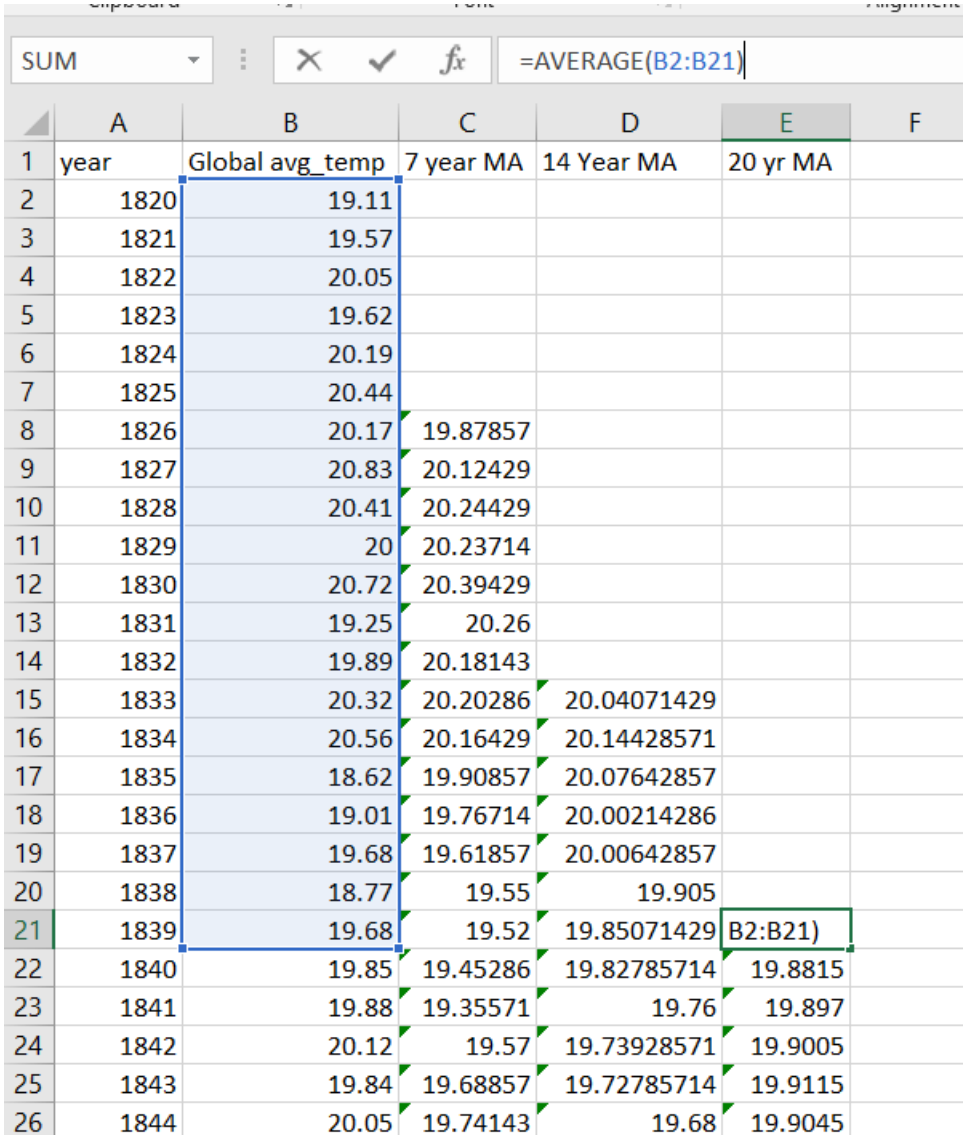
Figure 3: Querying For Houston Data

The data was downloaded in a CSV format and then exported to Excel.

2.0 Data Processing

2.1 Selecting a Format

Once the data was opened in Excel, the next step was to get into a format that made sense. To decrease volatility, moving average were calculated and plotted for 7 years, 14 years and 20 years, as shown in Figure 4 and Figure 5.. It was decided to stick with 20 years, as that presented a clear picture without sacrificing too much detail.



	A	B	C	D	E	F
1	year	Global avg_temp	7 year MA	14 Year MA	20 yr MA	
2	1820	19.11				
3	1821	19.57				
4	1822	20.05				
5	1823	19.62				
6	1824	20.19				
7	1825	20.44				
8	1826	20.17	19.87857			
9	1827	20.83	20.12429			
10	1828	20.41	20.24429			
11	1829	20	20.23714			
12	1830	20.72	20.39429			
13	1831	19.25	20.26			
14	1832	19.89	20.18143			
15	1833	20.32	20.20286	20.04071429		
16	1834	20.56	20.16429	20.14428571		
17	1835	18.62	19.90857	20.07642857		
18	1836	19.01	19.76714	20.00214286		
19	1837	19.68	19.61857	20.00642857		
20	1838	18.77	19.55	19.905		
21	1839	19.68	19.52	19.85071429	B2:B21)	
22	1840	19.85	19.45286	19.82785714	19.8815	
23	1841	19.88	19.35571	19.76	19.897	
24	1842	20.12	19.57	19.73928571	19.9005	
25	1843	19.84	19.68857	19.72785714	19.9115	
26	1844	20.05	19.74143	19.68	19.9045	

Figure 4: Calculating Moving Average

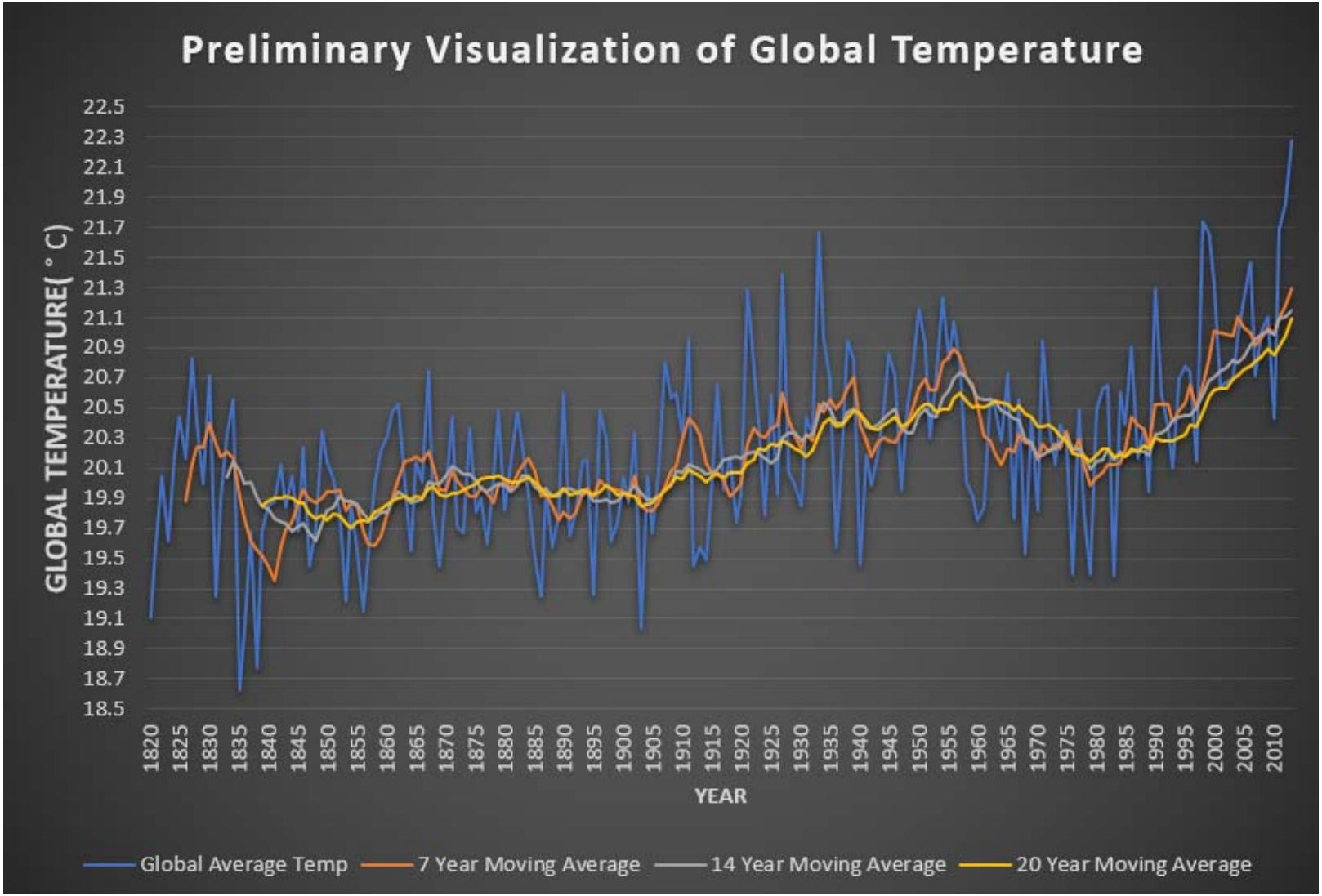


Figure 5: Plotting Raw Data, Moving Averages

3.0 Visualizing Data

When visualizing the data it was decided that it was important to present in such a manner that the city and global trends could easily be compared. As the city temperature was quite different than the global temperature, it was decided to use a secondary axis. The plot is shown in Figure 6.

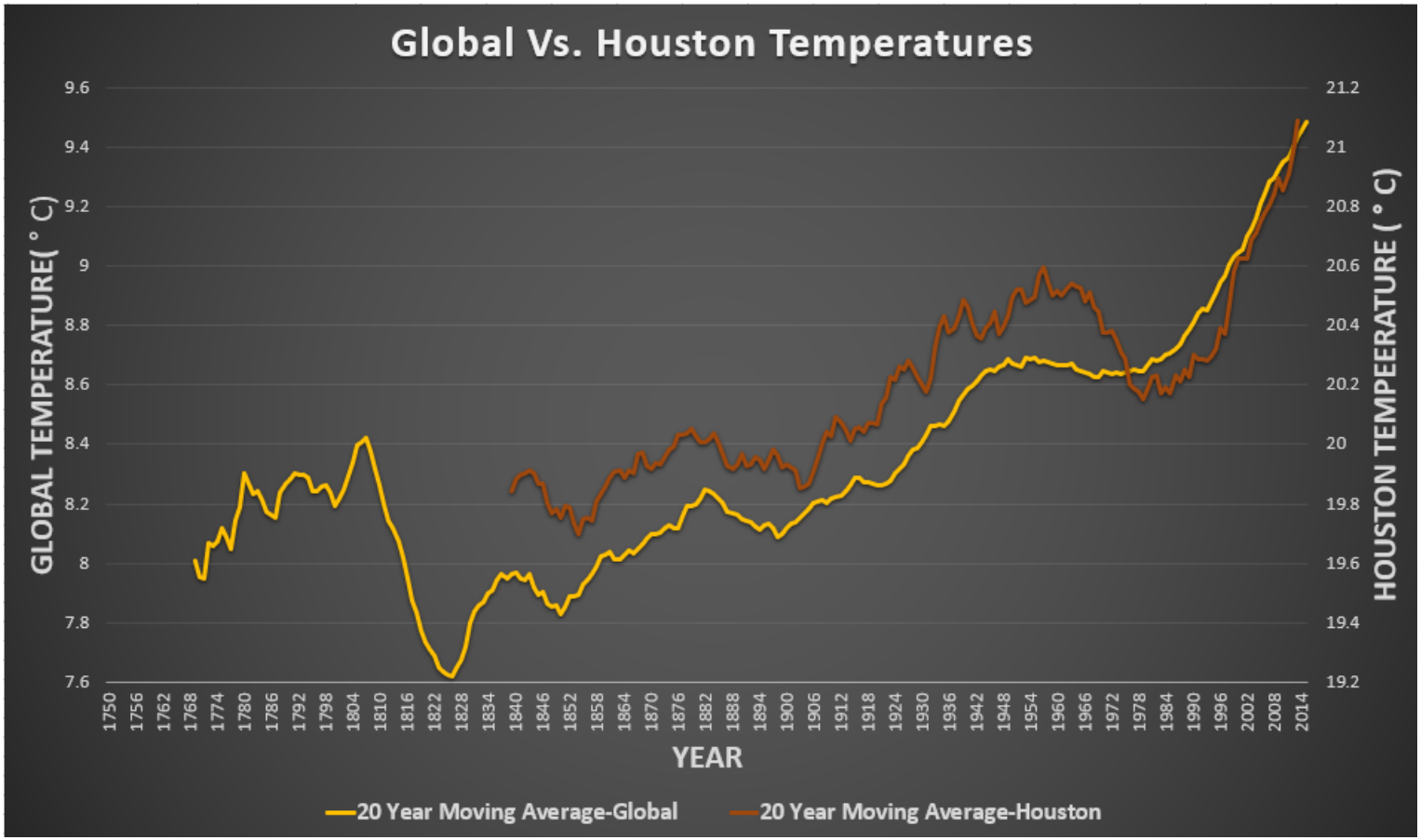


Figure 6: Global Temperature Vs. Houston Temperature

It was also determined that the rate of change between the moving average of the temperatures was important. This was also calculated and plotted, as shown in Figure 7 and Figure 8. A polynomial trendline has been fitted to the plots.

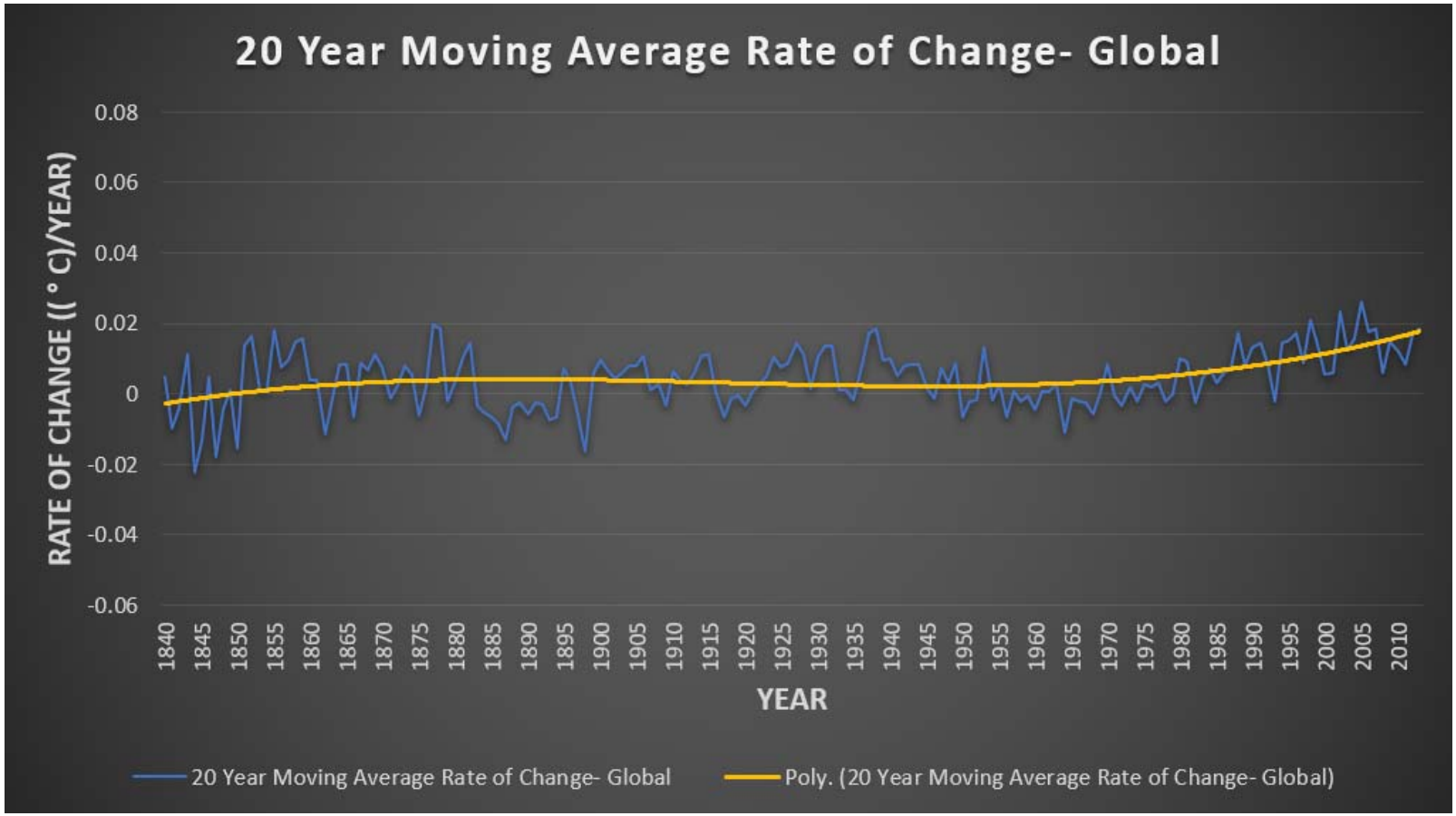


Figure 7: 20 Year Moving Rate of Change- Global

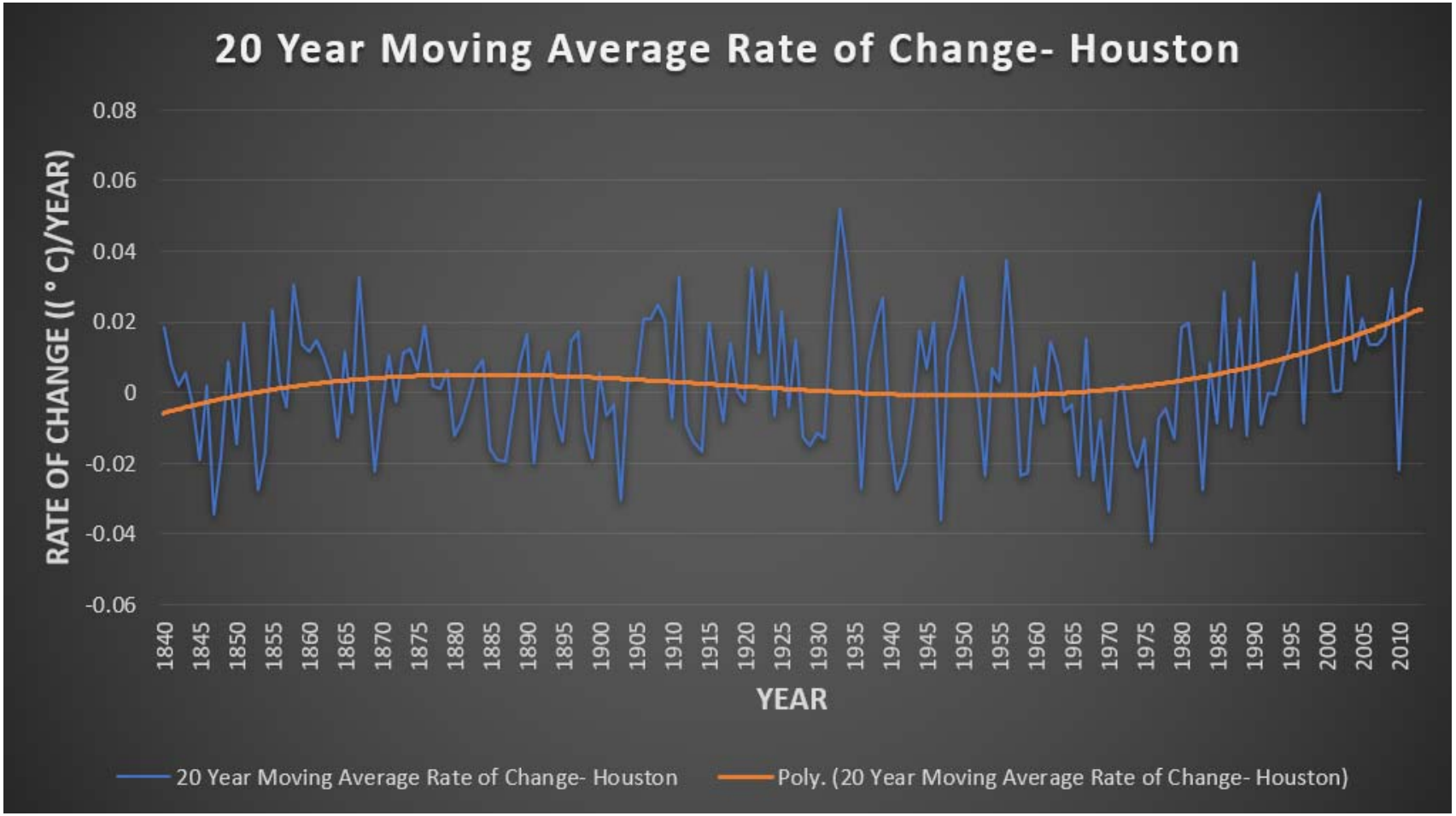


Figure 8: 20 Year Moving Rate of Change- Houston

Finally, it was decided that the change in the difference between the city and global temperature was also important, so this was plotted in Figure 9. A linear trendline has been added to show the decreasing trend.

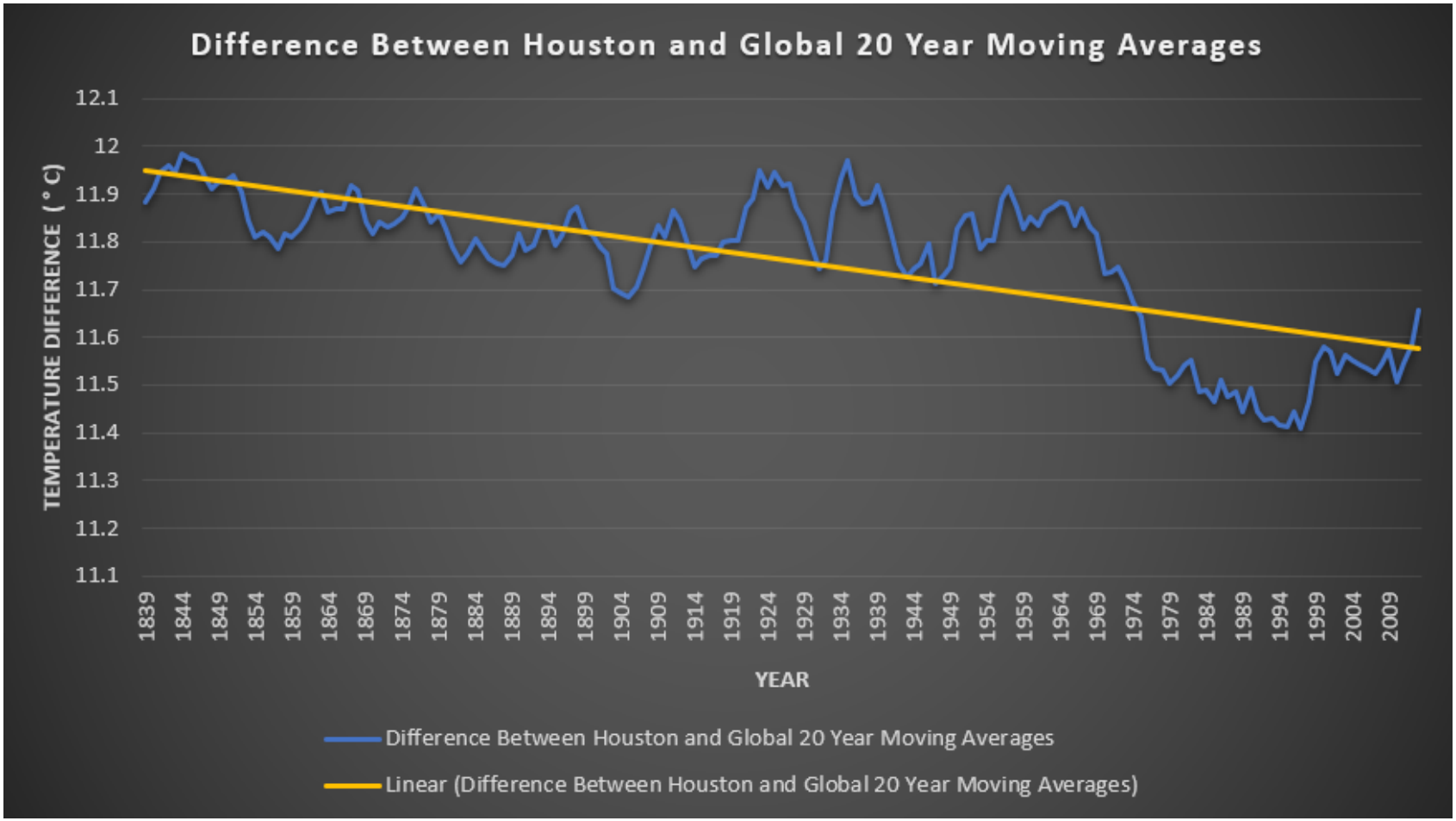


Figure 9: Difference between Houston and Global 20 Year Moving Averages

4.0 Observations

Some observations that were made from the data visualization:

- The Average Global Temperature and Houston Temperature has been increasing. The Global temperature has increased roughly 1.4 degrees, over the recorded span. Houston Temperature has increased by approximately 1.2 degrees. (Note that the spans are different for Global and Houston.
- There has been a sharp and continuous increase in the Global and Houston temperature, starting around 1970.
- The rate of change of both the global temperature and the Houston temperature has been increasing. The rate has started to increase sharply around 1970. The rate is currently around .02 degrees Celsius/Year and trending upwards.
- It can be seen that the rate of change for Houston is currently a bit higher than the rate of change for the Global Average. Houston's rate is above .02 Celsius/Year, while the Global rate is below.
- Houston has had significantly higher temperatures than the Global Average. The difference between Houston's temperature and the Global temperature has been decreasing. It has changed from 12 degrees Celsius to 11.6 degrees, since 1839.
- The general trend shape of the temperature increase in Houston is consistent with the general trend shape of the Global Temperature increase.

5.0 Appendix

5.1 SQL Code

```
SELECT *
FROM global_data

SELECT city
FROM city_list
WHERE (country LIKE (%U.S.) OR country LIKE (%States%)) AND city LIKE (%ouston%)

SELECT avg_temp, year
FROM city_data
WHERE city IN ('Houston')
#
#
#
```