# Analyzing global warming trends

## Background

Every year around this time, there's a flurry of activity in the world's major meteorological agencies as they prepare to release official global temperature figures for the previous year (Source: https://www.carbonbrief.org/explainer-how-do-scientists-measure-global-temperature).

In this report, we have used data from Udacity database containing information on the yearly average temperature over about 150 years, both for the world and the my city, San Francisco.

To aid in interpretation, a ten-year moving average was used, taking the average of the prior 10 years at any given year.

## Obtaining data

The following SQL commands were used to obtain the data of interest from Udacity's database:

- This command was used to select data for San Francisco

```
SELECT *
 FROM city_data
 WHERE city = 'San Francisco';
```

- This command was used to obtain global data:

```
SELECT *
 FROM global_data;
```

The respective tables were saved to .csv files.

## Modifying data frames

A 10-year moving average column was added to each of the two data frames by using the command '=AVERAGE(Xi:Xi+10)'.

Python was used to manipulate the data frames from this point onwards.

Since the data for San Francisco started in 1858, to improve comparability, we also restricted the global data to 1858 and onward:

- *global_df = global_df[global_df.year > 1857]*

The two data frames were concatenated with pandas for easier use with the python package seaborn:

- *concatenated = pd.concat([city_df.assign(dataset='San Francisco'), global_df.assign(dataset='World')])*

Seaborn was finally used to generate the plot of the moving average temperature trends over a period of 158 years. Below is the python code used for reference:

*fig = plt.figure()ax = sns.lineplot(x='year', y='ten_y_ma', data= concatenated, hue = 'dataset', palette='husl')    ax.set_ylabel("Ten-year moving average temperature (C)")ax.set_xlabel("Time (years)")  ax.set_ylim(top=20)*
*plt.suptitle("temperature trend through the years")plt.legend(loc='upper right')  plt.savefig('$OUTDIR/10y_ma_sf_world.png', dpi=1000)*

## Comparing global and local trends

Here is the plot of the trends for San Francisco and the rest of the world.

1. As we can see from the plot, over a span of 158 years, there has been a slow, but gradual increase in global temperatures, that appears to be steeper after the year 1980.
2. On average, over 158 years the global temperature has increased by about 2 degrees centigrades, whereas the San Francisco temperature has increased by roughly 1.5 degrees centigrade.
3. San Francisco has been on average warmer that the global average.
4. There appears to be a slightly less steep temperature rise in San Francisco compared to the global trends.
5. Similarly to the global trends, the temperature rise appears to have been steeper since 1980.


temperature trend through the years