

# Project: Explore Weather Trends

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The following document contains an outline describing the steps that I took to prepare data to be visualized about temperatures around the world, along with some observations about its trends.

## **Step 1.** Extract the data from the database.

For the first step, I used a workspace provided by Udacity that is connected to a database. This database has data about temperatures of different cities of the world in the last 150 years.

In order to access the database, I wrote a SQL query to extract the city level data and the global data. After I found the data, I just clicked on the “Download CSV” button to download a CSV file:

- City level SQL query

```
SELECT year, avg_temp
  FROM city_data
 WHERE city = 'Tijuana';
```

- Global SQL query

```
SELECT *
  FROM global_data;
```

Input		HISTORY ▾	MENU ▾
SCHEMA	<pre> 1 SELECT year, avg_temp 2 FROM city_data 3 WHERE city = 'Tijuana'; </pre>		
	Success!	EVALUATE	
Output 165 results		Download CSV	
year	avg_temp		
1849	16.03		
1850	15.55		
1851	15.66		
1852	16.06		
1853	16.69		
1854	16.11		

**Step 2.** Open up the CSV.

I used Google Spreadsheets to open up the CSV. I simply upload the CSV files to my Google Drive and it gave me the option to open the files with Google Spreadsheets.

**Step 3.** Create a line chart that compares your city's temperatures with the global temperatures.

Since yearly temperatures can fluctuate a lot from one year to the next, I calculated moving averages to smooth out the data so it could be easier to observe any trends.

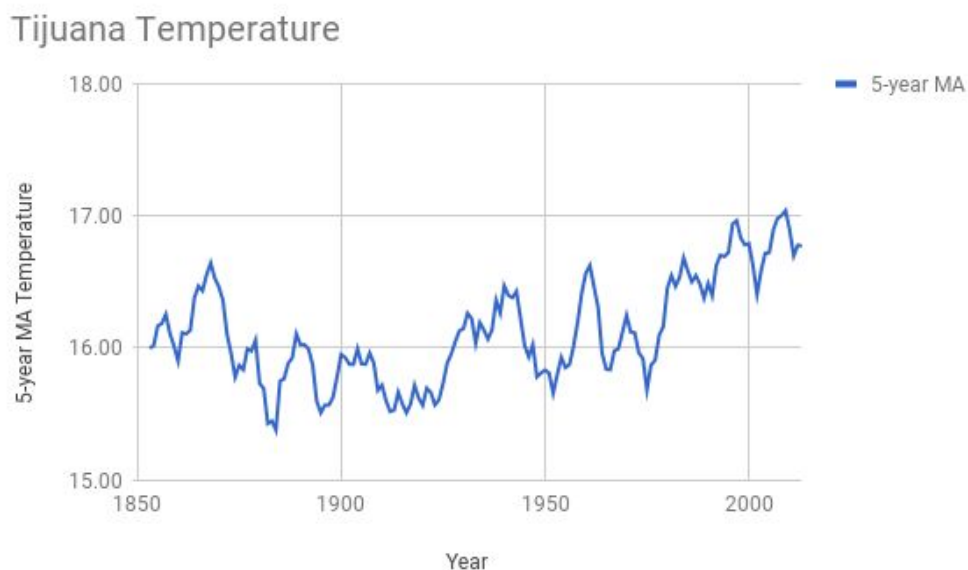
In order to calculate the moving averages, first, I created another column to store the MA (moving averages). Then, I went down to the 5th year and used the AVERAGE() function to calculate the average of the first 5 years. After that, I simply clicked and dragged the formula all the way down to the end of the dataset.

fx		=AVERAGE(B2:B6)		
	A	B	C	
1	year	avg_temp	5-year MA	
2	1849	16.03		
3	1850	15.55		
4	1851	15.66		
5	1852	16.06	16.00 ×	
6	1853	16.69	=AVERAGE(B2:B6)	
7	1854	16.11		16.01

Now with the data ready to be visualized, I created a line chart by selecting the year column and the 5-year MA column and using the spreadsheet's "insert graph" functionality.

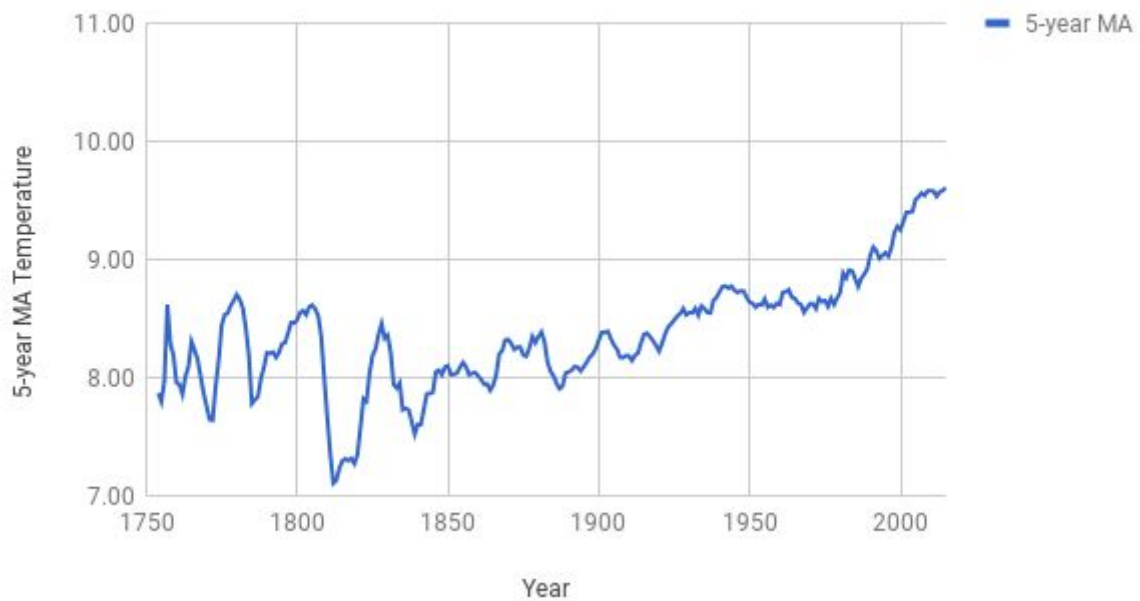
My key considerations when deciding how to visualize the trends were first to use the MA instead of the avg-temp so that if any trend would exist, it could show. Next, I had to make sure the x-axis and y-axis displayed the right fields so that the link between the year and the MA could really show. After that, I decided the intervals that I wanted the table to show in both axis, just to be sure that anyone could easily grasp the fluctuations on the temperatures and how they moved along the timeline. Finally, I just checked that the chart and its axis had the correct titles, and a clear legend for the two lines I used in the Tijuana vs Global chart.

Tijuana Temperature Line Chart



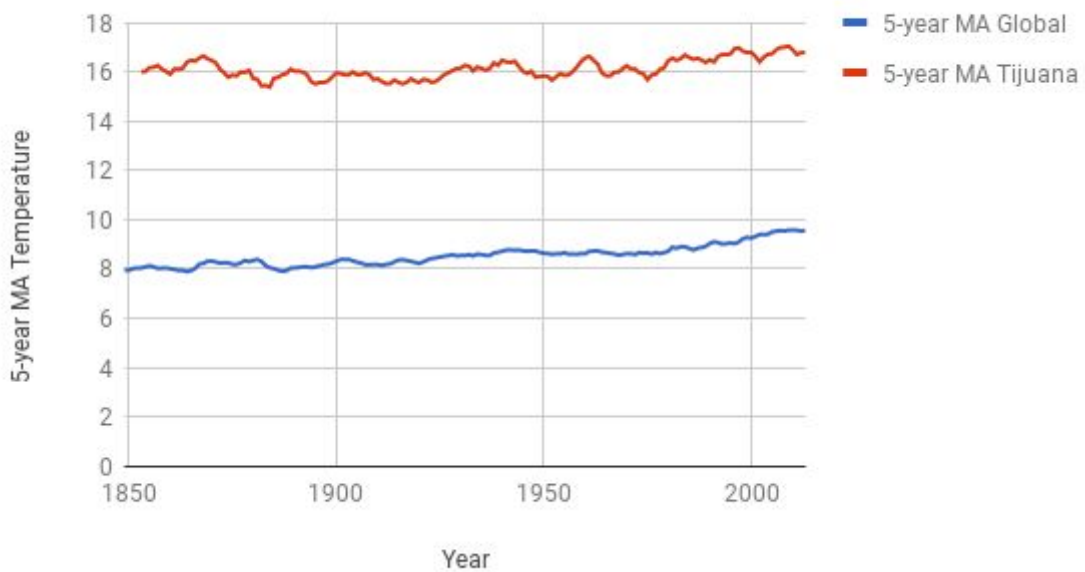
## Global Temperature Line Chart

## Global Temperature



## Global vs. Tijuana Temperature Line Chart

## Global-Tijuana Temperature



**Step 4.** Make observations about the similarities and differences between the world averages and your city's averages, as well as overall trends. (Questions in quotation marks, taken from the project description found in [udacity.com](https://www.udacity.com))

*"Is your city hotter or cooler on average compared to the global average? Has the difference been consistent over time?"* On average, my city average temperature (around 16 degrees), is 8 degrees hotter compared to the global average (around 8 degrees). This difference has been consistent over the last 140 years, although in the last 30 years there has been a slightly greater increment in the global average (around 9.5 degrees) compared to Tijuana's (around 17 degrees), with the difference being now of 7.5 degrees.

*"How do the changes in your city's temperatures over time compare to the changes in the global average?"* Tijuana's average temperature has remained consistently around 16 degrees from 1850 to 1975, with a slight increment in the last 30 years, bringing the current average closer to the 17 degrees. The global temperature in 1850 was 8 degrees in average, with an approximate increase of .6 degrees from 1850 to 1980, and an additional 1 degree increment from 1980-2013, reaching a current average around the 9.5 degrees. Tijuana's temperature remained steady around the 16 degrees from 1850-1980, while the global temperature did experience a slight increment every 50 years from 1850-1980. However, both, global and Tijuana temperature have increased at about the same rate in the last 30 years, each adding one additional degree to their temperatures.

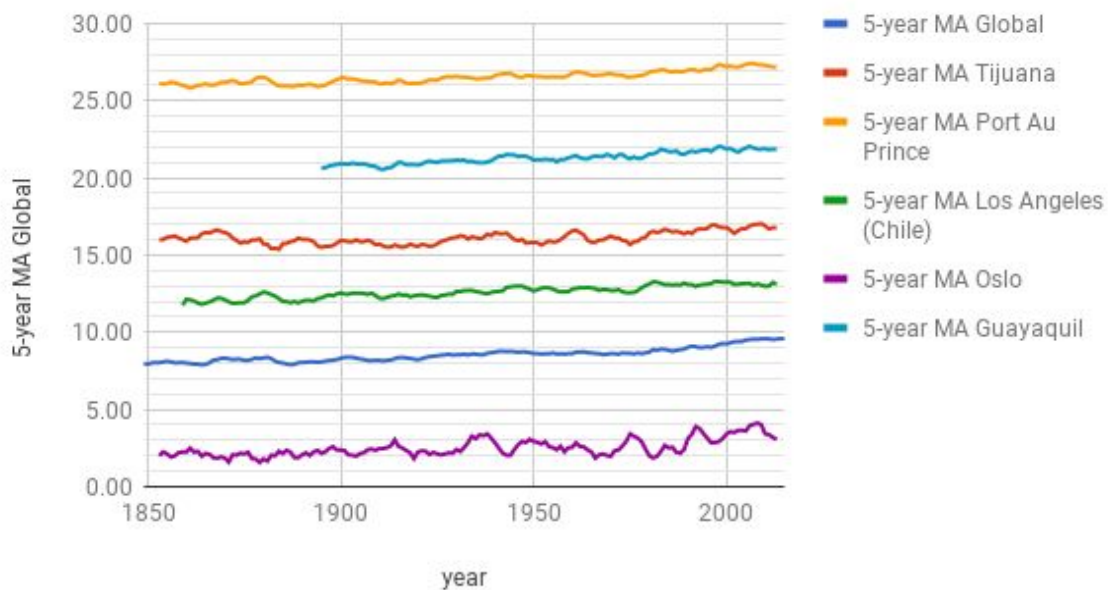
*"What does the overall trend look like? Is the world getting hotter or cooler? Has the trend been consistent over the last few hundred years?"* There is a clear overall trend of increasing average temperatures that suggests that the world might be getting hotter. The trend has been consistent over the last few hundred years showing a small increment every 50 years. The last 30 years, however, have shown an accelerated increment in the trend.

*Are there any spikes in the trend, meaning a rapid ascend or descend of temperature in a small amount of time?* Not from 1850 to 1980, where the world's temperature increased .30 degrees every 50 years, but when we zoom in to the period from 1980 to 2013, we'll notice that the world's temperature is still increasing in this .30 degrees increments, the difference being that the time increments have dramatically shortened to every 10 years. Said in another way, the temperature increase we used to experience every 50 years, we now experience it in a span of only 10 years.

## Extension

Here is a chart that visualize the temperatures of 5 cities around the world. I tried to choose cities from different latitudes, so I ended up choosing a city closer to the north pole, a city from the equator and a city closer to the south pole. I added a city from Haiti because I heard that global warming affects tropical islands the most.

### Temperature of Cities of the World



What we can learn from this visualization is that trend of increasing temperatures is shared by several cities around the world, throughout many different kinds of locations. At least for the cities selected, all of them have experience a 1 degree increment in their temperatures from 1850 to 2013.