WeatherTrend

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- my name is *gu*
- I'm from South Korea so I chose Seoul for my project

```
In [41]: import matplotlib.pyplot as plt
         import pandas as pd
```
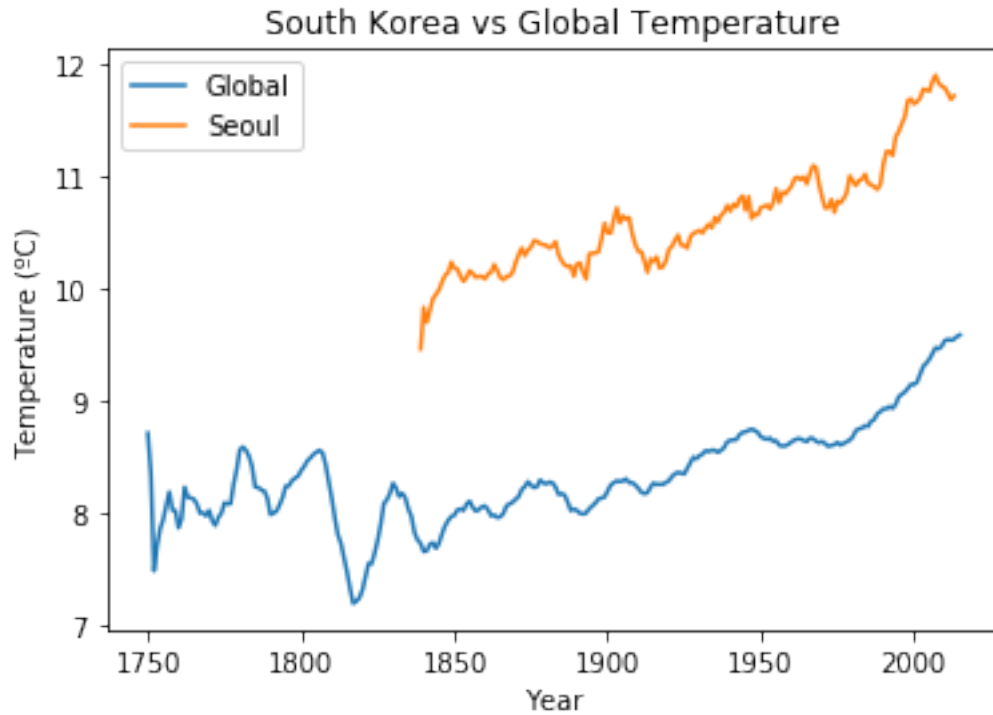
- Line chart uses the moving average for 10-year each in order to visualize the graph effectively.
- As you can see, Seoul and Global have a similar trend that both temperature are gradually increasing around since 1840.
- However, Seoul was already hotter than the rest of the world even before the Industrial Revolution.
- Presumably, other factors such as geographical location contributed to warming Seoul besides the effect of global warming.

```
In [71]: # reading global data
         glbtmp = pd.read_csv('/Users/gujungun/Downloads/globaldata10.csv')
         glbtmp_rolling = glbtmp.rolling(window=10, min_periods=1).mean()
         plt.plot(glbtmp['year'],glbtmp_rolling['gb_avg_temp'], label='Global')
         plt.legend()

         # reading Seoul data from city_data
         citytmp = pd.read_csv('/Users/gujungun/Downloads/citydata.csv')
         seoul = citytmp[((citytmp.city == 'Seoul'))]
         seoul_rolling = seoul.rolling(window=10, min_periods=1).mean()
         plt.plot(seoul['year'], seoul_rolling['avg_temp'], label='Seoul')

         plt.xlabel('Year')
         plt.ylabel('Temperature (žC)')
         plt.title('South Korea vs Global Temperature')
         plt.legend()

Out[71]: <matplotlib.legend.Legend at 0x110310240>
```

South Korea vs Global Temperature

- Seoul has been always hotter than Global world.
- As ʹdiffʹ columns refers the temperature gap between Seoul and global yearly.
- Average temperature difference is 2.16 degree for last 175 years(from 1839 to 2013)

In [70]:
```python
# joining two dataframes to one
temp_join = pd.merge(seoul, glbtmp, on = 'year')
temp_join['diff'] = temp_join['avg_temp'] - temp_join['gb_avg_temp']
print(temp_join.loc[:,['year','city','avg_temp','10yr_avg','gb_avg_temp','gb_10yr_avg
```

	year	city	avg_temp	10yr_avg	gb_avg_temp	gb_10yr_avg	diff
0	1839	Seoul	9.47	NaN	7.63	7.738	1.84
1	1840	Seoul	10.21	NaN	7.80	7.666	2.41
2	1841	Seoul	9.44	NaN	7.69	7.671	1.75
3	1842	Seoul	10.13	NaN	8.02	7.728	2.11
4	1843	Seoul	10.33	NaN	8.17	7.744	2.16
5	1844	Seoul	10.15	NaN	7.65	7.694	2.50
6	1845	Seoul	10.25	NaN	7.85	7.740	2.40
7	1846	Seoul	10.57	NaN	8.55	7.825	2.02
8	1847	Seoul	10.59	NaN	8.09	7.896	2.50
9	1848	Seoul	10.36	10.150	7.98	7.943	2.38
10	1849	Seoul	10.39	10.242	7.98	7.978	2.41
11	1850	Seoul	9.69	10.190	7.90	7.988	1.79
12	1851	Seoul	9.33	10.179	8.18	8.037	1.15
13	1852	Seoul	9.52	10.118	8.10	8.045	1.42

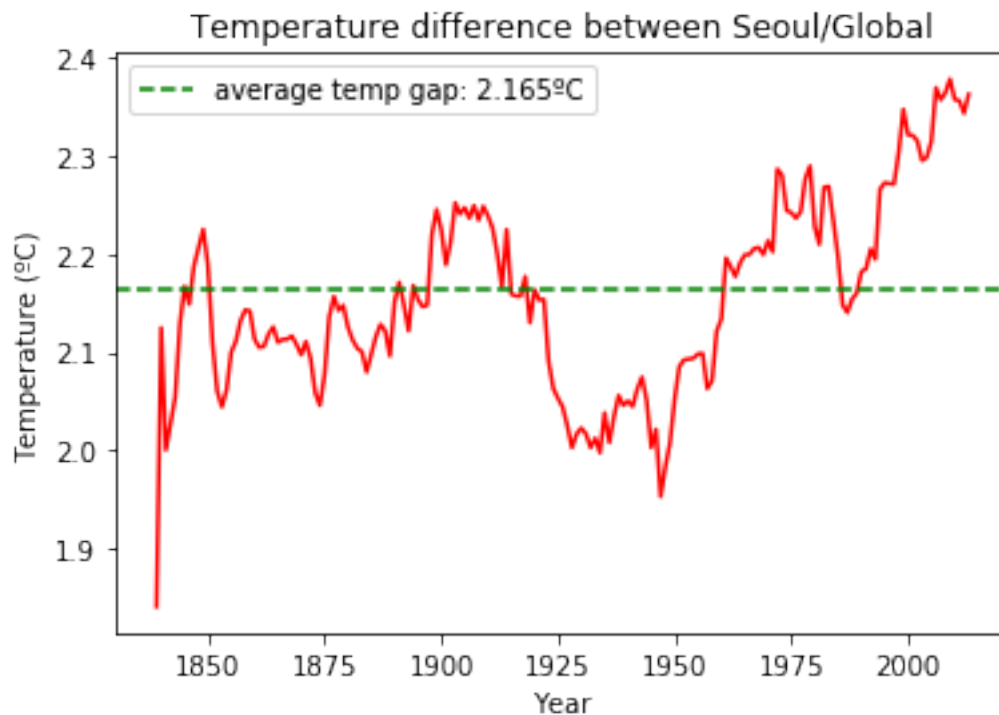| 14	1853	Seoul	9.86	10.071	8.04	8.032	1.82
15	1854	Seoul	10.53	10.109	8.21	8.088	2.32
16	1855	Seoul	10.83	10.167	8.11	8.114	2.72
17	1856	Seoul	10.30	10.140	8.00	8.059	2.30
18	1857	Seoul	10.27	10.108	7.76	8.026	2.51
19	1858	Seoul	10.45	10.117	8.10	8.038	2.35
20	1859	Seoul	10.37	10.115	8.25	8.065	2.12
21	1860	Seoul	9.47	10.093	7.96	8.071	1.51
22	1861	Seoul	9.77	10.137	7.85	8.038	1.92
23	1862	Seoul	9.69	10.154	7.56	7.984	2.13
24	1863	Seoul	10.53	10.221	8.11	7.991	2.42
25	1864	Seoul	10.00	10.168	7.98	7.968	2.02
26	1865	Seoul	10.20	10.105	8.18	7.975	2.02
27	1866	Seoul	10.11	10.086	8.29	8.004	1.82
28	1867	Seoul	10.56	10.115	8.44	8.072	2.12
29	1868	Seoul	10.49	10.119	8.25	8.087	2.24
..	...	...	...	...	...	...	...
145	1984	Seoul	10.67	11.026	8.69	8.787	1.98
146	1985	Seoul	10.78	10.943	8.66	8.779	2.12
147	1986	Seoul	10.46	10.933	8.83	8.827	1.63
148	1987	Seoul	11.03	10.914	8.99	8.841	2.04
149	1988	Seoul	11.23	10.891	9.20	8.892	2.03
150	1989	Seoul	12.01	10.934	8.92	8.911	3.09
151	1990	Seoul	11.86	11.117	9.23	8.936	2.63
152	1991	Seoul	11.39	11.228	9.18	8.937	2.21
153	1992	Seoul	11.48	11.229	8.84	8.957	2.64
154	1993	Seoul	11.02	11.193	8.87	8.941	2.15
155	1994	Seoul	12.32	11.358	9.04	8.976	3.28
156	1995	Seoul	11.27	11.407	9.35	9.045	1.92
157	1996	Seoul	11.13	11.474	9.04	9.066	2.09
158	1997	Seoul	11.70	11.541	9.20	9.087	2.50
159	1998	Seoul	12.66	11.684	9.52	9.119	3.14
160	1999	Seoul	12.13	11.696	9.29	9.156	2.84
161	2000	Seoul	11.42	11.652	9.20	9.153	2.22
162	2001	Seoul	11.60	11.673	9.41	9.176	2.19
163	2002	Seoul	11.80	11.705	9.57	9.249	2.23
164	2003	Seoul	11.80	11.783	9.53	9.315	2.27
165	2004	Seoul	12.25	11.776	9.32	9.343	2.93
166	2005	Seoul	11.16	11.765	9.70	9.378	1.46
167	2006	Seoul	12.01	11.853	9.53	9.427	2.48
168	2007	Seoul	12.25	11.908	9.73	9.480	2.52
169	2008	Seoul	11.96	11.838	9.43	9.471	2.53
170	2009	Seoul	11.84	11.809	9.51	9.493	2.33
171	2010	Seoul	11.30	11.797	9.70	9.543	1.60
172	2011	Seoul	11.12	11.749	9.52	9.554	1.60
173	2012	Seoul	11.23	11.692	9.51	9.548	1.72
174	2013	Seoul	12.12	11.724	9.61	9.556	2.51

[175 rows x 7 columns]

- I used the 25-year moving average data in order to figure out if there is a tendency that Seoul is becoming more hot faster than Global is.
- By observing the graph, from the late of 1980s Seoul has been hotter steeper than the average temperature on Earth has been increased.

In [47]:
```python
# Average temperature difference between Seoul and global
plt.figure()
rolling_diff = temp_join['diff'].rolling(window=25, min_periods=1).mean()

plt.plot(temp_join['year'], rolling_diff, color='Red', label='')
plt.axhline(temp_join['diff'].mean(), color='green', linestyle='dashed', label='averag
plt.xlabel('Year')
plt.ylabel('Temperature (žC)')
plt.title('Temperature difference between Seoul/Global')
plt.legend()
plt.show()

print("Average temperature gap:", temp_join['diff'].mean(),'žC')
```


Average temperature gap: 2.1651999999999996 žC