Exploring Weather Trends

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1) What tools did you use for each step?
Extract data first using SQL query

```
Select *
From city_data
Where city='Astana'
```

```
Select *
From city_data
Where city='Almaty'
```

```
Select *
From global_data
```

Combined three csv files into one excel file

year	avg_temp	avg_Almaty	avg_Astana	global	Almaty	Astana
1750	8.72					
1751	7.98					
1752	5.78					
1753	8.39					
1754	8.47			7.868		
1755	8.36			7.796		
1756	8.85			7.97		
1757	9.02			8.618		
1758	6.74			8.288		
1759	7.99			8.192		
1760	7.19			7.958		
1761	8.77			7.942		
1762	8.61			7.86		
1763	7.5			8.012		
1764	8.4			8.094		
1765	8.25			8.306		
1766	8.41			8.234		
1767	8.22			8.156		
1768	6.78			8.012		
1769	7.69			7.87		

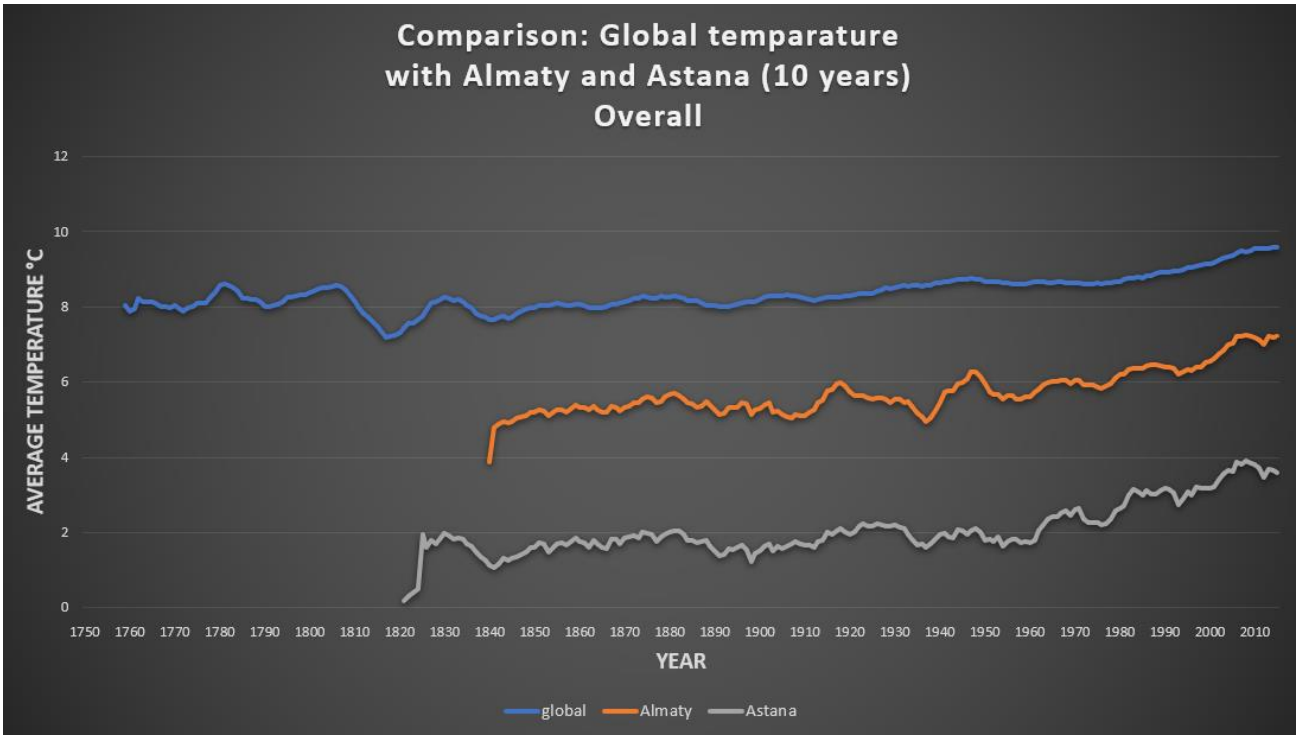
results

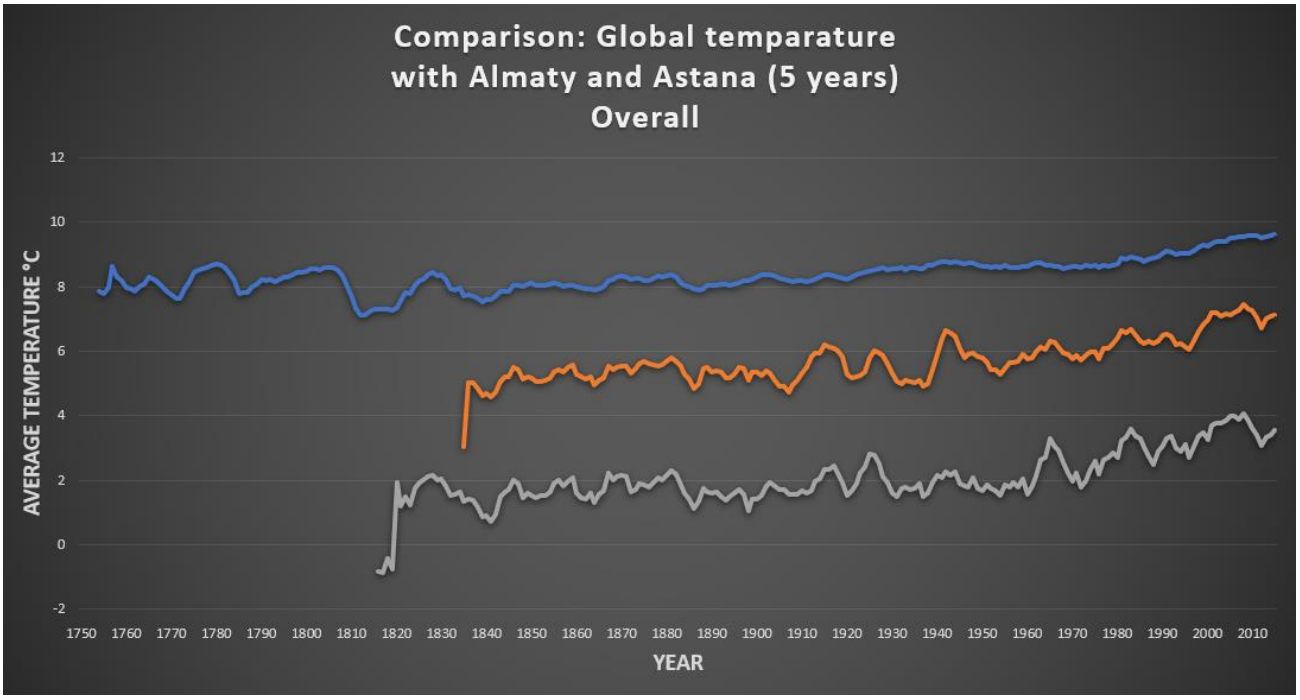
2) How did you calculate the moving average? =Average(B60:B64)

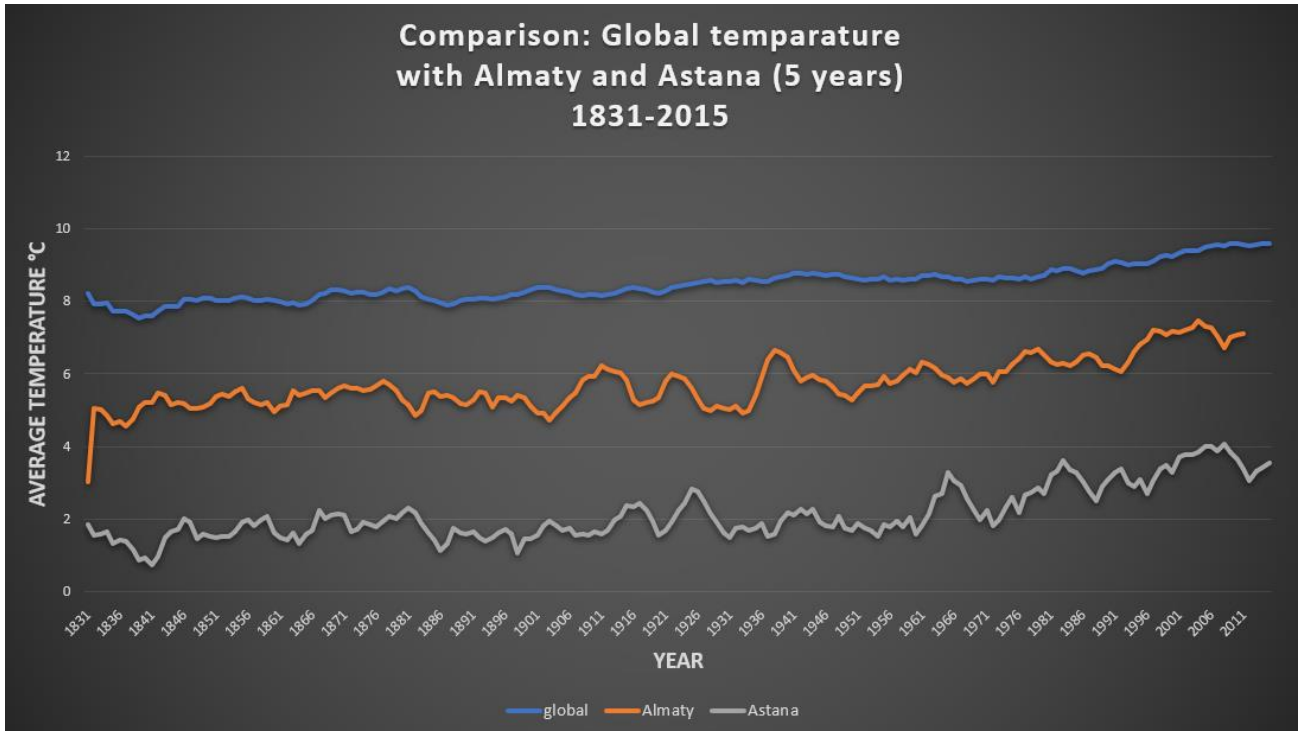
E64 =AVERAGE(B60:B64)

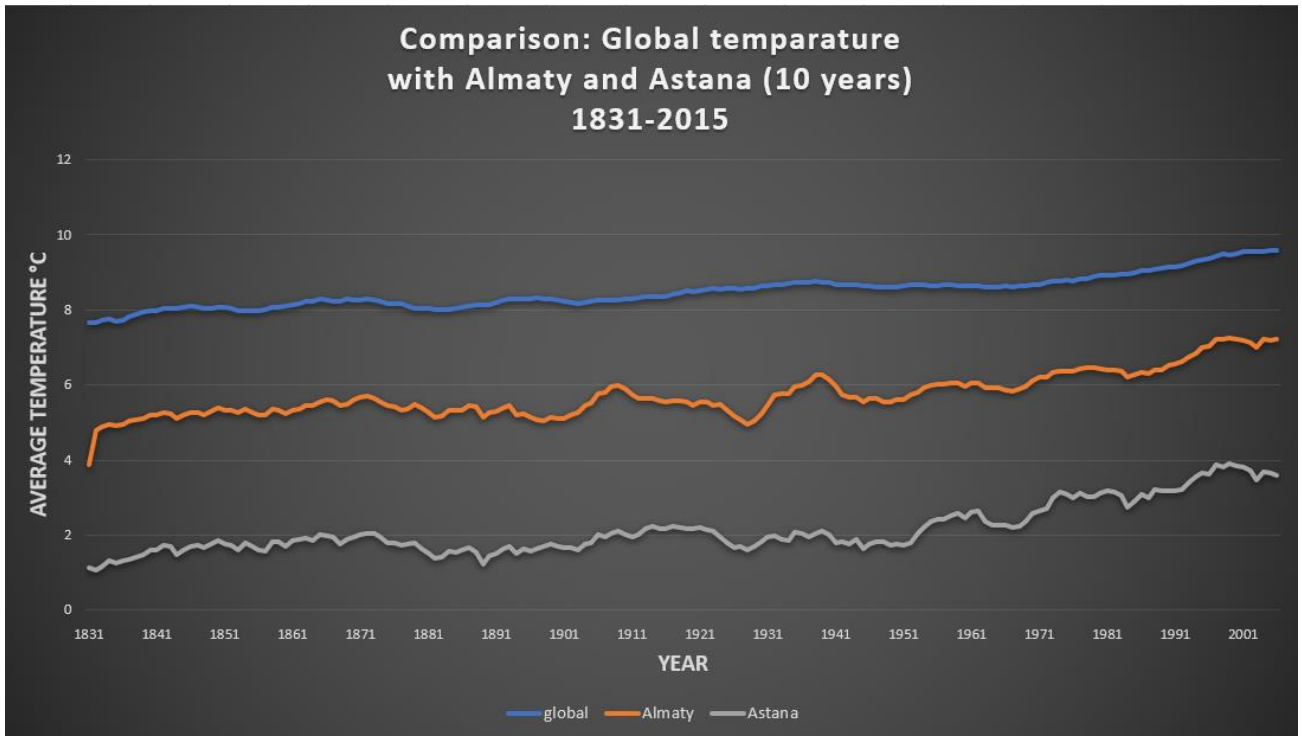
year	avg_temp	avg_Almaty	avg_Astana	global	Almaty	Astana
1809	7.08			7.996		
1810	6.92			7.668		
1811	6.86			7.354		
1812	7.05		0.65	7.108		
1813	7.74		0.41	7.13		
1814	7.59		1.3	7.232		
1815	7.24		-12.13	7.296		
1816	6.94		5.63	7.312		-0.828
1817	6.98		0.5	7.298		-0.858
1818	7.83		2.57	7.316		-0.426

3) What were your key considerations when deciding how to visualize the trends? To start, I looked at all the data and decided to take two cities, as this will very clearly show the difference in their weather conditions (the two cities are located 1,229 km from each other). To simplify the analysis, I used all the instructions and a well-known tool like excel.


Comparison: Global temparature
with Almaty and Astana (10 years)
Overall
AVERAGE TEMPERATURE °C
12
10
8
6
4
2
0
1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010
YEAR
global
Almaty
Astana


Comparison: Global temparature
with Almaty and Astana (5 years)
Overall
AVERAGE TEMPERATURE °C
12
10
8
6
4
2
0
-2
1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010
YEAR

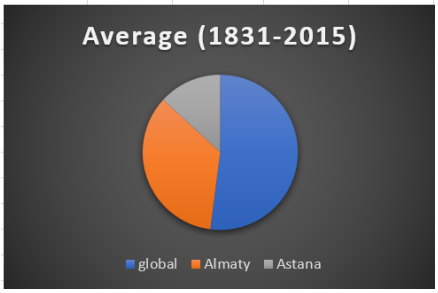




Observation:

If you look at the graph (with moving average), we see that all three lines are different from each other. For clarity, I prepared a pie chart (without moving average), where we see that there is a big difference with global temperature.

Average (1831-2015)	
city	average
global	8.494919
Almaty	5.682295
Astana	2.145355



But if you go back to our linear graphic, where I compared the average value of each year depending on 5 years and 10 years. We can notice that Almaty has a sharp jump in temperature since 1837, Astana also has a sharp jump in temperature in 1839. By that time, global temperature has a more stable picture of its temperature without sharp jumps.

1831 – 2015 (with moving average 5 year)

Min & Max (1831-2015)		
city	min	max
global	7.522	9.608
Almaty	3.032	7.454
Astana	0.736	4.078

Global - Cooler temperature we have in 1835-1839, hottest in 2011-2015.

Almaty - Cooler temperature we have in 1831-1835, hottest in 2004-2008.

Astana - Cooler temperature we have in 1837-1841, hottest in 2004-2008.

Min & Max (Overall)		
city	min	max
global	7.108	9.608
Almaty	3.032	7.454
Astana	-0.858	4.078

Global - Cooler temperature we have in 1808-1817, hottest in 2011-2015.

Almaty - Cooler temperature we have in 1831-1835, hottest in 2004-2008.

Astana - Cooler temperature we have in 1813-1817, hottest in 2004-2008.

1831 – 2015 (with moving average 10 year)

Min & Max (1831-2015)		
city	min	max
global	7.666	9.594
Almaty	3.861	7.267
Astana	1.081	3.92

Global - Cooler temperature we have in 1831-1840, hottest in 2006-2015.

Almaty - Cooler temperature we have in 1831-1840, hottest in 1999-2008.

Astana - Cooler temperature we have in 1832-1841, hottest in 1999-2008.

1831 – 2015 (without moving average)

Min & Max (1831-2015)		
city	**min**	**max**
global	=MIN(B83:B267)	
Almaty	-4.97	8.71
Astana	0.2	5.49

Global - Cooler temperature we have in 1837 (7.38), hottest in 2015 (9.83).

Almaty - Cooler temperature we have in 1831 (-4.97), hottest in 2013 (8.71).

Astana - Cooler temperature we have in 1860 (0.2), hottest in 2015 (5.49).

Min & Max (Overall)		
city	**min**	**max**
global	5.78	9.83
Almaty	-4.97	8.71
Astana	-12.13	5.63

*Some interesting case in **Astana**. In 1815 Astana have lowest avg_temp -12.13 and max 5.63 in 1816*

Global temperature has been growing steadily without sharp drops and rises, but it is worth noting that it has begun to grow more progressively since 1981 (8.843).

Almaty has a more interesting graph with oscillating temperature, we can observe an elevated temperature in 1917 (5.945), 1926 (6.021), 1942 (6.455), we can observe a sharp decrease in 1835 (3.371), 1907 (4.775), 1935 (4.955), and a sharp increase in temperature began precisely in 2002 (7.056).

Astana is the coldest city, if you cut it off with the rest of the points. It, like Almaty, has a fluctuating temperature. We can observe the elevated temperature in 1847 (2.053), 1944 (2.71), 1984 (3.065), 2001 (3.5783). We can observe a reduced temperature in 1836 (-0.286), 1859 (0.876), 1954 (1.821), 1991 (2.02), 2006 (2.883). What is surprising, if the global and Almaty temperatures are steadily increasing every year, then in Astana the temperature has sharply decreased since 2006.

Global temperature is hotter, in Almaty more stable temperature, in Astana cold temperature. If we compare overall trend, we can notice that the temperature rises every year, even though in Astana and Almaty fluctuating behavior.