

## Project #1: Exploring Weather Trends

Objective: To analyze local and global temperature data and compare local trends to global trends.

### Step-by-step outline

- 1) The closest city to where I live was pulled with the next lines:

```
SELECT *  
FROM city_list  
WHERE country = 'Chile'
```

The only city found was Santiago, which is the city where I live.

- 2) The local temperature data was pulled with the next lines:

```
SELECT year, avg_temp  
FROM city_data  
WHERE city = 'Santiago' and country = 'Chile'
```

The country was specified because there is another city called Santiago in the Database.

- 3) The global temperature data was pulled with the next lines:

```
SELECT *  
FROM global_data
```

- 4) After the data extraction with the SQL workspace, both data sets were merged into the same spreadsheet via Microsoft Excel.
- 5) N-year moving averages were calculated with the =AVERAGE function from Excel, taking the average over the last 5 and 10 years (present year included).
- 6) Columns with 5- and 10-year Moving Averages were plotted, as can be seen in **figure 1**. Trendlines of average temperatures were also plotted (blue-dashed), and their linear equations are visible next to them.

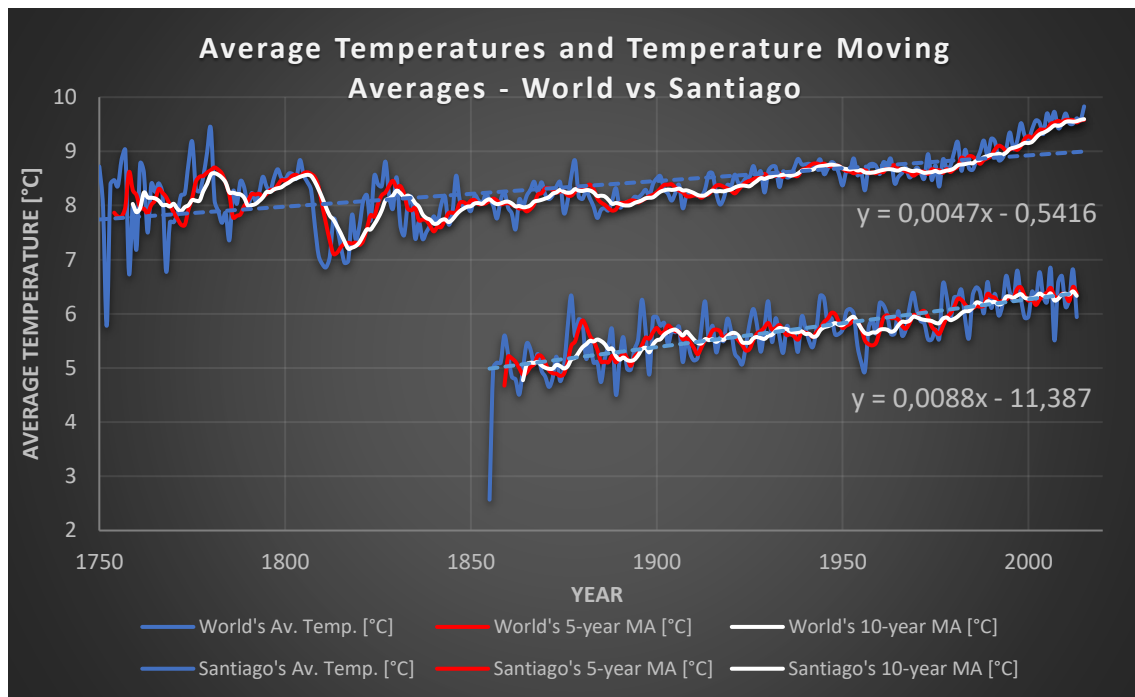


Figure 1: Average Temperatures + 5- and 10-year Moving Averages for World and Santiago's data

- 7) Since the objective of this project is to compare global and local temperatures, the plot range that will be studied goes from 1855 to 2013. The 10-year MA seems to 'over smooth' the original line, so only the 5-year MA will be considered, as can be seen in **figure 2**.

## Main observations

It is possible to observe that notorious and important temperature changes occur at the same time for the world and for Santiago, like in the 1875-1878 period, in the 1911-1916 period and in 1956 (white brackets in **figure 2**), with two temperature increases and one temperature decrease, respectively.

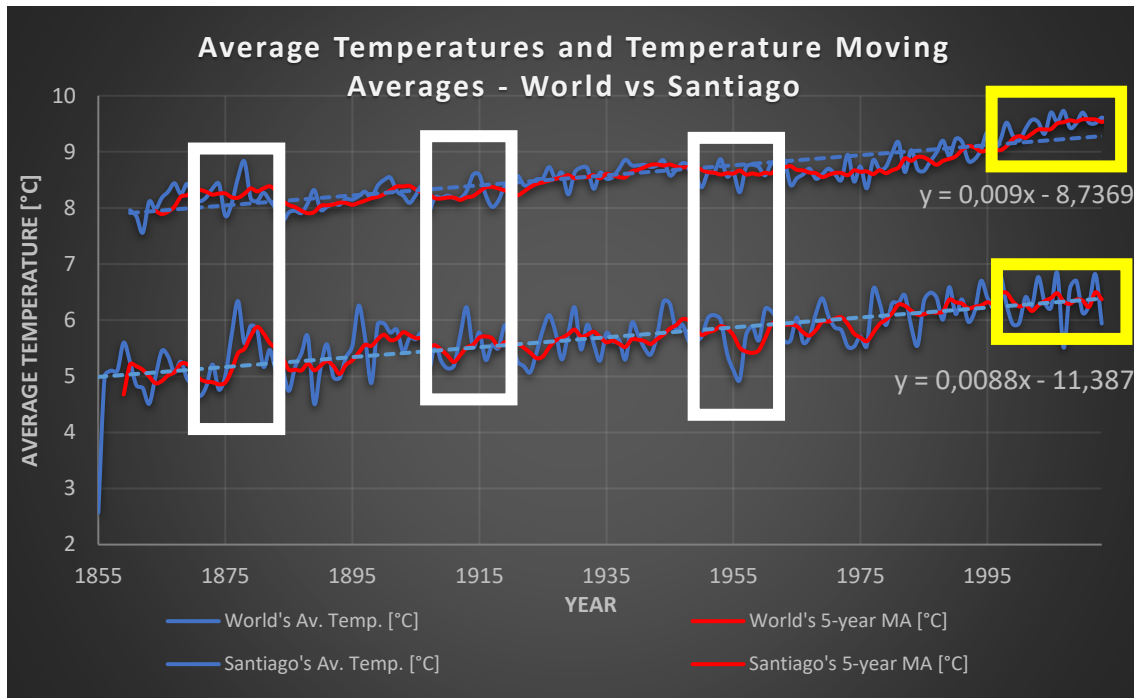


Figure 2: Average Temperatures and 5-year Moving Averages for World and Santiago's data, restricted to the range 1855-2013

Santiago de Chile is **cooler** on average compared to the global average, with a **very volatile** difference over time, as can be seen in **figure 3**. However, it is possible to observe that since after 1997, World's average temperature has consistently increased, reaching the highest temperature difference in 2011 since 1874 (**figure 3**).

Historically, the world presents a temperature gradient that is almost half than Santiago's historical gradient (0,0047 vs 0,0088, **figure 1**). When considering the range from 1855 to 2013, both the World and Santiago have almost the same gradient, so they rise their temperatures at the same scale through the years. Nevertheless, after 1997, the World temperature presents a highest gradient compared to Santiago (yellow brackets in **figure 2**), which **may mean** that Santiago is not strictly affected by climate change, unlike the world, which is **getting hotter** every year.

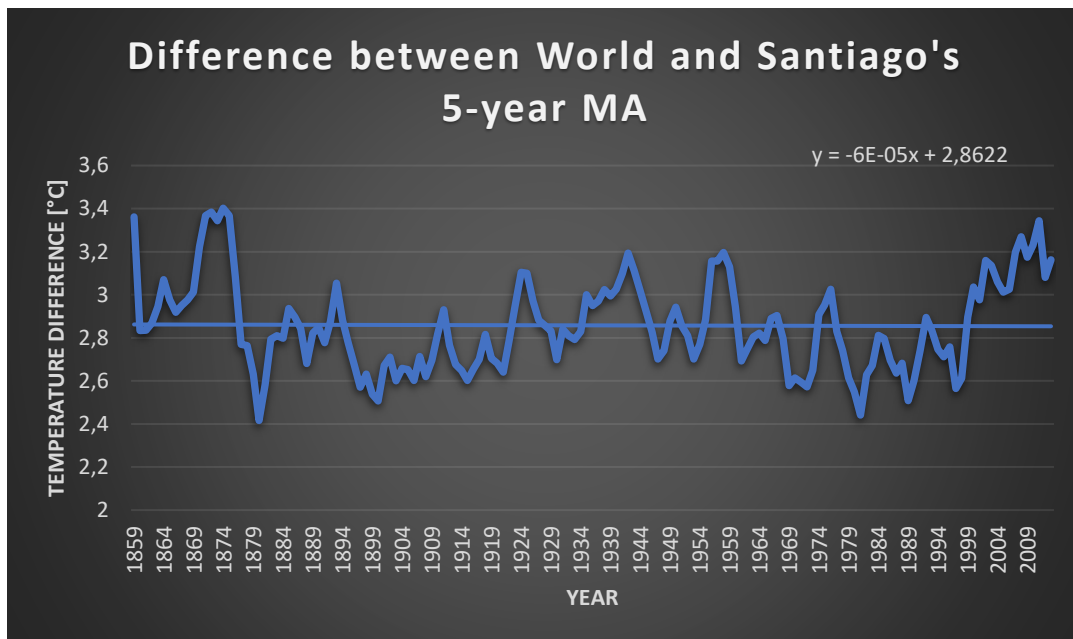


Figure 3: Difference between World and Santiago's 5-year MA, crests mark big difference (less similarity) and valleys mark little difference (more similarity)

This method does not seem like the most appropriate to analyze this data, due to the over smoothing of the chart, where the changes mentioned would not be visible. However, this smoothing helps seeing more clearly the temperature trend, which tends to go up through the years, especially since 1997.