Name: Venkata Sai Archana Ogirala (Preferred Name: Sai Ogirala)

Weather Trend Analysis Project:

What tools did you use for each step? (Python, SQL, Excel, etc)

Tools: Udacity Workspace to extract data using SQL Query and MS Excel to visualize the Weather Trends Line Charts

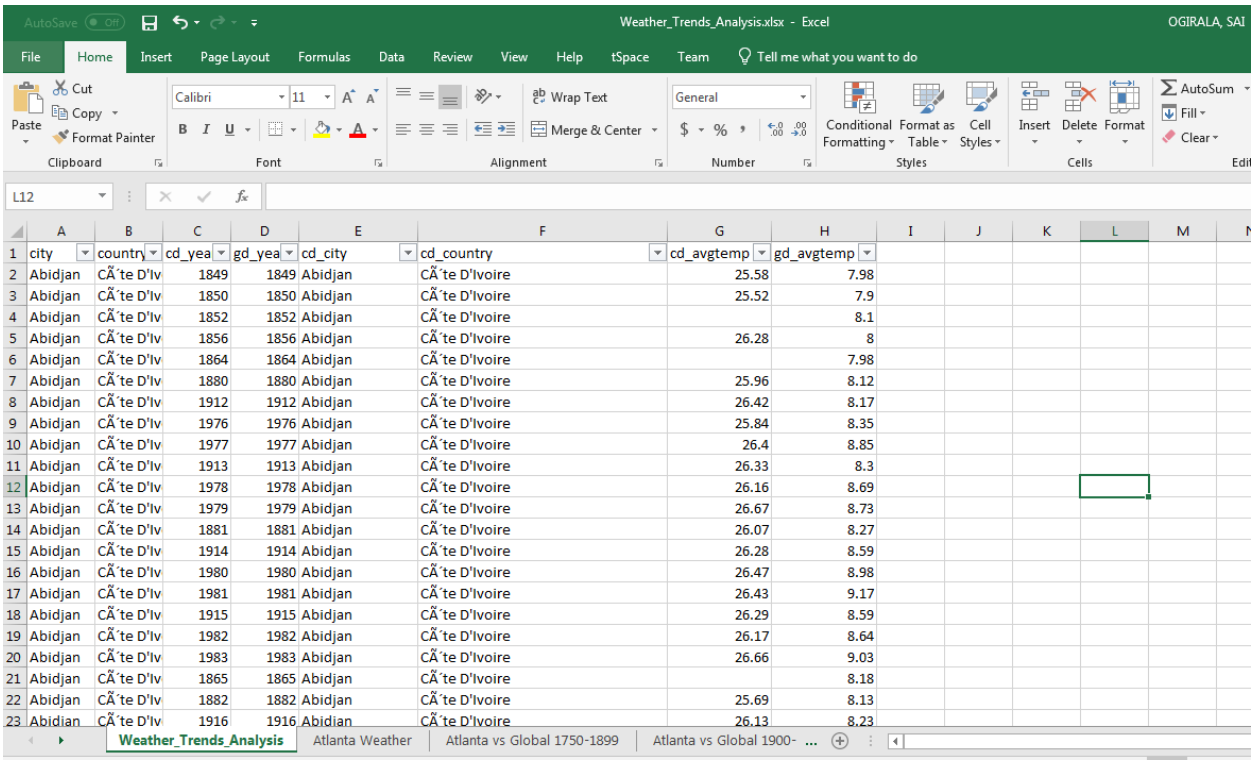
"Original SQL Query used to extract data from Udacity Workspace:

```
select cd.year as cd_year,
    gd.year as gd_year,
    cd.city as cd_city,
    cd.country as cd_country,
    cd.avg_temp as cd_avgtemp,
    gd.avg_temp as gd_avgtemp
from city_data as cd, global_data as gd
where cd.year=gd.year;
```

2. I used Excel to filter City= "Atlanta" after extracting data from Udacity Workspace.

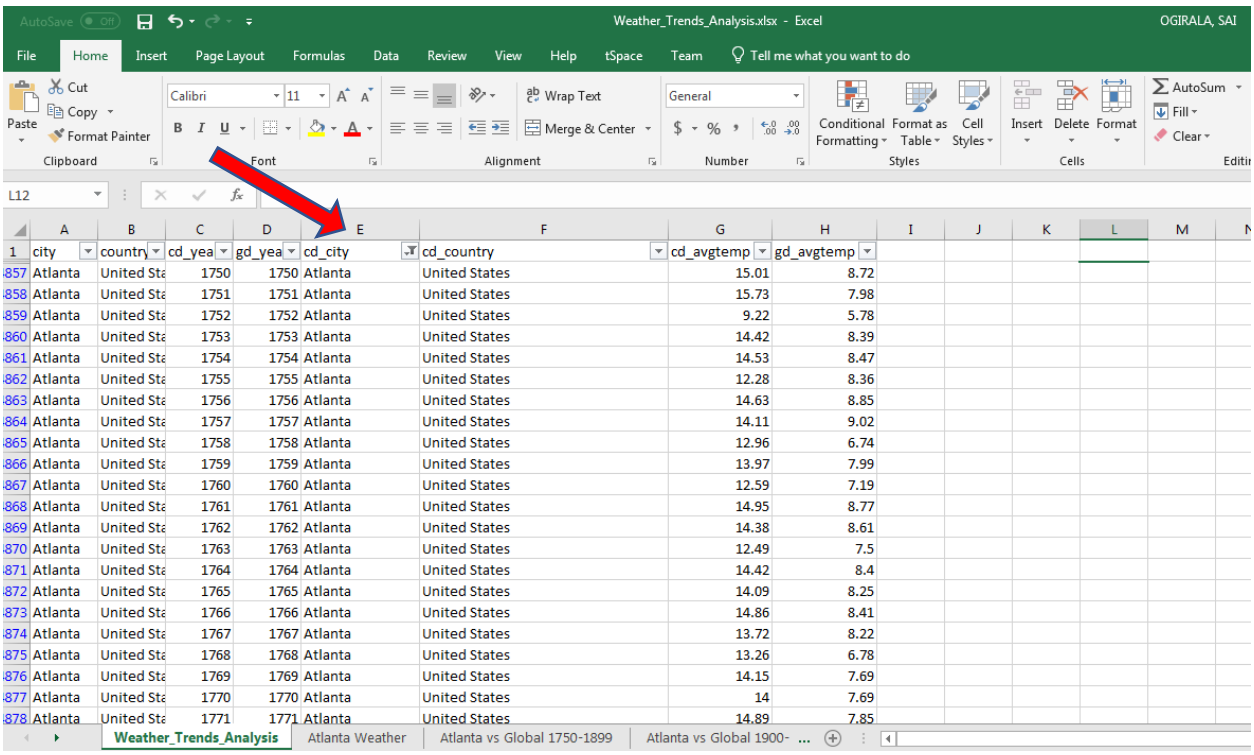
To get Atlanta Moving Average Temperature and Global Average Temperature in Line Chart. First, I used original SQL Query data using Udacity Workspace and downloaded into csv file. Later, I copied entire CSV data into new Excel file called "Weather Trend Analysis" Excel file and then I filtered the data where city = "Atlanta" I didn't write any where condition to show city= "Atlanta". Instead of doing that, I just filtered data using Excel function Filter button and then I copied selected columns of Atlanta data into another worksheet "Atlanta Weather" to avoid any errors with original data that I extracted.

Original SQL Data extracted from Udacity Workspace: Weather Trend Analysis Worksheet



	A	B	C	D	E	F	G	H
1	city	country	cd_yea	gd_yea	cd_city	cd_country	cd_avgtemp	gd_avgtemp
2	Abidjan	CÃ´te D'Iv	1849	1849	Abidjan	CÃ´te D'Ivoire	25.58	7.98
3	Abidjan	CÃ´te D'Iv	1850	1850	Abidjan	CÃ´te D'Ivoire	25.52	7.9
4	Abidjan	CÃ´te D'Iv	1852	1852	Abidjan	CÃ´te D'Ivoire		8.1
5	Abidjan	CÃ´te D'Iv	1856	1856	Abidjan	CÃ´te D'Ivoire	26.28	8
6	Abidjan	CÃ´te D'Iv	1864	1864	Abidjan	CÃ´te D'Ivoire		7.98
7	Abidjan	CÃ´te D'Iv	1880	1880	Abidjan	CÃ´te D'Ivoire	25.96	8.12
8	Abidjan	CÃ´te D'Iv	1912	1912	Abidjan	CÃ´te D'Ivoire	26.42	8.17
9	Abidjan	CÃ´te D'Iv	1976	1976	Abidjan	CÃ´te D'Ivoire	25.84	8.35
10	Abidjan	CÃ´te D'Iv	1977	1977	Abidjan	CÃ´te D'Ivoire	26.4	8.85
11	Abidjan	CÃ´te D'Iv	1913	1913	Abidjan	CÃ´te D'Ivoire	26.33	8.3
12	Abidjan	CÃ´te D'Iv	1978	1978	Abidjan	CÃ´te D'Ivoire	26.16	8.69
13	Abidjan	CÃ´te D'Iv	1979	1979	Abidjan	CÃ´te D'Ivoire	26.67	8.73
14	Abidjan	CÃ´te D'Iv	1881	1881	Abidjan	CÃ´te D'Ivoire	26.07	8.27
15	Abidjan	CÃ´te D'Iv	1914	1914	Abidjan	CÃ´te D'Ivoire	26.28	8.59
16	Abidjan	CÃ´te D'Iv	1980	1980	Abidjan	CÃ´te D'Ivoire	26.47	8.98
17	Abidjan	CÃ´te D'Iv	1981	1981	Abidjan	CÃ´te D'Ivoire	26.43	9.17
18	Abidjan	CÃ´te D'Iv	1915	1915	Abidjan	CÃ´te D'Ivoire	26.29	8.59
19	Abidjan	CÃ´te D'Iv	1982	1982	Abidjan	CÃ´te D'Ivoire	26.17	8.64
20	Abidjan	CÃ´te D'Iv	1983	1983	Abidjan	CÃ´te D'Ivoire	26.66	9.03
21	Abidjan	CÃ´te D'Iv	1865	1865	Abidjan	CÃ´te D'Ivoire		8.18
22	Abidjan	CÃ´te D'Iv	1882	1882	Abidjan	CÃ´te D'Ivoire	25.69	8.13
23	Abidjan	CÃ´te D'Iv	1916	1916	Abidjan	CÃ´te D'Ivoire	26.13	8.23

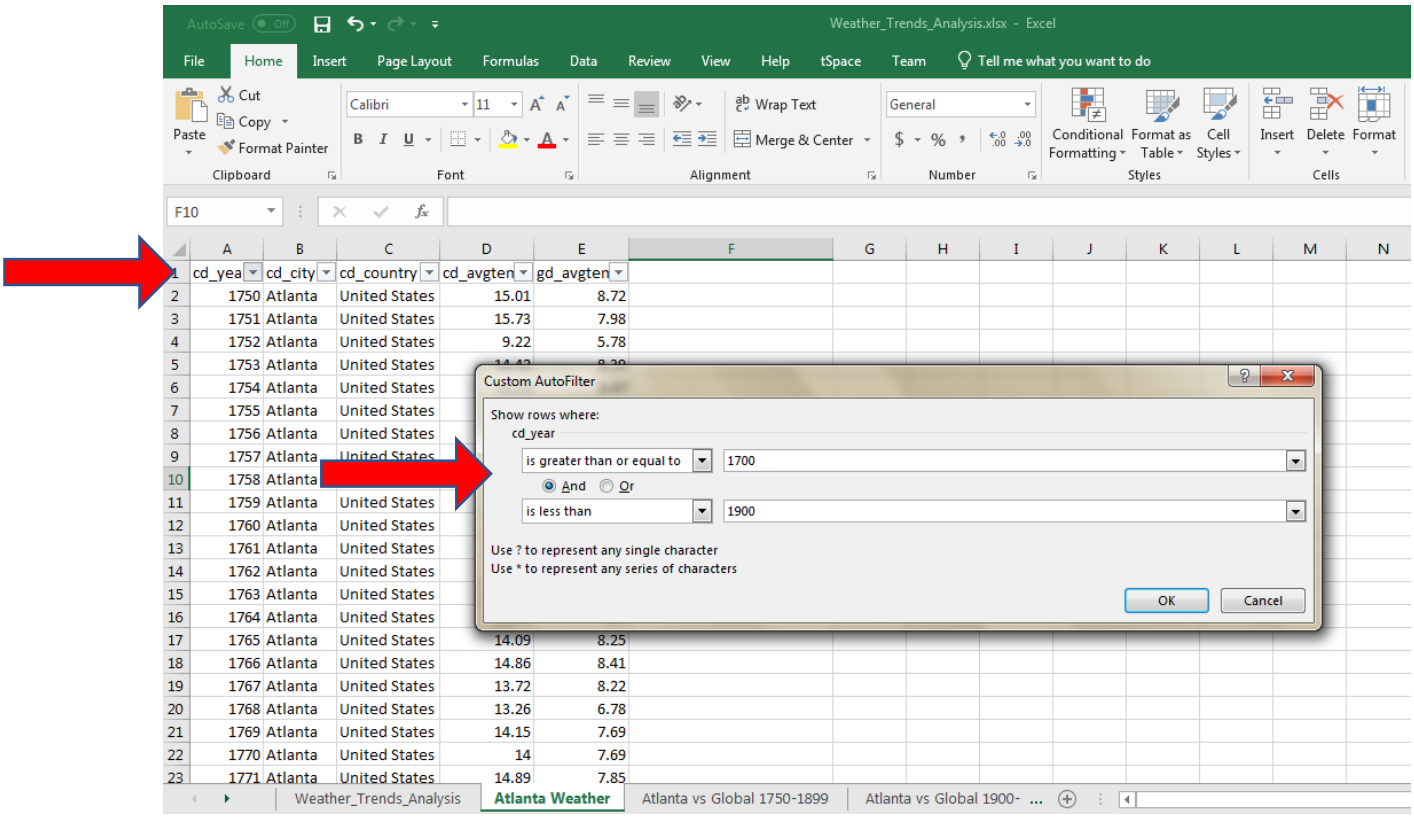
Weather Trend Analysis Worksheet Screenshot : Filtered cd_city = “Atlanta”



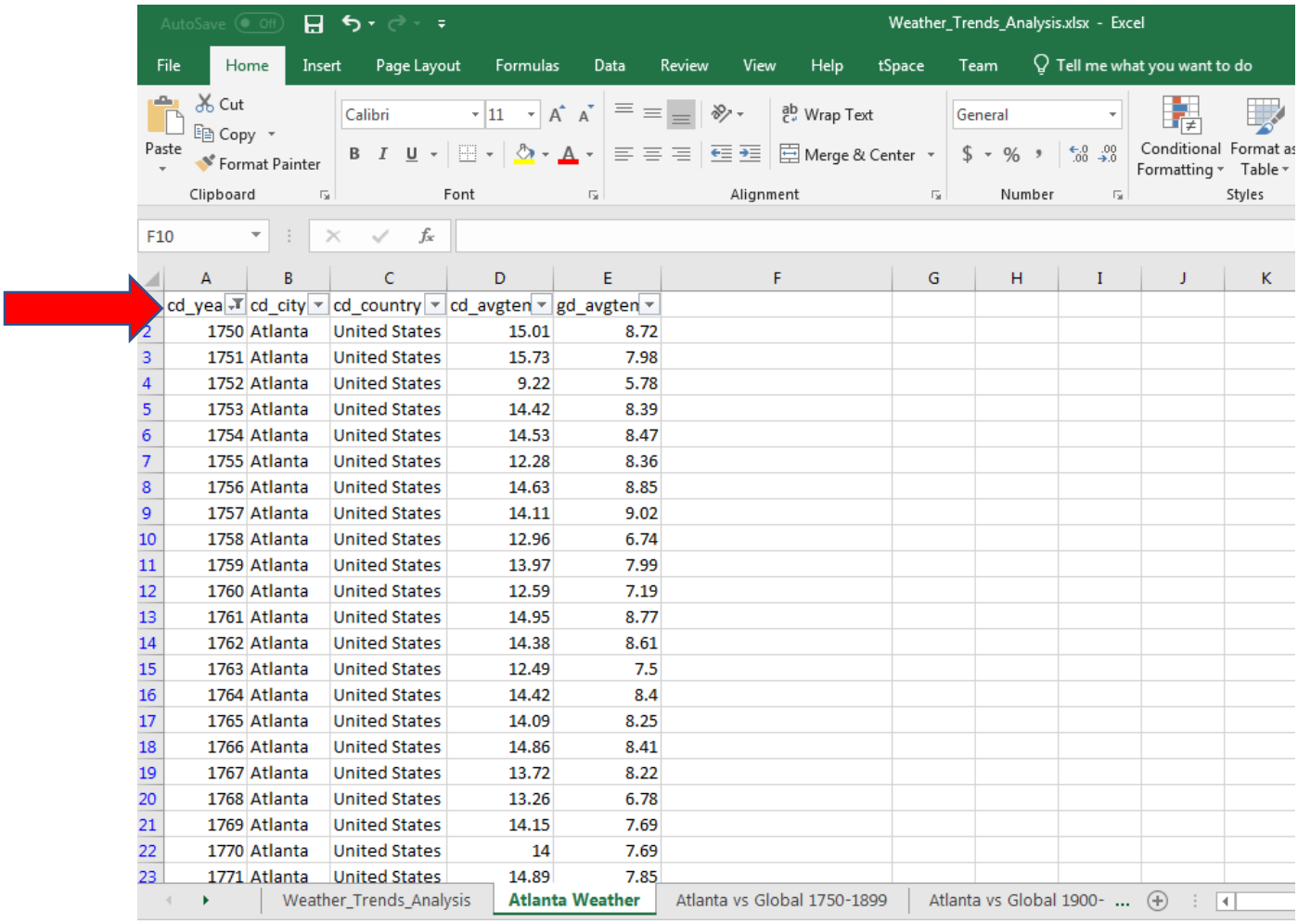
	A	B	C	D	E	F	G	H
1	city	country	cd_yea	gd_yea	cd_city	cd_country	cd_avgtemp	gd_avgtemp
857	Atlanta	United Sta	1750	1750	Atlanta	United States	15.01	8.72
858	Atlanta	United Sta	1751	1751	Atlanta	United States	15.73	7.98
859	Atlanta	United Sta	1752	1752	Atlanta	United States	9.22	5.78
860	Atlanta	United Sta	1753	1753	Atlanta	United States	14.42	8.39
861	Atlanta	United Sta	1754	1754	Atlanta	United States	14.53	8.47
862	Atlanta	United Sta	1755	1755	Atlanta	United States	12.28	8.36
863	Atlanta	United Sta	1756	1756	Atlanta	United States	14.63	8.85
864	Atlanta	United Sta	1757	1757	Atlanta	United States	14.11	9.02
865	Atlanta	United Sta	1758	1758	Atlanta	United States	12.96	6.74
866	Atlanta	United Sta	1759	1759	Atlanta	United States	13.97	7.99
867	Atlanta	United Sta	1760	1760	Atlanta	United States	12.59	7.19
868	Atlanta	United Sta	1761	1761	Atlanta	United States	14.95	8.77
869	Atlanta	United Sta	1762	1762	Atlanta	United States	14.38	8.61
870	Atlanta	United Sta	1763	1763	Atlanta	United States	12.49	7.5
871	Atlanta	United Sta	1764	1764	Atlanta	United States	14.42	8.4
872	Atlanta	United Sta	1765	1765	Atlanta	United States	14.09	8.25
873	Atlanta	United Sta	1766	1766	Atlanta	United States	14.86	8.41
874	Atlanta	United Sta	1767	1767	Atlanta	United States	13.72	8.22
875	Atlanta	United Sta	1768	1768	Atlanta	United States	13.26	6.78
876	Atlanta	United Sta	1769	1769	Atlanta	United States	14.15	7.69
877	Atlanta	United Sta	1770	1770	Atlanta	United States	14	7.69
878	Atlanta	United Sta	1771	1771	Atlanta	United States	14.89	7.85

In “Atlanta Weather” Worksheet you can find columns like cd_year, cd_city, cd_country, cd_avgtemp, gd_avgtemp. Here in this “Atlanta Weather” worksheet again I filtered cd_year >=1700 and cd_year < 1900 after filtering that data between “cd_year -1700 to 1900.

Atlanta Weather Worksheet Screenshot : Filtered cd_year >=1700 and cd_year<1900



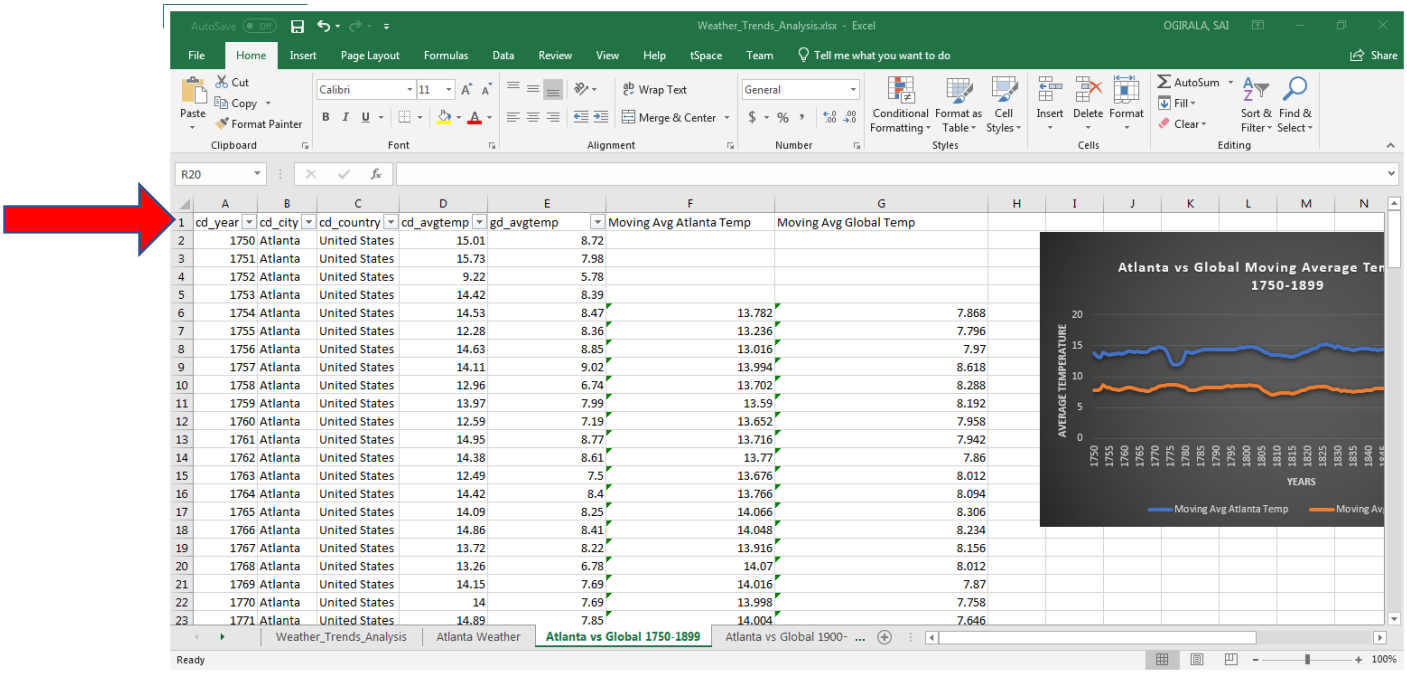
Atlanta Weather Worksheet: Filtered Cd_year >= 1700 and cd_year <1900



	A	B	C	D	E
1	cd_yea	cd_city	cd_country	cd_avgten	gd_avgten
2	1750	Atlanta	United States	15.01	8.72
3	1751	Atlanta	United States	15.73	7.98
4	1752	Atlanta	United States	9.22	5.78
5	1753	Atlanta	United States	14.42	8.39
6	1754	Atlanta	United States	14.53	8.47
7	1755	Atlanta	United States	12.28	8.36
8	1756	Atlanta	United States	14.63	8.85
9	1757	Atlanta	United States	14.11	9.02
10	1758	Atlanta	United States	12.96	6.74
11	1759	Atlanta	United States	13.97	7.99
12	1760	Atlanta	United States	12.59	7.19
13	1761	Atlanta	United States	14.95	8.77
14	1762	Atlanta	United States	14.38	8.61
15	1763	Atlanta	United States	12.49	7.5
16	1764	Atlanta	United States	14.42	8.4
17	1765	Atlanta	United States	14.09	8.25
18	1766	Atlanta	United States	14.86	8.41
19	1767	Atlanta	United States	13.72	8.22
20	1768	Atlanta	United States	13.26	6.78
21	1769	Atlanta	United States	14.15	7.69
22	1770	Atlanta	United States	14	7.69
23	1771	Atlanta	United States	14.89	7.85

I copied this data to another worksheet called "Atlanta vs Global 1750-1899" which shows no of years, city and city avg temperature and global avg temperature. In this "Atlanta vs Global 1750-1899" Worksheet I created two separate columns to calculate using =average () function and interval = 5 years shows Moving Avg Atlanta Temp and Moving Avg Global Temp.

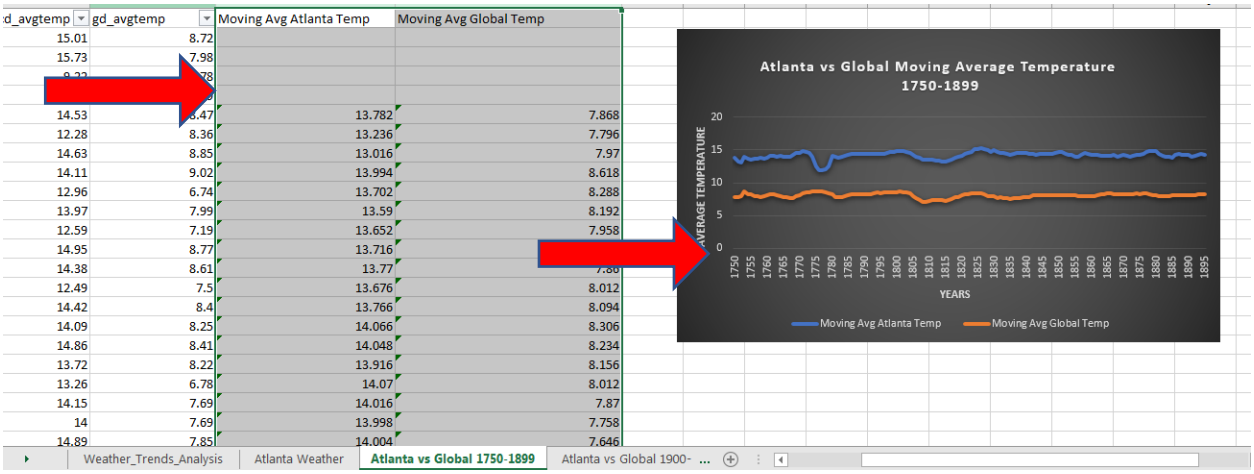
<u>Atlanta vs Global 1750-1899 Worksheet Screenshot:</u> created Moving Avg Atlanta Temp and Moving Avg Global Temp using =average () function



cd_year	cd_city	cd_country	cd_avgtemp	gd_avgtemp	Moving Avg Atlanta Temp	Moving Avg Global Temp
1750	Atlanta	United States	15.01	8.72		
1751	Atlanta	United States	15.73	7.98		
1752	Atlanta	United States	9.22	5.78		
1753	Atlanta	United States	14.42	8.39		
1754	Atlanta	United States	14.53	8.47	13.782	7.868
1755	Atlanta	United States	12.28	8.36	13.236	7.796
1756	Atlanta	United States	14.63	8.85	13.016	7.97
1757	Atlanta	United States	14.11	9.02	13.994	8.618
1758	Atlanta	United States	12.96	6.74	13.702	8.288
1759	Atlanta	United States	13.97	7.99	13.59	8.192
1760	Atlanta	United States	12.59	7.19	13.652	7.958
1761	Atlanta	United States	14.95	8.77	13.716	7.942
1762	Atlanta	United States	14.38	8.61	13.77	7.86
1763	Atlanta	United States	12.49	7.5	13.676	8.012
1764	Atlanta	United States	14.42	8.4	13.766	8.094
1765	Atlanta	United States	14.09	8.25	14.066	8.306
1766	Atlanta	United States	14.86	8.41	14.048	8.234
1767	Atlanta	United States	13.72	8.22	13.916	8.156
1768	Atlanta	United States	13.26	6.78	14.07	8.012
1769	Atlanta	United States	14.15	7.69	14.016	7.87
1770	Atlanta	United States	14	7.69	13.998	7.758
1771	Atlanta	United States	14.89	7.85	14.004	7.646

Once after getting moving averages for Atlanta and Global I applied Line Charts to show both Atlanta and Global Moving Average Temperatures between 1750 – 1899 and 1900-2013 using two separate Line Charts.

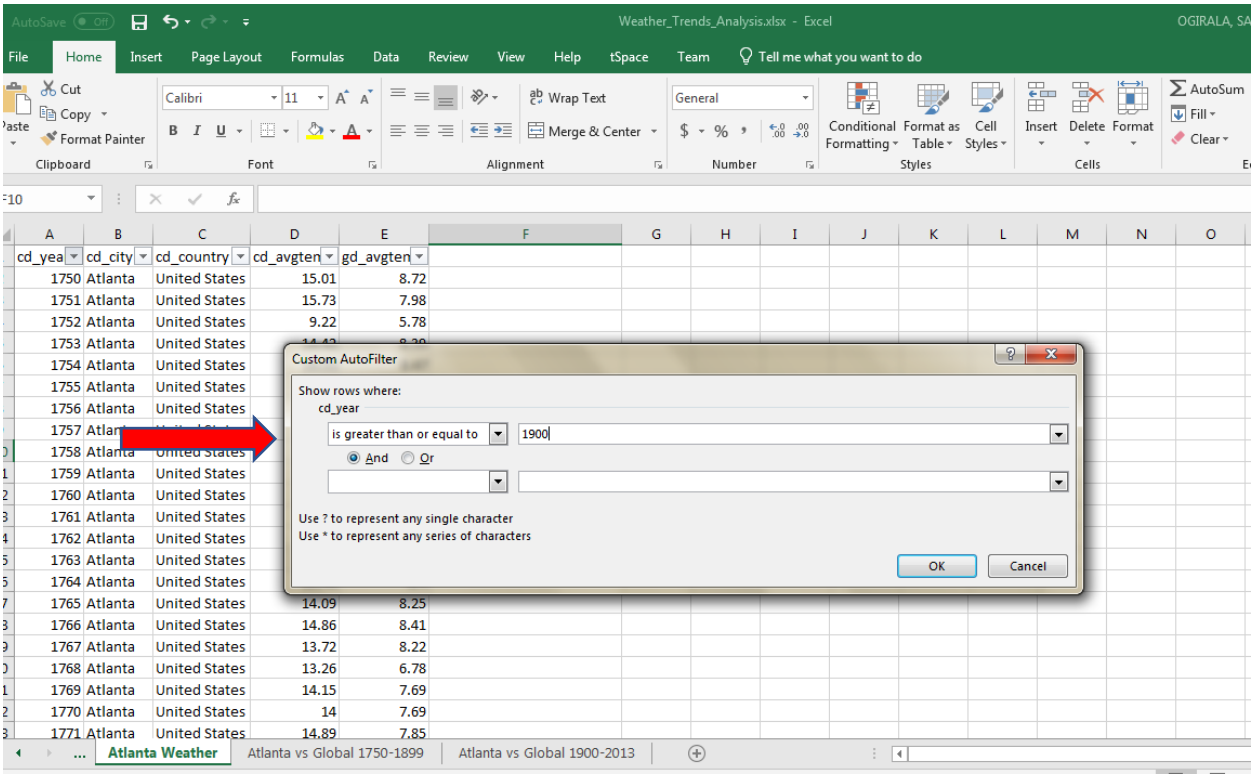
<u>Atlanta vs Global 1750-1899 Worksheet Screenshot:</u> Moving Average Atlanta vs Global Temperatures Line Chart



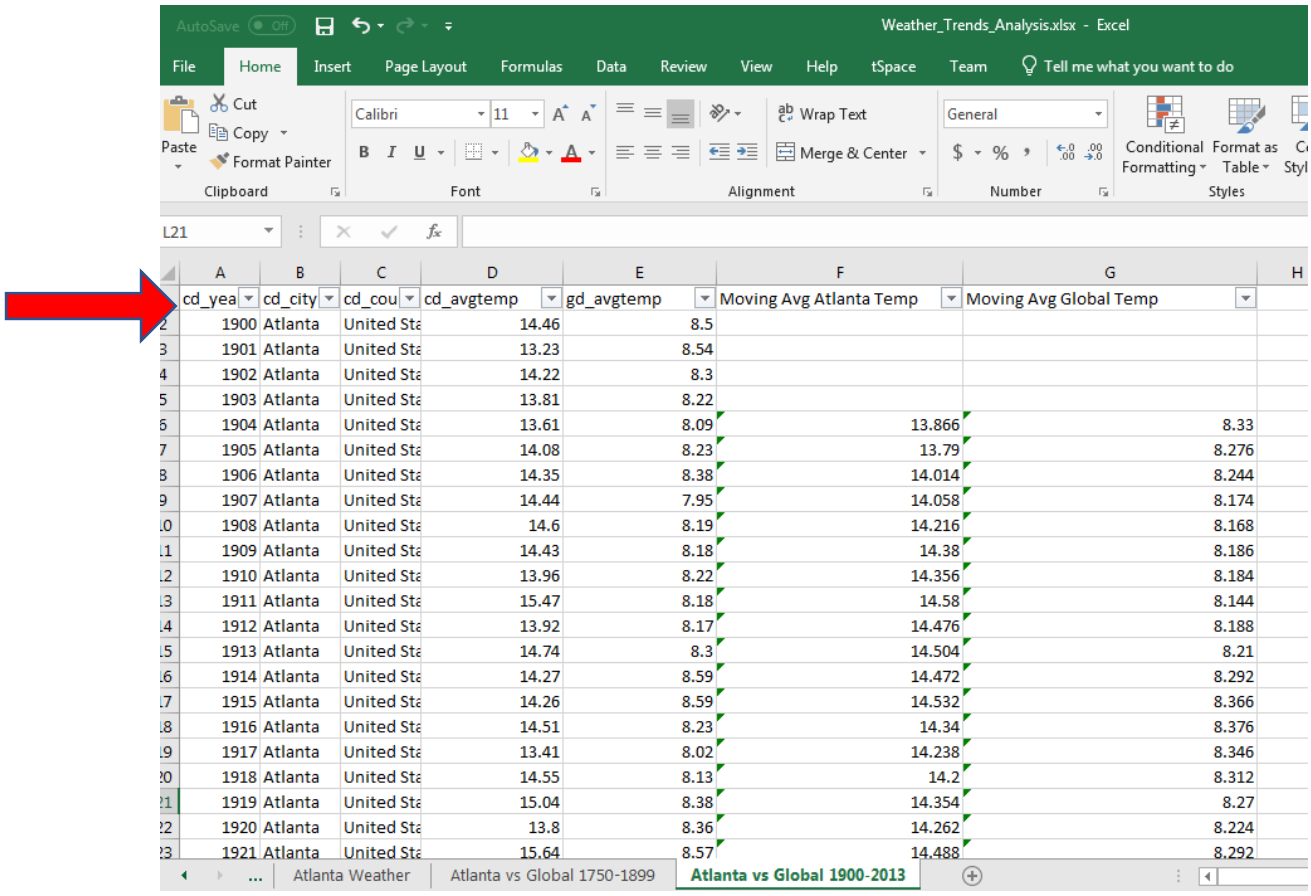
d_avgtemp	gd_avgtemp	Moving Avg Atlanta Temp	Moving Avg Global Temp
15.01	8.72		
15.73	7.98		
14.53	8.47	13.782	7.868
12.28	8.36	13.236	7.796
14.63	8.85	13.016	7.97
14.11	9.02	13.994	8.618
12.96	6.74	13.702	8.288
13.97	7.99	13.59	8.192
12.59	7.19	13.652	7.958
14.95	8.77	13.716	
14.38	8.61	13.77	
12.49	7.5	13.676	8.012
14.42	8.4	13.766	8.094
14.09	8.25	14.066	8.306
14.86	8.41	14.048	8.234
13.72	8.22	13.916	8.156
13.26	6.78	14.07	8.012
14.15	7.69	14.016	7.87
14	7.69	13.998	7.758
14.89	7.85	14.004	7.646

Similarly, to get "Atlanta vs Global 1900-2013" again I filtered cd_year >=1900 from "Atlanta Weather" worksheet and copied that data into new worksheet called "Atlanta vs Global 1900-2013. Again, I created two separate columns to calculate using =average () function and interval = 5 years shows Moving Avg Atlanta Temp and Moving Avg Global Temp

<u>Atlanta Weather Worksheet Screenshot:</u> Filtered cd_year >1900



Atlanta vs Global 1900-2013 screenshot: created Moving avg Atlanta Temp and Moving Avg Global Temp columns and applied =average () function

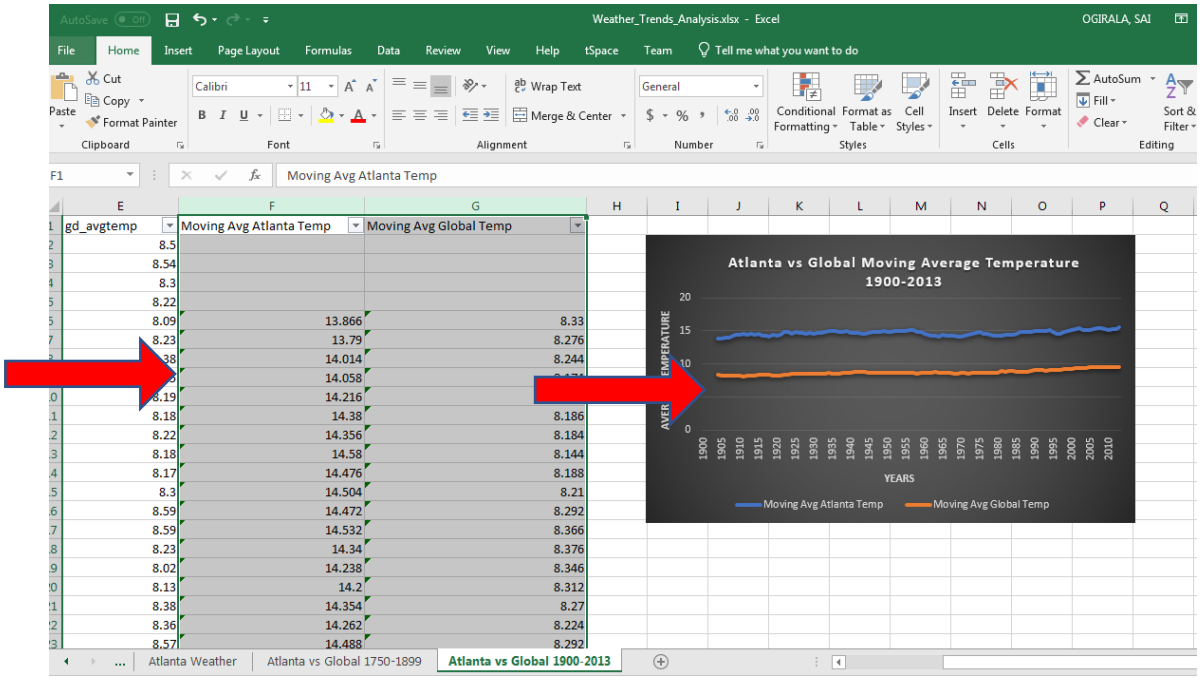


Weather_Trends_Analysis.xlsx - Excel

cd_yea	cd_city	cd_cou	cd_avgtemp	gd_avgtemp	Moving Avg Atlanta Temp	Moving Avg Global Temp
1900	Atlanta	United Sta	14.46	8.5		
1901	Atlanta	United Sta	13.23	8.54		
1902	Atlanta	United Sta	14.22	8.3		
1903	Atlanta	United Sta	13.81	8.22		
1904	Atlanta	United Sta	13.61	8.09	13.866	8.33
1905	Atlanta	United Sta	14.08	8.23	13.79	8.276
1906	Atlanta	United Sta	14.35	8.38	14.014	8.244
1907	Atlanta	United Sta	14.44	7.95	14.058	8.174
1908	Atlanta	United Sta	14.6	8.19	14.216	8.168
1909	Atlanta	United Sta	14.43	8.18	14.38	8.186
1910	Atlanta	United Sta	13.96	8.22	14.356	8.184
1911	Atlanta	United Sta	15.47	8.18	14.58	8.144
1912	Atlanta	United Sta	13.92	8.17	14.476	8.188
1913	Atlanta	United Sta	14.74	8.3	14.504	8.21
1914	Atlanta	United Sta	14.27	8.59	14.472	8.292
1915	Atlanta	United Sta	14.26	8.59	14.532	8.366
1916	Atlanta	United Sta	14.51	8.23	14.34	8.376
1917	Atlanta	United Sta	13.41	8.02	14.238	8.346
1918	Atlanta	United Sta	14.55	8.13	14.2	8.312
1919	Atlanta	United Sta	15.04	8.38	14.354	8.27
1920	Atlanta	United Sta	13.8	8.36	14.262	8.224
1921	Atlanta	United Sta	15.64	8.57	14.488	8.292

Atlanta Weather | Atlanta vs Global 1750-1899 | Atlanta vs Global 1900-2013

<u>Atlanta vs Global 1900-2013 Screenshot:</u> Moving Average Atlanta vs Global Temperatures Line Chart



How did you calculate the moving average?

To calculate Moving Average, I used formula **"=average ()"** function and interval as 5 years to get moving average for both "Atlanta City Temperature" and "Global Average Temperature".

- **What were your key considerations when deciding how to visualize the trends?**
  - First, it has huge data and data is scattered in three different tables and found common columns among three tables Year column from City_Data and Global_Data and City Column from City_List and City_Data. To get meaningful output data I wrote SQL using where condition.
- **Line chart** with local and global temperature trends:

Figure1: Atlanta vs Global 1750- 1899 Moving Average Temperature

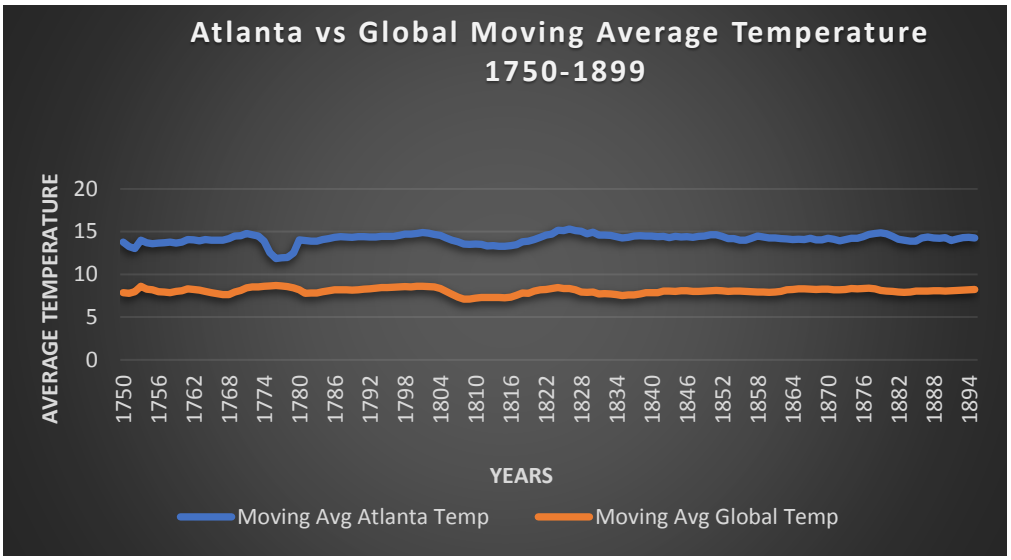
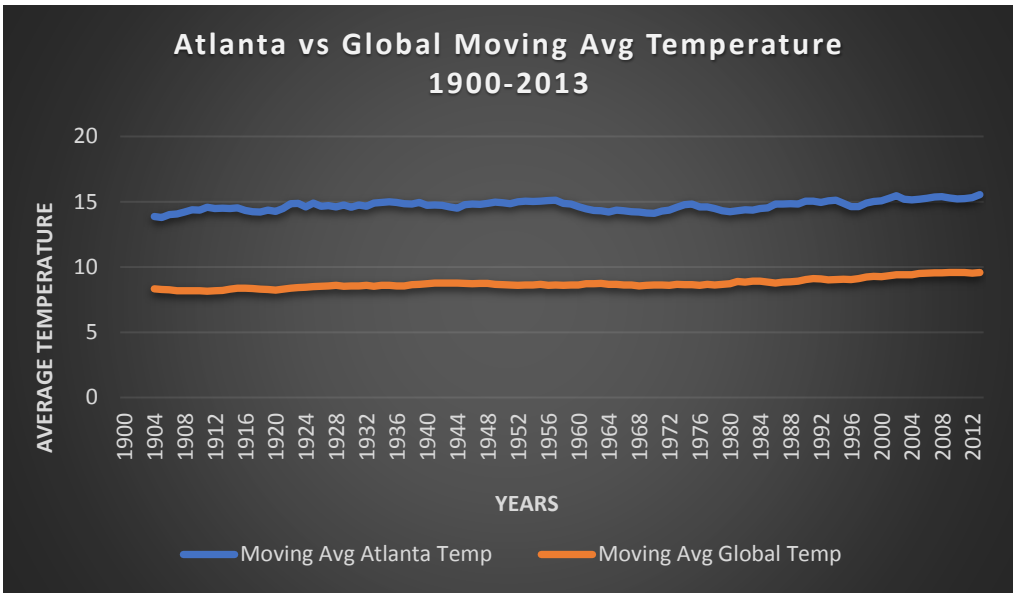


Figure2: Atlanta vs Global 1900-2013 Moving Average Temperature



<u>At least four observations about the similarities and/or differences in the trends:</u>

Is your city hotter or cooler on average compared to the global average? Has the difference been consistent over time?

- From above **Figure 1 and Figure 2 Line Charts:** Overall My city Atlanta is hotter on average compared to the Global Average Temperature.
- Yes, Over the period from 1750 to 2013 the difference between Atlanta Average temperature and Global Average temperature has been consistent.

"How do the changes in your city's temperatures over time compare to the changes in the global average?"

- Between 1750-1899 Atlanta city Temperature and Global Temperature there is no big change or rise in temperatures.
- But during 1775-1780 Atlanta City Temperature has fallen and colder compare to the Global Temperature.
- Secondly, between 1800-1820 both Atlanta city and Global temperatures are fallen
- Between 1900-2013,

What does the overall trend look like? Is the world getting hotter or cooler? Has the trend been consistent over the last few hundred years?

- Over 100 years between 1750 -1899 and 1900 -2013 Moving Average temperatures for Atlanta and Global are consistent and slowly rising.

- From 1905 to 1980’s both Atlanta and Global Average Temperature has been consistent and there is no rise or fallen temperatures.
- Most Importantly, for past 28 years from 1985-2013 there is big rise in temperature for both Atlanta Weather and as well Global Weather.
- Overall, World has becoming hotter each year as the temperature rises due to Global warming and other usages of human beings like Plastic Bottles, polluting air due to Harmful gases releasing in the air etc.