

Exploring Weather Trends

*Comparing temperature trends:
Melbourne Australia to global temperatures*



Melbourne, Australia
Autumn, 2020

David L Nugent <davidn@uniquode.io>

Data Extraction

The SQL Query

The following query was used to extract the dataset from the temperatures database.

```
SELECT
    G.year,
    C.avg_temp as city_avg_temp,
    G.avg_temp as global_avg_temp
FROM city_data C
LEFT JOIN global_data G
    ON C.year=G.year
WHERE C.city = 'Melbourne'
    AND C.country = 'Australia'
ORDER BY G.year;
```

The objective is to extract data applicable to years where data is available for the city and include corresponding global temperatures for comparison.

The resulting dataset consisted of temperatures covering 173 years spanning 1841 through 2013 inclusive. There were no missing years in this dataset, and all years had values for both city and global average temperatures.

Data Preparation

Tabulation

The dataset was imported into a Google spreadsheet, which resulted in 3 columns of data:

year	city_avg_temp	global_avg_temp
1841	13.09	7.69
1842	12.96	8.02
1843	13.34	8.17
1844	12.6	7.65
1845	13.16	7.85
1846	13.43	8.55
1847	13.03	8.09
1848	12.58	7.98
1849	12.3	7.98
1850	12.99	7.9
...

First 10 roles of the extracted dataset

Columns were inserted after each of the temperature columns to provide space for a moving average over 10 years corresponding with each.

Column names were assigned to the new columns:

- Melbourne,AU
- Global

Moving averages commence at year 1850 when a full 10 year span first becomes available. This was calculated using the AVERAGE function of the adjacent and previous 9 entries, then copied with relative row references to cells to the last row of data as shown in the next two figures.

fx	=average(B2:B11)			
	A	B	C	
1	year	city_avg_temp	Melbourne,AU	global
2	1841	13.09		
3	1842	12.96		
4	1843	13.34		
5	1844	12.60		
6	1845	13.16		
7	1846	13.43		
8	1847	13.03		
9	1848	12.58		
10	1849	12.30		
11	1850	12.99		
12	1851	12.97	12.94	

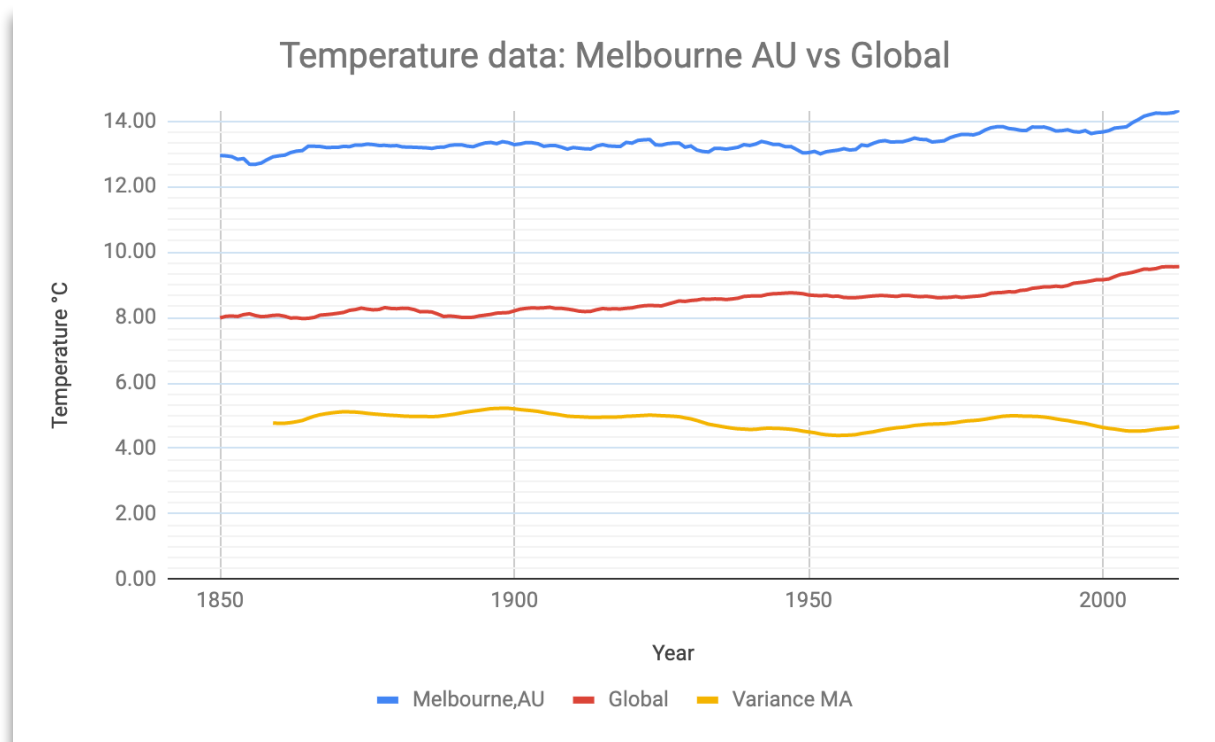
Moving average calculation, city

fx	=average(D2:D11)					
	A	B	C	D	E	
1	year	city_avg_temp	Melbourne,AU	global_avg_temp	Global	Diffe
2	1841	13.09		7.69		
3	1842	12.96		8.02		
4	1843	13.34		8.17		
5	1844	12.60		7.65		
6	1845	13.16		7.85		
7	1846	13.43		8.55		
8	1847	13.03		8.09		
9	1848	12.58		7.98		
10	1849	12.30		7.98		
11	1850	12.99	12.95	7.90		

Moving average calculation, global

Data Visualisation

A line chart was configured to map moving averages vs years, also including an additional moving average of the difference between local and global temperatures to assist in further investigation.



[Link to published google sheet.](#)

Data Interpretation

Observations

Comparison

Direct comparison of global vs local average temperatures shows a fairly consistent difference - temperatures in Melbourne are warmer than the global average. The overall difference between local vs global average temperatures is around 5°C.

Trend

The general trend in both datasets is an overall increase in average temperatures over the years, with a slightly increasing curve that is more marked in the global averages than local.

Variability

Both datasets exhibit very similar variability, but local temperatures in Melbourne have a slightly higher standard deviation.

Correlation Local vs Global

Both global and local temperatures show similar variation over time, each dataset showing upward movement over the last 173 years to 2013. There seems to be a correlation between the datasets with a Pearson product-moment correlation coefficient of 0.627 or approximately 63%.