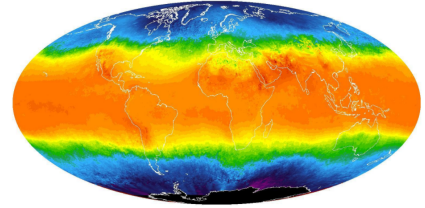


Project 1 - Explore weather trends

Summary

This project is a comparison of the global temperature over the years with the data of the capital of New Zealand, Wellington.



Key considerations:

Show clear data, the data has to be accurate as much as possible, has to be easy to read, has to show relevant information that can help to shape action plans.

1-Extracting

I downloaded all Udacity's database available by executing the followings commands in the SQL workspace.

```
SELECT * FROM global_data
SELECT * FROM city_list
SELECT * FROM city_data
```

In addition, in SQL workspace, I ran the following code to visualise all available data in my country and I saved as a new spreadsheet called "city_data_where_nz":

```
SELECT * FROM city_data WHERE country='New Zealand'
```

Input

HISTORY ▾MENU ▾

1 `SELECT * FROM city_data WHERE country='New Zealand'`

Success!

EVALUATE

Output 161 results

Download CSV

year	city	country	avg_temp
1853	Wellington	New Zealand	11.21
1854	Wellington	New Zealand	11.99
1855	Wellington	New Zealand	12.09
1856	Wellington	New Zealand	11.64
1857	Wellington	New Zealand	11.49
1858	Wellington	New Zealand	11.51
1859	Wellington	New Zealand	12.21
1860	Wellington	New Zealand	12.32

^ Menu

Expand

Udacity's SQL Workspace

The only city found in their database in New Zealand was Wellington.

2-Merging information

Then I opened the spreadsheet **global_data** and the created **city_data_where_nz** with Excel.

In the spreadsheet **global_data**, I created a new column called "Wellington, NZ" and I used the VLOOKUP in order to get all values from the another spreadsheet :

```
=IFERROR(VLOOKUP(A105,city_data_where_nz.csv!$A:$D,4,FALSE),"Not Available")
```

Year	Average Global Temperature	10 Years - MA - Global Temperature	% Diff from previous year
1863	8.11	7.991	0.09%
1864	7.98	7.968	-0.29%
1865	8.18	7.975	
1866	8.29	8.004	
1867	8.44	8.072	0.85%
1868	8.25	8.087	0.19%
1869	8.43	8.105	0.22%

Filtering only available data

The ifError formula was needed because for some years the database had no data for Wellington, therefore, I decided to leave the cells as "not available", which means that the data could not be found in the **city_data_where_nz** spreadsheet. Then I applied a filter in order to keep only the years where I could find data in both compared spreadsheets.

3- Calculations

I used this way to find out what was the percentage difference between every year.

Year	Average Global Temperature	10 Years - MA - Global Temperature	% Diff from previous year
1863	8.11	7.991	0.09%
1864	7.98	7.968	-0.29%
1865	8.18	7.975	
1866	8.29	8.004	
1867	8.44	8.072	0.85%
1868	8.25	8.087	0.19%
1869	8.43	8.105	0.22%

Yearly increase rate global

Wellington, NZ	10 Years - MA - Wellington, NZ	% Diff from previous year
11.83	12.044	0.52%
12.58	12.103	0.49%
12.58	12.152	
12.91	12.279	
12.91	12.413	1.00%

Yearly increase rate local

And the following formulas to create that table:

Local	Globally	Wellington	Diff
Mean temperature increase rate	=AVERAGE(D:D)	=AVERAGE(G:G)	=[@Wellington]-Table5[@Globally]
Standard Error	=STDEV(D:D)/SQRT(COUNT(D:D))	=STDEV(G:G)/SQRT(COUNT(G:G))	=[@Wellington]-Table5[@Globally]
1883 Temperature	=MIN(B:B)	=MIN(F:F)	=[@Wellington]-Table5[@Globally]
2013 Temperature	=MAX(B:B)	=MAX(F:F)	=[@Wellington]-Table5[@Globally]
Difference in 130 years (°C)	=K118-K117	=L118-L117	=[@Wellington]-Table5[@Globally]
Difference in 130 years %	=K118/K117-1	=L118/L117-1	=[@Wellington]-Table5[@Globally]

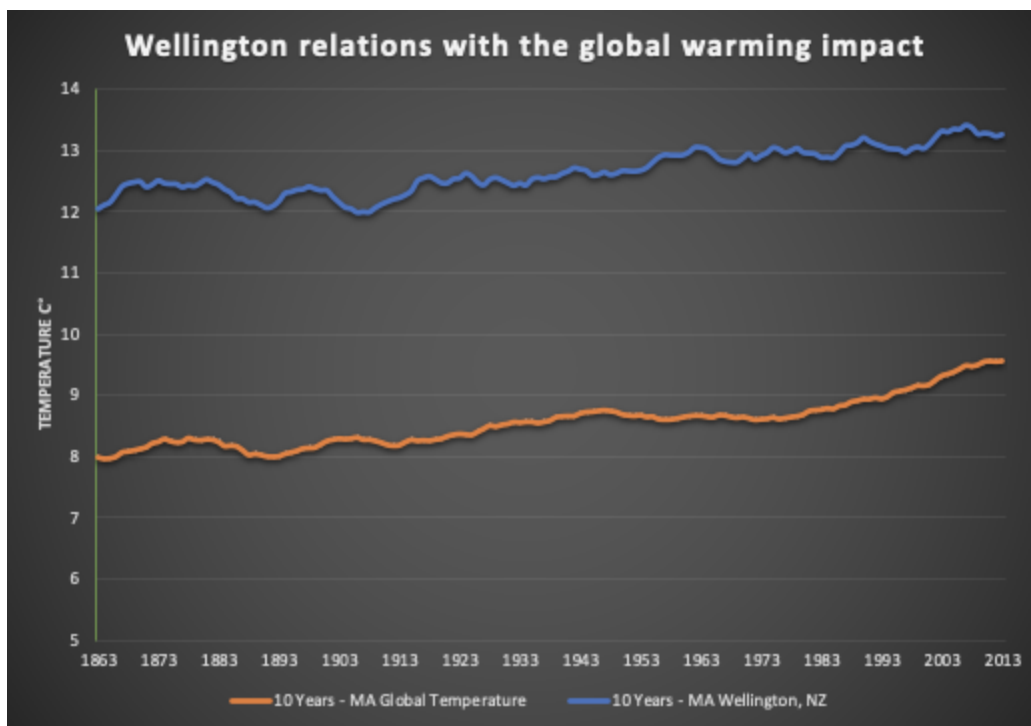
Data summary, formulas taken.

The moving average used to smooth the data was taken by 10 years time.

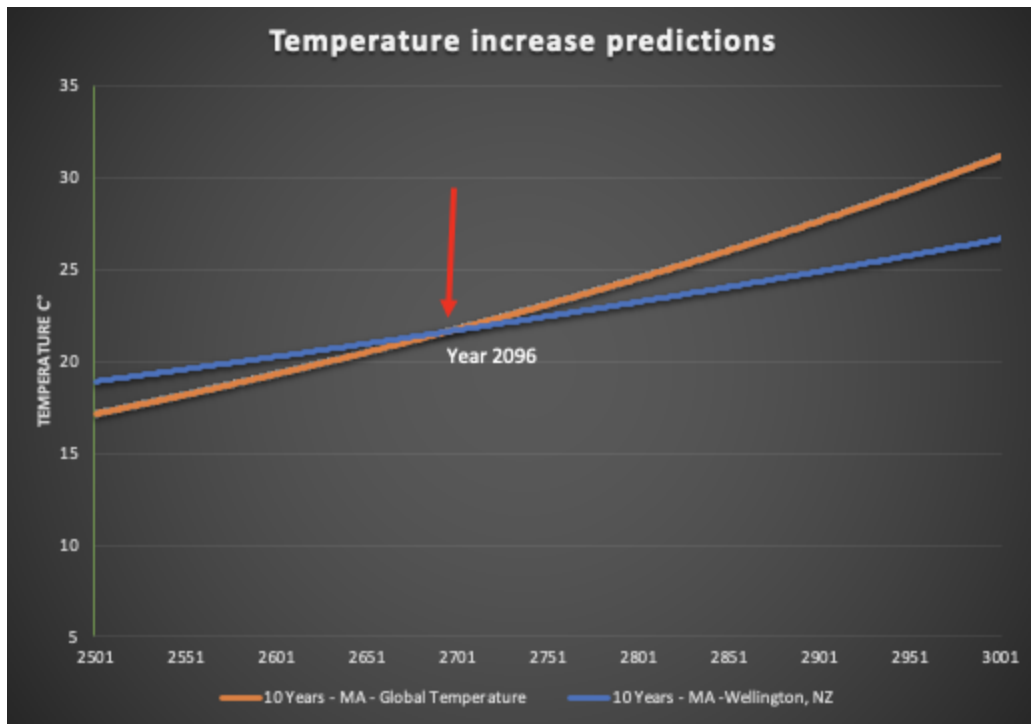
A	B	C
Year	Average Global Temperature	10 Years - MA Global Temperature
1863	8.11	7.991
1864	7.98	7.968
1865	8.18	7.975
1866	8.29	8.004
1867	8.44	8.072
1868	8.25	8.087
1869	8.43	8.105
1870	8.2	8.129
1871	8.12	8.156
1872	8.19	8.219
1873	8.35	
1874	8.43	=AVERAGE(B117:B126)

10 years - moving average

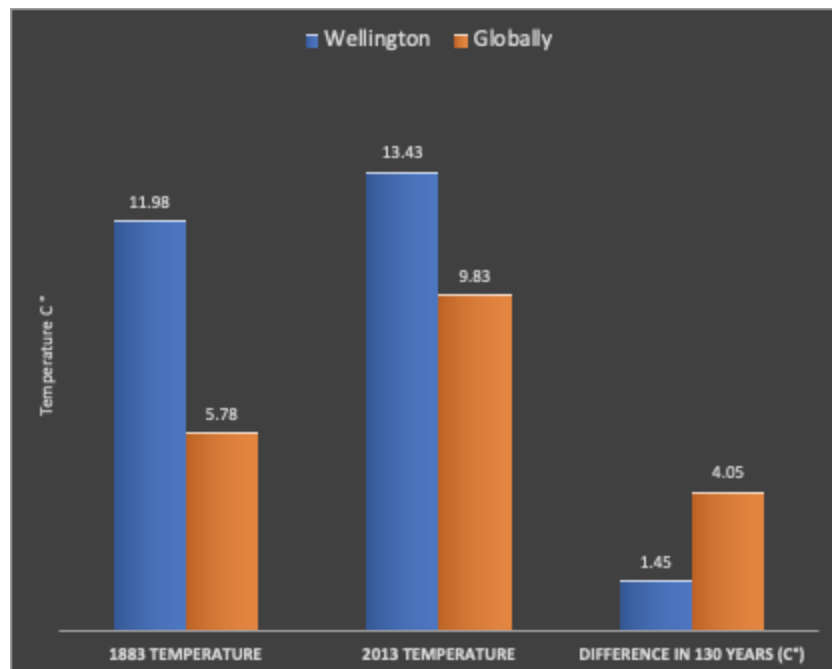
4- Charts



Wellington X Global comparison



Global and local predictions.



Min, Max Temperatures and difference over the years.

5- Predictions

This is a rough predictions of what would be the next years globally and locally.

To do that, I have got the mean temperature increase rate for both scenarios and I used that rate as a constant to find what would be the next year temperature.

Logic: (Previous year temperature X Mean temperature increase rate)+ Previous year temperature

Formula: $(B12 * \text{global_data!}\$K\$115) + B12$

fx $= (B16 * \text{global_data!}\$K\$115) + B16$				
B	C	D	E	
Average Global Temperature	10 Years - MA - Global Temperature	Wellington, NZ	10 Years - MA - Wellington, NZ	
9.61		13.57		
9.621	9.586	13.58	13.354	
9.633	9.579	13.59	13.350	
9.645	9.591	13.60	13.406	
9.656	9.584	13.61	13.422	
$= (B16 * \text{global_data!}\$K\$115) + B16$		13.62	13.429	
9.679	9.624	13.63	13.508	
9.691	9.623	13.64	13.517	
9.702	9.641	13.64	13.536	
9.714	9.662	13.65	13.612	

Final considerations:

- Both average temperatures have been increasing over time
- Both have a higher average temperature now comparing with the past.
- Over 130 years, the Wellington temperature increased 1.45 C° and the global temperature 4.05 C°
- The Wellington temperature has not been increasing as the global is.
- The global increase rate is higher than Wellington, which means the world itself has a more climate impact than Wellington.
- The global data has a lower standard error, which means fewer fluctuations, more reliability.
- The global average temperature has been approaching the Wellington temperature over the years.
- The global temperature would match with the Wellington around the year 2696.

- The Wellington city in New Zealand apparently does most effective environmental protective actions than another countries.

References:

Accessed at 03/05/2020:

<https://www.usatoday.com/story/money/2019/07/14/climate-change-countries-doing-most-least-to-protect-environment/39534413/>