

# Exploring Weather Trend (Globally and Locally)

Objectives: extract global and local weather data from the given temperature database using the SQL workspace. Figure out the local and global temperature difference and give a rough trend though data analysis.

Conclusion: The earth is getting hotter, and the global warming has occurred faster in recent years.

## 1. Data extraction:

### a. global temperature:

```
SELECT *
```

```
FROM global_data
```

Download a csv file with 266 points.

### b. local temperature:

In order to find the city nearest to me, I looked through city names list in United States in the city\_list.

```
SELECT *
```

```
FROM city_list
```

```
WHERE country = 'United States'
```

Kansas City is the city nearest to me. Then I extracted the weather data in Kansas City from city\_data through following scripts:

```
SELECT *
```

```
FROM city_data
```

```
WHERE city = 'Kansas City'
```

## 2. In order to smooth out data to observe long term trends, moving averages are used in both global and local temperature data. In general, the mean temperatures within 10 years are stored in a new column called 10-year AT. The calculation is conducted as follows:

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L
40	1788	Kansas City	United States	11.99			1788	8.45				
41	1789	Kansas City	United States	11.78			1789	8.33				
42	1790	Kansas City	United States	11.65	11.538		1790	7.98	7.995	-3.543		
43	1791	Kansas City	United States	11.94			1791	8.23				
44	1792	Kansas City	United States	11.49			1792	8.09				
45	1793	Kansas City	United States	11.82			1793	8.23				
46	1794	Kansas City	United States	11.99			1794	8.53				
47	1795	Kansas City	United States	4.18			1795	8.35				
48	1796	Kansas City	United States	11.75			1796	8.27				
49	1797	Kansas City	United States	11.57			1797	8.51				
50	1798	Kansas City	United States	12.21			1798	8.67				
51	1799	Kansas City	United States	11.98			1799	8.51				
52	1800	Kansas City	United States	11.85	=AVERAGE(D43:D52)		1800	8.48	8.387	-2.691		
53	1801	Kansas City	United States	12.17	AVERAGE(number1, [number2],...)		1801	8.59				
54	1802	Kansas City	United States	12.32			1802	8.58				
55	1803	Kansas City	United States	12.14			1803	8.5				
56	1804	Kansas City	United States	12.21			1804	8.84				
57	1805	Kansas City	United States	12.2			1805	8.56				
58	1806	Kansas City	United States	11.9			1806	8.43				
59	1807	Kansas City	United States	11.68			1807	8.28				

Figure 1. the illustration of the calculation of moving average.

### 3. Line chart

When I extracted the local weather data from temperature database, I noticed that the average temperature in old time are missing. Thus, the moving average temperature are displayed into several segments to enable the addition of trends.

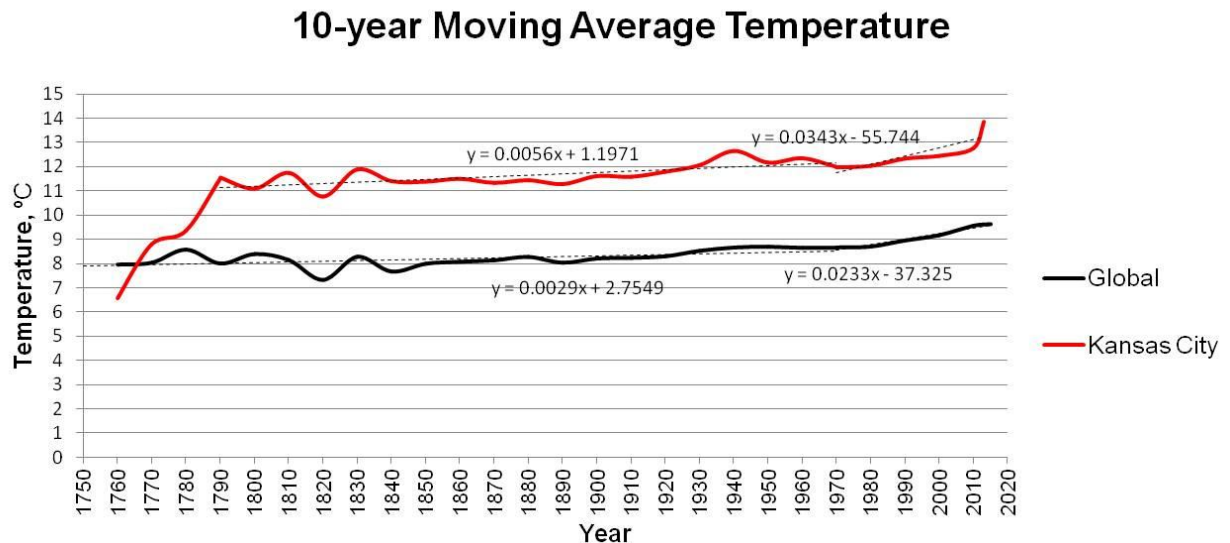


Chart 1. The moving average global and local temperature.

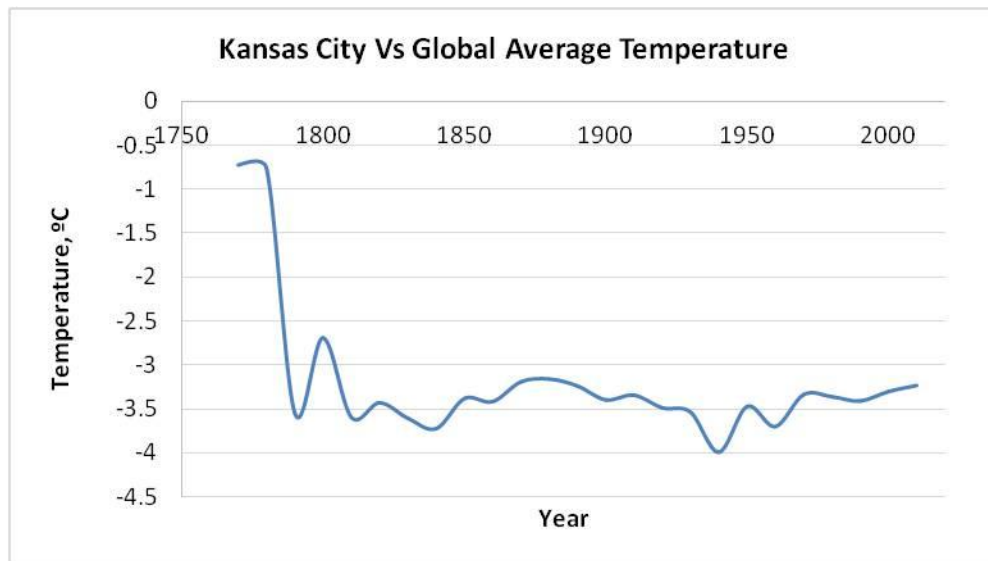


Chart 2. The average global minus local temperature over years.

### 4. Observations

- a. The average temperature by year in Kansas City is hotter than the global average. The difference has been consistent at about 3.5 °C except some outliers before 1800. To figure the origin of the outliers, the raw data were reviewed. The average global temperature has been consistent since 1760, while the average local temperature shows some large

fluctuations before 1800. This fluctuation might come from manual record errors or measurement deficiency.

- b. Since 1800, the average temperature Kansas City has increased by about 1.24 °C, while the average global temperature has increased by 1.61 °C.
- c. Both average local and global temperature have increased a lot since 1760, and the world is getting hotter and hotter.
- d. Since 1970 the global warming has occurred faster. For Kansas City, the local warming rate was 0.056 °C per decade before 1970 compared to 0.343 °C per decade after 1970. The global warming rate was 0.029 °C per decade before 1970 compared to 0.223 °C per decade after 1970.