Weather Trends project

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First, I found Kawasaki was in the city_list. I have extract Kawasaki's data from city_data in temperatures database and saved as 'city-Kawasaki.csv'.

code: `SELECT * FROM city_data WHERE city LIKE 'Kawasaki'`

After I opened 'city-Kawasaki.csv',I found the 'Kawasaki's data is from 1845 to 2013. So I collect global weather data with the same year period to compare and saved as 'global.csv'.

code: `SELECT * FROM global_data WHERE year BETWEEN 1845 AND 2013`

I have read the csv file and calculated with Python. I have calculated moving average in 10 years average with rolling() function in pandas. I plot the line chart and I have found 10 year is enough and not too much.

In [12]:
```
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
global_df = pd.read_csv('global.csv')
global_df['move_ave'] = global_df['avg_temp']
global_df['move_ave'] = global_df['move_ave'].rolling(10, min_periods=0,win_type
= 'boxcar').mean()
global_df.head()
```

Out[12]:

	year	avg_temp	move_ave
0	1845	7.85	7.850000
1	1846	8.55	8.200000
2	1847	8.09	8.163333
3	1848	7.98	8.117500
4	1849	7.98	8.090000

In [13]:
```
kawasaki_df = pd.read_csv('city-Kawasaki.csv')
kawasaki_df['move_ave'] = kawasaki_df['avg_temp']
kawasaki_df['move_ave'] = kawasaki_df['move_ave'].rolling(10,win_type = 'boxcar
',min_periods = 0).mean()
kawasaki_df.head()
```

Out[13]:

	year	city	country	avg_temp	move_ave
0	1845	Kawasaki	Japan	11.95	11.950000
1	1846	Kawasaki	Japan	12.40	12.175000
2	1847	Kawasaki	Japan	12.21	12.186667
3	1848	Kawasaki	Japan	12.14	12.175000
4	1849	Kawasaki	Japan	12.14	12.168000

Calculate the difference between Kawasaki and global temperature and calculate moving average with 10 year period.

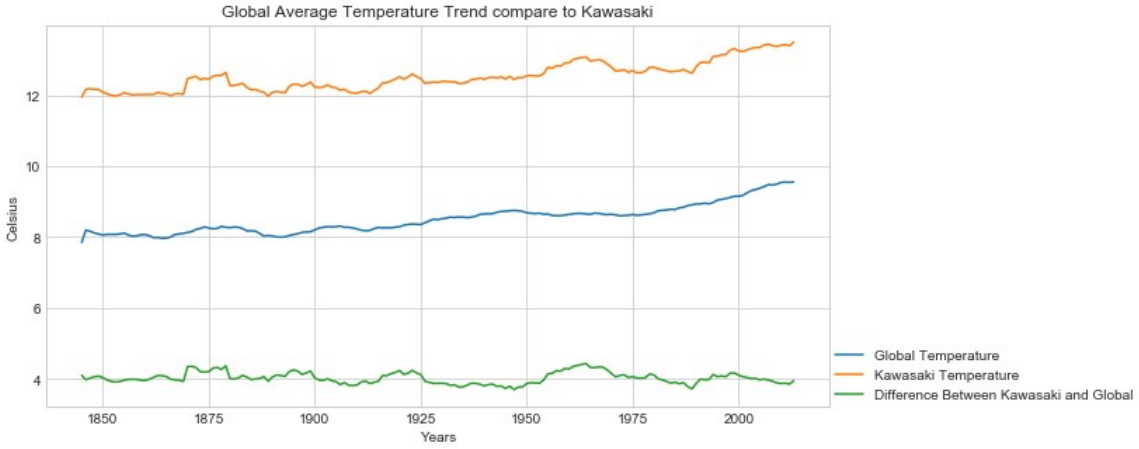
In [14]:
```
total_df =pd.DataFrame(global_df)
total_df['kawasaki_avg'] = kawasaki_df['avg_temp']
total_df['kawasaki_move_ave'] = kawasaki_df['move_ave']
total_df['def_temp_avg'] = total_df['kawasaki_avg']-total_df['avg_temp']
total_df['def_move_ave'] = total_df['def_temp_avg']
total_df['def_move_ave'] = total_df['def_move_ave'].rolling(10,min_periods=0,win
_type='boxcar').mean()
```

When I create a line chart,my key consideration was put all of three line chart together in one figure. This helped me to compare easily.

The three line chart includeds: Kawasaki's temperature, global's temperature, difference between Kawasaki's and global's.

In [15]:
```
import numpy as np
total_df['global_diff'] = pd.DataFrame(np.diff(total_df['move_ave']))
total_df['kawasaki_diff'] = pd.DataFrame(np.diff(total_df['kawasaki_move_ave']))
plt.style.use('seaborn-whitegrid')
fig, ax = plt.subplots(figsize=(10, 5))
ax.plot(total_df ['year'], total_df['move_ave'], label='Global Temperature')
ax.plot(total_df ['year'], total_df['kawasaki_move_ave'], label='Kawasaki Temper
ature')
ax.plot(total_df ['year'], total_df['def_move_ave'], label='Difference Between K
awasaki and Global')
ax.set_title('Global Average Temperature Trend compare to Kawasaki')
ax.set_xlabel('Years')
ax.set_ylabel('Celsius')
ax.legend(loc=(1,0))
```

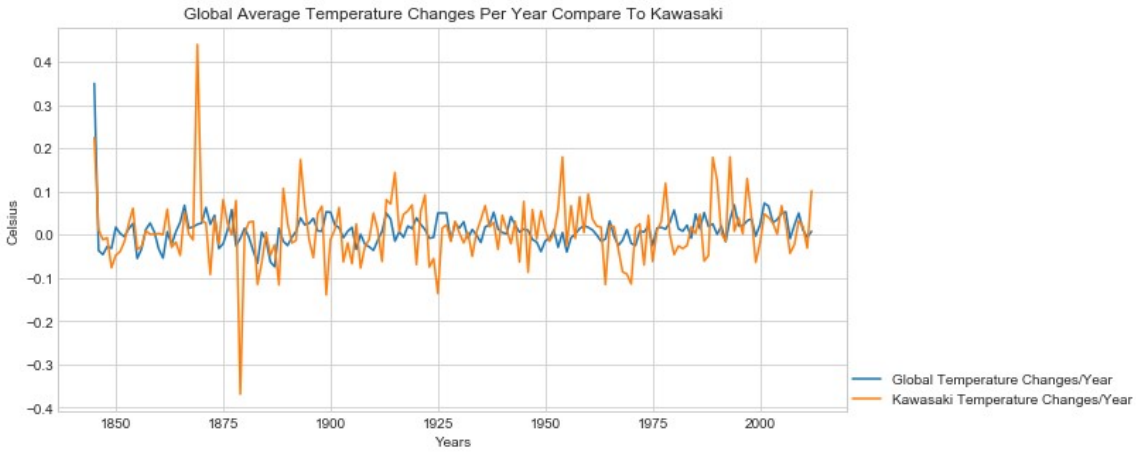
Out[15]: <matplotlib.legend.Legend at 0x1527f96eef0>



To see how the temperature is changing, I calculated every years change of global's and Kawasaki's temperature. I found that Kawasaki's temperature change is more drastic.

In [16]:
```
fig, ax = plt.subplots(figsize=(10, 5))
ax.plot(total_df ['year'], total_df['global_diff'], label='Global Temperature Changes/Year')
ax.plot(total_df ['year'], total_df['kawasaki_diff'], label='Kawasaki Temperature Changes/Year')
ax.set_title('Global Average Temperature Changes Per Year Compare To Kawasaki')
ax.set_xlabel('Years')
ax.set_ylabel('Celsius')
ax.legend(loc=(1,0))
```

Out[16]: <matplotlib.legend.Legend at 0x1527faf0fd0>



Observations:

1.Global temperature and my City temperature are going hotter.

2.My City is hotter on average compared to global average, and the difference has been consistent over time.

3.The changes in my city's temperatures over time compare to the changes in the global average is more drastic.

4.The trend of temperature is changed faster in last 100 year, but consistant in every year.