Tool use in each stage

import data use sql, manipulate and clean data, visualization : using python, caculate moving average using excel

SQL

Select * from global_data;

select * from city_data;

select * from city_list;

Import data to python

In [79]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
sns.set()
sns.set(style="whitegrid")
```

In [80]:

```
Global=pd.read_csv("global_data.csv")
Global.head()
```

Out[80]:

	year	avg_temp
0	1750	8.72
1	1751	7.98
2	1752	5.78
3	1753	8.39
4	1754	8.47

In [81]:

```
data=pd.read_csv("city_data.csv")
data.head()
```

Out[81]:

	year	city	country	avg_temp
0	1849	Abidjan	Côte D'Ivoire	25.58
1	1850	Abidjan	Côte D'Ivoire	25.52
2	1851	Abidjan	Côte D'Ivoire	25.67
3	1852	Abidjan	Côte D'Ivoire	NaN

	year	city	country	avg_temp
4	1855	Abidjan	Côte D'Ivoire	NaN

In [82]:

```
List=pd.read_csv("citylist.csv")
List.head()
```

Out[82]:

	city	country
0	Abidjan	Côte D'Ivoire
1	Abu Dhabi	United Arab Emirates
2	Abuja	Nigeria
3	Accra	Ghana
4	Adana	Turkey

In [83]:

```
country=pd.merge(data,List,on="city")
country=country[["year","country_x","city","avg_temp"]]
country
```

Out[83]:

	year	country_x	city	avg_temp
0	1849	Côte D'Ivoire	Abidjan	25.58
1	1850	Côte D'Ivoire	Abidjan	25.52
2	1851	Côte D'Ivoire	Abidjan	25.67
3	1852	Côte D'Ivoire	Abidjan	NaN
4	1853	Côte D'Ivoire	Abidjan	NaN
5	1854	Côte D'Ivoire	Abidjan	NaN
6	1855	Côte D'Ivoire	Abidjan	NaN
7	1856	Côte D'Ivoire	Abidjan	26.28
8	1857	Côte D'Ivoire	Abidjan	25.17
9	1858	Côte D'Ivoire	Abidjan	25.49
10	1859	Côte D'Ivoire	Abidjan	25.92
11	1860	Côte D'Ivoire	Abidjan	25.46
12	1861	Côte D'Ivoire	Abidjan	25.67
13	1862	Côte D'Ivoire	Abidjan	25.17
14	1863	Côte D'Ivoire	Abidjan	NaN
15	1864	Côte D'Ivoire	Abidjan	NaN
16	1865	Côte D'Ivoire	Abidjan	NaN
17	1866	Côte D'Ivoire	Abidjan	NaN

	year	country_x	city	avg_temp
18	1867	Côte D'Ivoire	Abidjan	NaN
19	1868	Côte D'Ivoire	Abidjan	NaN
20	1869	Côte D'Ivoire	Abidjan	NaN
21	1870	Côte D'Ivoire	Abidjan	NaN
22	1871	Côte D'Ivoire	Abidjan	NaN
23	1872	Côte D'Ivoire	Abidjan	NaN
24	1873	Côte D'Ivoire	Abidjan	25.62
25	1874	Côte D'Ivoire	Abidjan	25.68
26	1875	Côte D'Ivoire	Abidjan	25.25
27	1876	Côte D'Ivoire	Abidjan	25.14
28	1877	Côte D'Ivoire	Abidjan	25.85
29	1878	Côte D'Ivoire	Abidjan	25.87
...	...	...	...	...
76588	1984	Mexico	Zapopan	20.88
76589	1985	Mexico	Zapopan	20.79
76590	1986	Mexico	Zapopan	20.91
76591	1987	Mexico	Zapopan	20.94
76592	1988	Mexico	Zapopan	20.91
76593	1989	Mexico	Zapopan	21.12
76594	1990	Mexico	Zapopan	21.46
76595	1991	Mexico	Zapopan	21.20
76596	1992	Mexico	Zapopan	21.00
76597	1993	Mexico	Zapopan	21.04
76598	1994	Mexico	Zapopan	21.46
76599	1995	Mexico	Zapopan	21.50
76600	1996	Mexico	Zapopan	21.08
76601	1997	Mexico	Zapopan	20.99
76602	1998	Mexico	Zapopan	21.38
76603	1999	Mexico	Zapopan	20.86
76604	2000	Mexico	Zapopan	21.12
76605	2001	Mexico	Zapopan	21.23
76606	2002	Mexico	Zapopan	21.50
76607	2003	Mexico	Zapopan	21.51
76608	2004	Mexico	Zapopan	21.24
76609	2005	Mexico	Zapopan	21.42
76610	2006	Mexico	Zapopan	21.50
76611	2007	Mexico	Zapopan	21.35
76612	2008	Mexico	Zapopan	21.02
76613	2009	Mexico	Zapopan	21.76
76614	2010	Mexico	Zapopan	20.90
76615	2011	Mexico	Zapopan	21.55
76616	2012	Mexico	Zapopan	21.52
76617	2013	Mexico	Zapopan	22.19

76618 rows × 4 columns

76618 rows × 4 columns

In [84]:

```
df=pd.merge(country,Global,on="year")
df=df.dropna()
df=df.drop_duplicates()
df.head()
```

Out[84]:

	year	country_x	city	avg_temp_x	avg_temp_y
0	1849	Côte D'Ivoire	Abidjan	25.58	7.98
1	1849	United Arab Emirates	Abu Dhabi	26.01	7.98
2	1849	Ghana	Accra	25.70	7.98
3	1849	Turkey	Adana	18.47	7.98
4	1849	Australia	Adelaide	15.19	7.98

In [85]:

```
df=df.rename(columns={"avg_temp_x":"Country_temp","avg_temp_y":"Global_temp","country_x":"Country"
})
```

In [89]:

```
df=df[df["Country"]=="South Korea"]
df.head()
```

Out[89]:

	year	Country	city	Country_temp	Global_temp
265	1849	South Korea	Seoul	10.39	7.98
595	1850	South Korea	Seoul	9.69	7.90
925	1851	South Korea	Seoul	9.33	8.18
1256	1852	South Korea	Seoul	9.52	8.10
1587	1853	South Korea	Seoul	9.86	8.04

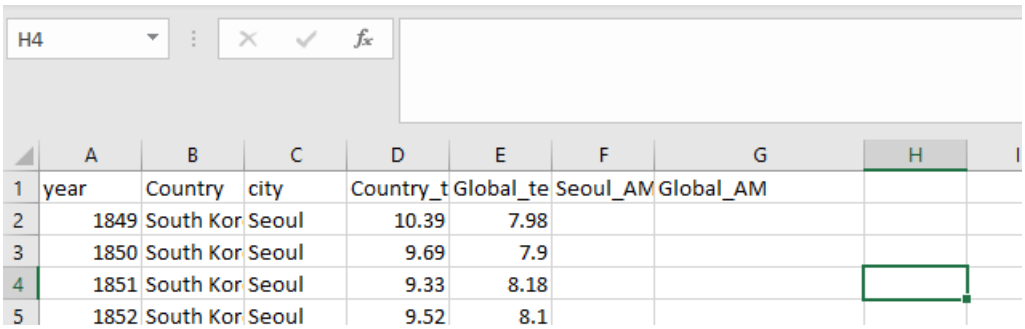
In [87]:

```
df.to_csv("seoul temp.csv",index=False)
```

Moving average

How did you calculate the moving average?

Taking 5 years to caculate the moving average temp



6	1853	South Kor	Seoul	9.86	8.04			
7	1854	South Kor	Seoul	10.53	8.21	9.758	8.04	
8	1855	South Kor	Seoul	10.83	8.11	9.786	8.086	
9	1856	South Kor	Seoul	10.3	8	10.014	8.128	
10	1857	South Kor	Seoul	10.27	7.76	10.208	8.092	
11	1858	South Kor	Seoul	10.45	8.1	10.358	8.024	
12	1859	South Kor	Seoul	10.37	8.25	10.476	8.036	
13	1860	South Kor	Seoul	9.47	7.96	10.444	8.044	
14	1861	South Kor	Seoul	9.77	7.85	10.172	8.014	
15	1862	South Kor	Seoul	9.69	7.56	10.066	7.984	
16	1863	South Kor	Seoul	10.53	8.11	9.95	7.944	
17	1864	South Kor	Seoul	10	7.98	9.966	7.946	
18	1865	South Kor	Seoul	10.2	8.18	9.892	7.892	
19	1866	South Kor	Seoul	10.11	8.29	10.038	7.936	

=> f7: =average(f2:f6)

=> g7:=average(g2:g6)

Import again the file from csv after cacualte moving average

In [90]:

```
df_ma=pd.read_csv("seoul temp.csv")
df_ma
```

Out[90]:

	year	Country	city	Country_temp	Global_temp	Seoul_AM	Global_AM
0	1849	South Korea	Seoul	10.39	7.98	NaN	NaN
1	1850	South Korea	Seoul	9.69	7.90	NaN	NaN
2	1851	South Korea	Seoul	9.33	8.18	NaN	NaN
3	1852	South Korea	Seoul	9.52	8.10	NaN	NaN
4	1853	South Korea	Seoul	9.86	8.04	9.7325	8.0400
5	1854	South Korea	Seoul	10.53	8.21	9.6000	8.0550
6	1855	South Korea	Seoul	10.83	8.11	9.8100	8.1325
7	1856	South Korea	Seoul	10.30	8.00	10.1850	8.1150
8	1857	South Korea	Seoul	10.27	7.76	10.3800	8.0900
9	1858	South Korea	Seoul	10.45	8.10	10.4825	8.0200
10	1859	South Korea	Seoul	10.37	8.25	10.4625	7.9925
11	1860	South Korea	Seoul	9.47	7.96	10.3475	8.0275
12	1861	South Korea	Seoul	9.77	7.85	10.1400	8.0175
13	1862	South Korea	Seoul	9.69	7.56	10.0150	8.0400
14	1863	South Korea	Seoul	10.53	8.11	9.8250	7.9050
15	1864	South Korea	Seoul	10.00	7.98	9.8650	7.8700
16	1865	South Korea	Seoul	10.20	8.18	9.9975	7.8750
17	1866	South Korea	Seoul	10.11	8.29	10.1050	7.9575
18	1867	South Korea	Seoul	10.56	8.44	10.2100	8.1400
19	1868	South Korea	Seoul	10.49	8.25	10.2175	8.2225
20	1869	South Korea	Seoul	10.71	8.43	10.3400	8.2900
21	1870	South Korea	Seoul	10.34	8.20	10.4675	8.3525
22	1871	South Korea	Seoul	10.48	8.12	10.5250	8.3300
23	1872	South Korea	Seoul	10.26	8.19	10.5050	8.2500
24	1873	South Korea	Seoul	9.85	8.35	10.4475	8.2350

	year	Country	city	Country_temp	Global_temp	Seoul_AM	Global_AM
25	1874	South Korea	Seoul	10.52	8.43	10.2325	8.2150
26	1875	South Korea	Seoul	10.43	7.86	10.2775	8.2725
27	1876	South Korea	Seoul	10.71	8.08	10.2650	8.2075
28	1877	South Korea	Seoul	10.48	8.54	10.3775	8.1800
29	1878	South Korea	Seoul	10.29	8.83	10.5350	8.2275
...	...	...	...	...	...	...	...
145	1994	South Korea	Seoul	12.32	9.04	11.4375	9.0300
146	1995	South Korea	Seoul	11.27	9.35	11.5525	8.9825
147	1996	South Korea	Seoul	11.13	9.04	11.5225	9.0250
148	1997	South Korea	Seoul	11.70	9.20	11.4350	9.0750
149	1998	South Korea	Seoul	12.66	9.52	11.6050	9.1575
150	1999	South Korea	Seoul	12.13	9.29	11.6900	9.2775
151	2000	South Korea	Seoul	11.42	9.20	11.9050	9.2625
152	2001	South Korea	Seoul	11.60	9.41	11.9775	9.3025
153	2002	South Korea	Seoul	11.80	9.57	11.9525	9.3550
154	2003	South Korea	Seoul	11.80	9.53	11.7375	9.3675
155	2004	South Korea	Seoul	12.25	9.32	11.6550	9.4275
156	2005	South Korea	Seoul	11.16	9.70	11.8625	9.4575
157	2006	South Korea	Seoul	12.01	9.53	11.7525	9.5300
158	2007	South Korea	Seoul	12.25	9.73	11.8050	9.5200
159	2008	South Korea	Seoul	11.96	9.43	11.9175	9.5700
160	2009	South Korea	Seoul	11.84	9.51	11.8450	9.5975
161	2010	South Korea	Seoul	11.30	9.70	12.0150	9.5500
162	2011	South Korea	Seoul	11.12	9.52	11.8375	9.5925
163	2012	South Korea	Seoul	11.23	9.51	11.5550	9.5400
164	2013	South Korea	Seoul	12.12	9.61	11.3725	9.5600
165	1843	South Korea	Seoul	10.33	8.17	11.4425	9.5850
166	1844	South Korea	Seoul	10.15	7.65	11.2000	9.2025
167	1845	South Korea	Seoul	10.25	7.85	10.9575	8.7350
168	1846	South Korea	Seoul	10.57	8.55	10.7125	8.3200
169	1847	South Korea	Seoul	10.59	8.09	10.3250	8.0550
170	1848	South Korea	Seoul	10.36	7.98	10.3900	8.0350
171	1839	South Korea	Seoul	9.47	7.63	10.4425	8.1175
172	1840	South Korea	Seoul	10.21	7.80	10.2475	8.0625
173	1841	South Korea	Seoul	9.44	7.69	10.1575	7.8750
174	1842	South Korea	Seoul	10.13	8.02	9.8700	7.7750

175 rows × 7 columns

Correlation

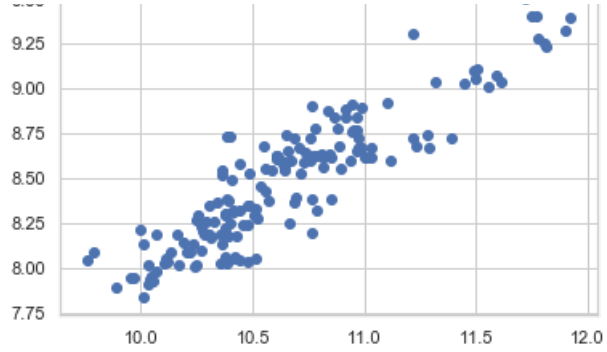
In [20]:

```
import matplotlib
import matplotlib.pyplot as plt
%matplotlib inline

plt.scatter(df_ma["Seoul_AM"],df_ma["Global_AM"])
```

Out[20]:

```
<matplotlib.collections.PathCollection at 0x29b3767acc0>
```



In [21]:

```
df_ma.corr(method='pearson')
```

Out[21]:

	year	Country_temp	Global_temp	Seoul_AM	Global_AM
year	1.000000	0.678746	0.867911	0.769750	0.796723
Country_temp	0.678746	1.000000	0.710788	0.605872	0.646042
Global_temp	0.867911	0.710788	1.000000	0.795725	0.821953
Seoul_AM	0.769750	0.605872	0.795725	1.000000	0.923418
Global_AM	0.796723	0.646042	0.821953	0.923418	1.000000

=> seoul temperature and global terperature have strong positive relationsip

My city: Seoul temperature

What were your key considerations when deciding how to visualize the trends?

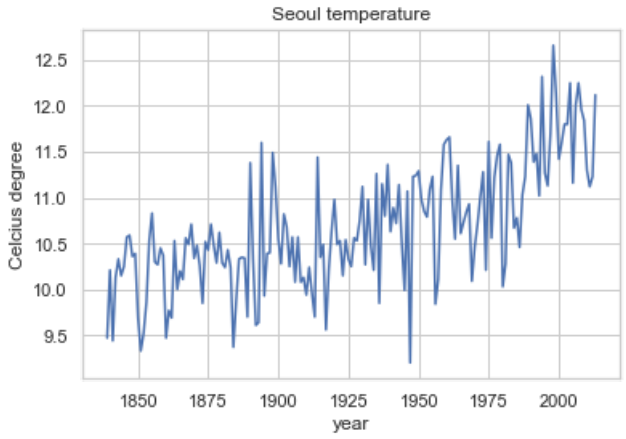
Line char would be better because it demonstrate the trend according to years

In [22]:

```
sns.lineplot(df_ma["year"],df_ma["Country_temp"])
plt.title("Seoul temperature")
plt.ylabel("Celcius degree")
```

Out[22]:

```
Text(0, 0.5, 'Celcius degree')
```



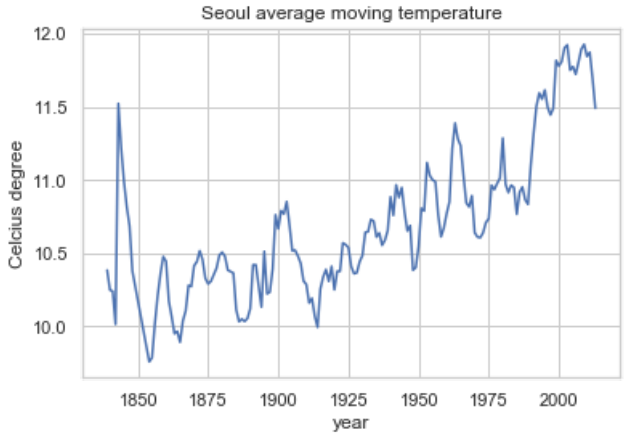
Seoul moving average temperature for 5 years

In [23]:

```
sns.lineplot(df_ma["year"],df_ma["Seoul_AM"])
plt.title("Seoul average moving temperature")
plt.ylabel("Celcius degree")
```

Out[23]:

```
Text(0, 0.5, 'Celcius degree')
```



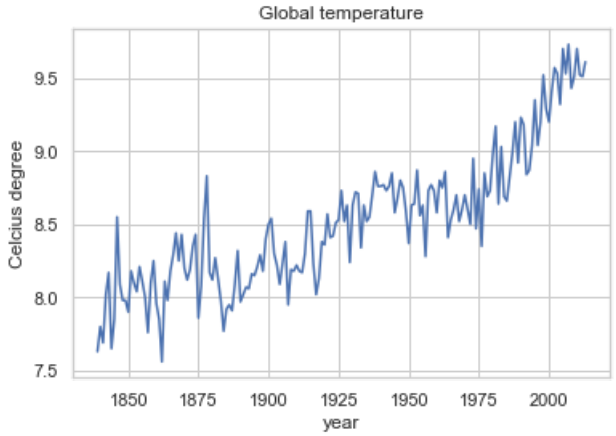
Compare with Global temperature

In [24]:

```
sns.lineplot(df_ma["year"],df_ma["Global_temp"])
plt.title("Global temperature")
plt.ylabel("Celcius degree")
```

Out[24]:

```
Text(0, 0.5, 'Celcius degree')
```

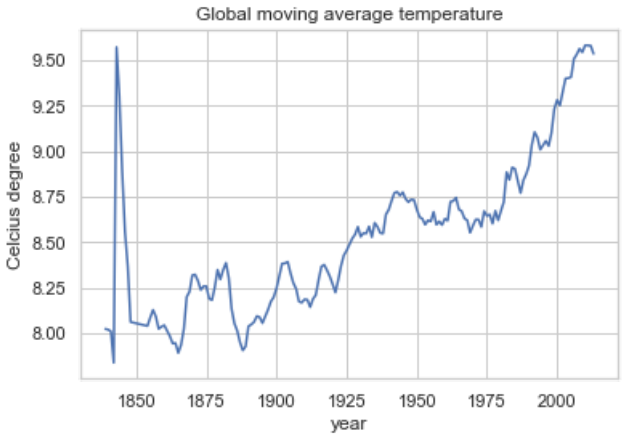


In [25]:

```
sns.lineplot(df_ma["year"],df_ma["Global_AM"])
plt.title("Global moving average temperature")
plt.ylabel("Celcius degree")
```

Out[25]:

```
Text(0, 0.5, 'Celcius degree')
```



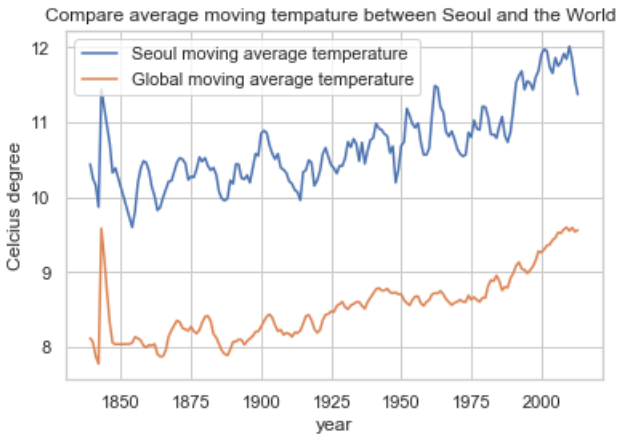
Combine

In [108]:

```
#Combine
sns.lineplot(df_ma["year"],df_ma["Seoul_AM"])
sns.lineplot(df_ma["year"],df_ma["Global_AM"])
plt.legend(labels=["Seoul moving average temperature","Global moving average
temperature"],loc="upper left")
plt.ylabel("Celcius degree")
plt.title("Compare average moving tempature between Seoul and the World ")
```

Out[108]:

```
Text(0.5, 1.0, 'Compare average moving tempature between Seoul and the World ')
```



In [ ]:

Observations

1) Is your city hotter or cooler on average compared to the global average? Has the difference been consistent over time?

My city is much hotter than the global temperature, the maximum temperature of my city is almost 12, while the maximum temperature the of the global is around 10and the minimum temparature of the my city is about 9, while the minimum temperature of global is around 7.5

2) How do the changes in your city's temperatures over time compare to the changes in the global average?

changes in the global average?

my city has many small,steep and peaky hills compared to the global temperature, which has flatter hills

3)What does the overall trend look like? Is the world getting hotter or cooler? Has the trend been consistent over the last few hundred years?

the temperate will keeping going up, the world is getting hotter and hotter , it has a peak on 1830 and dropped the increase again gradually reached higher than the peark before . The trend has been consider for 169 year from 1850 to 2019

4) Same

From the correlation, scatter plot we see that seoul and global temperature has the the strong correlationshiop in low temperature

Favorite city around the world

In [10]:

```
country.head()
```

Out[10]:

	year	country_x	city	avg_temp
0	1849	Côte D'Ivoire	Abidjan	25.58
1	1850	Côte D'Ivoire	Abidjan	25.52
2	1851	Côte D'Ivoire	Abidjan	25.67
3	1852	Côte D'Ivoire	Abidjan	NaN
4	1853	Côte D'Ivoire	Abidjan	NaN

In [36]:

```
df1=country.groupby("country_x")["avg_temp"].mean()
df1
```

Out[36]:

```
country_x
Afghanistan                    14.360950
Albania                        15.498202
Algeria                        16.433218
Angola                         23.693649
Argentina                      17.055535
Armenia                         8.365648
Australia                      15.863724
Austria                         8.004794
Azerbaijan                     11.099806
Bahamas                        24.754978
Bahrain                        25.843195
Bangladesh                     25.474085
Belarus                         5.360075
Belgium                         9.850599
Bolivia                         8.735157
Bosnia And Herzegovina          9.047079
Botswana                       18.992548
Brazil                         21.388041
Bulgaria                        8.429363
Burkina Faso                   28.049167
Burundi                        20.803688
Cameroon                       24.613784
Canada                          6.159089
```

```
Central African Republic              24.944730
Chile                                  8.450528
China                                 12.680495
Colombia                              24.291642
Congo                                 23.861014
Congo (Democratic Republic Of The)    22.273793
Croatia                                9.452285
                                         ...
Sierra Leone                          26.577688
Singapore                             26.522733
Slovakia                               9.838951
Slovenia                               9.452285
Somalia                               27.150851
South Africa                          17.209522
South Korea                           10.684800
Spain                                 15.274921
Sri Lanka                             25.926161
Sudan                                 27.372804
Suriname                              26.423771
Sweden                                 6.372772
Switzerland                            6.808577
Syria                                 18.350874
Tajikistan                             7.312418
Tanzania                              25.748806
Thailand                              27.154263
Tunisia                               18.424850
Turkey                                14.170389
Uganda                                23.231702
Ukraine                                6.994082
United Arab Emirates                  26.569497
United Kingdom                         8.867865
United States                         14.085249
Uruguay                               16.232286
Uzbekistan                            10.315055
Venezuela                             25.788913
Vietnam                               24.370776
Zambia                                20.427535
Zimbabwe                              20.202183
Name: avg_temp, Length: 135, dtype: float64
```

Favorite cities:hanoi , ho chi minh city from vietnam

In [68]:

```
fav=country[country["country_x"]=="Vietnam" ]
fav1=fav[fav["city"]=="Hanoi"]
fav1
```

Out[68]:

	year	country_x	city	avg_temp
26293	1840	Vietnam	Hanoi	21.00
26294	1841	Vietnam	Hanoi	21.30
26295	1842	Vietnam	Hanoi	21.16
26296	1843	Vietnam	Hanoi	21.26
26297	1844	Vietnam	Hanoi	20.78
26298	1845	Vietnam	Hanoi	20.68
26299	1846	Vietnam	Hanoi	21.25
26300	1847	Vietnam	Hanoi	20.83
26301	1848	Vietnam	Hanoi	20.73
26302	1849	Vietnam	Hanoi	20.94
26303	1850	Vietnam	Hanoi	21.11
26304	1851	Vietnam	Hanoi	21.26
26305	1852	Vietnam	Hanoi	21.12
26306	1853	Vietnam	Hanoi	21.51

	year	country_x	city	avg_temp
26307	1854	Vietnam	Hanoi	21.45
26308	1855	Vietnam	Hanoi	21.10
26309	1856	Vietnam	Hanoi	20.69
26310	1857	Vietnam	Hanoi	20.89
26311	1858	Vietnam	Hanoi	21.10
26312	1859	Vietnam	Hanoi	21.24
26313	1860	Vietnam	Hanoi	21.12
26314	1861	Vietnam	Hanoi	20.95
26315	1862	Vietnam	Hanoi	20.48
26316	1863	Vietnam	Hanoi	20.90
26317	1864	Vietnam	Hanoi	20.77
26318	1865	Vietnam	Hanoi	21.41
26319	1866	Vietnam	Hanoi	21.24
26320	1867	Vietnam	Hanoi	21.40
26321	1868	Vietnam	Hanoi	21.53
26322	1869	Vietnam	Hanoi	21.18
...	...	...	...	...
26437	1984	Vietnam	Hanoi	21.36
26438	1985	Vietnam	Hanoi	21.46
26439	1986	Vietnam	Hanoi	21.90
26440	1987	Vietnam	Hanoi	22.71
26441	1988	Vietnam	Hanoi	21.78
26442	1989	Vietnam	Hanoi	21.72
26443	1990	Vietnam	Hanoi	22.23
26444	1991	Vietnam	Hanoi	22.16
26445	1992	Vietnam	Hanoi	21.49
26446	1993	Vietnam	Hanoi	21.75
26447	1994	Vietnam	Hanoi	21.98
26448	1995	Vietnam	Hanoi	21.51
26449	1996	Vietnam	Hanoi	21.32
26450	1997	Vietnam	Hanoi	21.92
26451	1998	Vietnam	Hanoi	22.65
26452	1999	Vietnam	Hanoi	22.07
26453	2000	Vietnam	Hanoi	21.80
26454	2001	Vietnam	Hanoi	21.79
26455	2002	Vietnam	Hanoi	22.13
26456	2003	Vietnam	Hanoi	22.62
26457	2004	Vietnam	Hanoi	21.79
26458	2005	Vietnam	Hanoi	21.91
26459	2006	Vietnam	Hanoi	22.37
26460	2007	Vietnam	Hanoi	22.26
26461	2008	Vietnam	Hanoi	21.37
26462	2009	Vietnam	Hanoi	22.59
26463	2010	Vietnam	Hanoi	22.57
26464	2011	Vietnam	Hanoi	21.03
26465	2012	Vietnam	Hanoi	22.09
26466	2013	Vietnam	Hanoi	23.10

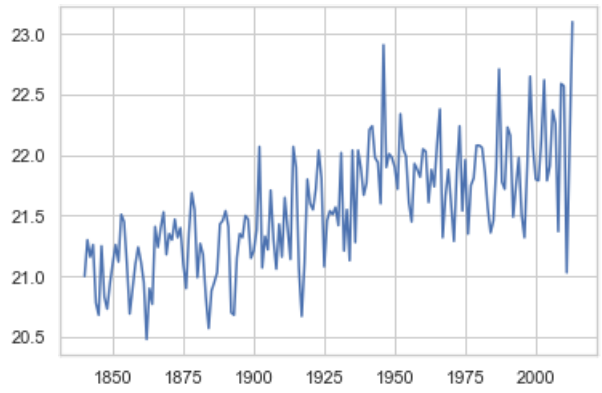
174 rows × 4 columns

In [73]:

```
plt.plot(fav1["year"],fav1["avg_temp"])
```

Out[73]:

```
[<matplotlib.lines.Line2D at 0x20909687a90>]
```



In [120]:

```
fav=country[country["country_x"]=="Vietnam" ]
fav2=fav[fav["city"]=="Ho Chi Minh City"].dropna()
fav2
```

Out[120]:

	year	country_x	city	avg_temp
27660	1825	Vietnam	Ho Chi Minh City	27.11
27674	1839	Vietnam	Ho Chi Minh City	26.69
27675	1840	Vietnam	Ho Chi Minh City	26.63
27676	1841	Vietnam	Ho Chi Minh City	27.02
27677	1842	Vietnam	Ho Chi Minh City	26.87
27678	1843	Vietnam	Ho Chi Minh City	26.94
27679	1844	Vietnam	Ho Chi Minh City	26.41
27680	1845	Vietnam	Ho Chi Minh City	26.12
27681	1846	Vietnam	Ho Chi Minh City	26.94
27682	1847	Vietnam	Ho Chi Minh City	26.41
27685	1850	Vietnam	Ho Chi Minh City	26.65
27686	1851	Vietnam	Ho Chi Minh City	26.82
27687	1852	Vietnam	Ho Chi Minh City	26.70
27688	1853	Vietnam	Ho Chi Minh City	26.87
27689	1854	Vietnam	Ho Chi Minh City	26.89
27690	1855	Vietnam	Ho Chi Minh City	26.76
27691	1856	Vietnam	Ho Chi Minh City	26.53
27692	1857	Vietnam	Ho Chi Minh City	26.51
27693	1858	Vietnam	Ho Chi Minh City	26.83
27694	1859	Vietnam	Ho Chi Minh City	26.88
27695	1860	Vietnam	Ho Chi Minh City	26.69
27696	1861	Vietnam	Ho Chi Minh City	26.58
27697	1862	Vietnam	Ho Chi Minh City	24.85
27698	1863	Vietnam	Ho Chi Minh City	26.67
27699	1864	Vietnam	Ho Chi Minh City	26.52
27700	1865	Vietnam	Ho Chi Minh City	26.89
27701	1866	Vietnam	Ho Chi Minh City	26.84
27702	1867	Vietnam	Ho Chi Minh City	26.86

	year	country_x	city	avg_temp
27703	1868	Vietnam	Ho Chi Minh City	27.06
27704	1869	Vietnam	Ho Chi Minh City	26.64
...	...	...	...	...
27819	1984	Vietnam	Ho Chi Minh City	27.43
27820	1985	Vietnam	Ho Chi Minh City	27.64
27821	1986	Vietnam	Ho Chi Minh City	27.47
27822	1987	Vietnam	Ho Chi Minh City	28.02
27823	1988	Vietnam	Ho Chi Minh City	27.79
27824	1989	Vietnam	Ho Chi Minh City	27.52
27825	1990	Vietnam	Ho Chi Minh City	27.88
27826	1991	Vietnam	Ho Chi Minh City	27.71
27827	1992	Vietnam	Ho Chi Minh City	27.64
27828	1993	Vietnam	Ho Chi Minh City	27.50
27829	1994	Vietnam	Ho Chi Minh City	27.60
27830	1995	Vietnam	Ho Chi Minh City	27.65
27831	1996	Vietnam	Ho Chi Minh City	27.43
27832	1997	Vietnam	Ho Chi Minh City	27.80
27833	1998	Vietnam	Ho Chi Minh City	28.39
27834	1999	Vietnam	Ho Chi Minh City	27.45
27835	2000	Vietnam	Ho Chi Minh City	27.59
27836	2001	Vietnam	Ho Chi Minh City	27.83
27837	2002	Vietnam	Ho Chi Minh City	28.06
27838	2003	Vietnam	Ho Chi Minh City	27.83
27839	2004	Vietnam	Ho Chi Minh City	27.69
27840	2005	Vietnam	Ho Chi Minh City	27.88
27841	2006	Vietnam	Ho Chi Minh City	28.04
27842	2007	Vietnam	Ho Chi Minh City	27.87
27843	2008	Vietnam	Ho Chi Minh City	27.61
27844	2009	Vietnam	Ho Chi Minh City	27.85
27845	2010	Vietnam	Ho Chi Minh City	28.28
27846	2011	Vietnam	Ho Chi Minh City	27.68
27847	2012	Vietnam	Ho Chi Minh City	28.25
27848	2013	Vietnam	Ho Chi Minh City	28.46

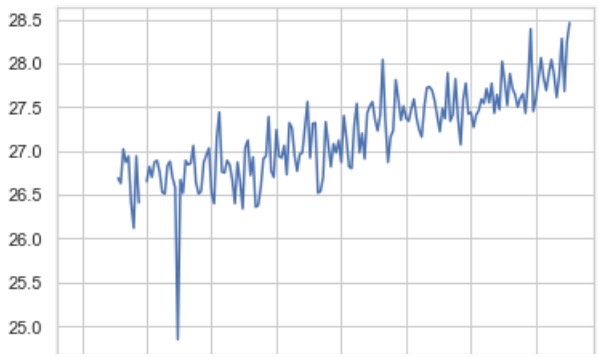
174 rows × 4 columns

In [74]:

```
plt.plot(fav2["year"],fav2["avg_temp"])
```

Out[74]:

```
[<matplotlib.lines.Line2D at 0x209096e21d0>]
```



In [75]:

```
fav1.to_csv("Hanoi.csv",index=False)
```

In [121]:

```
fav2.to_csv("HCM.csv",index=False)
```

In [128]:

```
fav1=pd.read_csv("Hanoi.csv").dropna()
fav1
```

Out[128]:

	year	country_x	city	avg_temp	ma
5	1845	Vietnam	Hanoi	20.68	21.100
6	1846	Vietnam	Hanoi	21.25	21.036
7	1847	Vietnam	Hanoi	20.83	21.026
8	1848	Vietnam	Hanoi	20.73	20.960
9	1849	Vietnam	Hanoi	20.94	20.854
10	1850	Vietnam	Hanoi	21.11	20.886
11	1851	Vietnam	Hanoi	21.26	20.972
12	1852	Vietnam	Hanoi	21.12	20.974
13	1853	Vietnam	Hanoi	21.51	21.032
14	1854	Vietnam	Hanoi	21.45	21.188
15	1855	Vietnam	Hanoi	21.10	21.290
16	1856	Vietnam	Hanoi	20.69	21.288
17	1857	Vietnam	Hanoi	20.89	21.174
18	1858	Vietnam	Hanoi	21.10	21.128
19	1859	Vietnam	Hanoi	21.24	21.046
20	1860	Vietnam	Hanoi	21.12	21.004
21	1861	Vietnam	Hanoi	20.95	21.008
22	1862	Vietnam	Hanoi	20.48	21.060
23	1863	Vietnam	Hanoi	20.90	20.978
24	1864	Vietnam	Hanoi	20.77	20.938
25	1865	Vietnam	Hanoi	21.41	20.844
26	1866	Vietnam	Hanoi	21.24	20.902
27	1867	Vietnam	Hanoi	21.40	20.960
28	1868	Vietnam	Hanoi	21.53	21.144
29	1869	Vietnam	Hanoi	21.18	21.270
30	1870	Vietnam	Hanoi	21.35	21.352
31	1871	Vietnam	Hanoi	21.30	21.340
32	1872	Vietnam	Hanoi	21.47	21.352
33	1873	Vietnam	Hanoi	21.32	21.366
34	1874	Vietnam	Hanoi	21.40	21.324
...	...	...	...	...	...
144	1984	Vietnam	Hanoi	21.36	21.928
145	1985	Vietnam	Hanoi	21.46	21.784
146	1986	Vietnam	Hanoi	21.90	21.660
147	1987	Vietnam	Hanoi	22.71	21.628

	year	country_x	city	avg_temp	ma
148	1988	Vietnam	Hanoi	21.78	21.798
149	1989	Vietnam	Hanoi	21.72	21.842
150	1990	Vietnam	Hanoi	22.23	21.914
151	1991	Vietnam	Hanoi	22.16	22.068
152	1992	Vietnam	Hanoi	21.49	22.120
153	1993	Vietnam	Hanoi	21.75	21.876
154	1994	Vietnam	Hanoi	21.98	21.870
155	1995	Vietnam	Hanoi	21.51	21.922
156	1996	Vietnam	Hanoi	21.32	21.778
157	1997	Vietnam	Hanoi	21.92	21.610
158	1998	Vietnam	Hanoi	22.65	21.696
159	1999	Vietnam	Hanoi	22.07	21.876
160	2000	Vietnam	Hanoi	21.80	21.894
161	2001	Vietnam	Hanoi	21.79	21.952
162	2002	Vietnam	Hanoi	22.13	22.046
163	2003	Vietnam	Hanoi	22.62	22.088
164	2004	Vietnam	Hanoi	21.79	22.082
165	2005	Vietnam	Hanoi	21.91	22.026
166	2006	Vietnam	Hanoi	22.37	22.048
167	2007	Vietnam	Hanoi	22.26	22.164
168	2008	Vietnam	Hanoi	21.37	22.190
169	2009	Vietnam	Hanoi	22.59	21.940
170	2010	Vietnam	Hanoi	22.57	22.100
171	2011	Vietnam	Hanoi	21.03	22.232
172	2012	Vietnam	Hanoi	22.09	21.964
173	2013	Vietnam	Hanoi	23.10	21.930

169 rows × 5 columns

ear	country_x	city	avg_temp	MA
1825	Vietnam	Ho Chi Mi	27.11	
1839	Vietnam	Ho Chi Mi	26.69	
1840	Vietnam	Ho Chi Mi	26.63	
1841	Vietnam	Ho Chi Mi	27.02	
1842	Vietnam	Ho Chi Mi	26.87	
1843	Vietnam	Ho Chi Mi	26.94	26.864
1844	Vietnam	Ho Chi Mi	26.41	26.83
1845	Vietnam	Ho Chi Mi	26.12	26.774
1846	Vietnam	Ho Chi Mi	26.94	26.672
1847	Vietnam	Ho Chi Mi	26.41	26.656
1850	Vietnam	Ho Chi Mi	26.65	26.564
1851	Vietnam	Ho Chi Mi	26.82	26.506
1852	Vietnam	Ho Chi Mi	26.7	26.588
1853	Vietnam	Ho Chi Mi	26.87	26.704
1854	Vietnam	Ho Chi Mi	26.89	26.69
1855	Vietnam	Ho Chi Mi	26.76	26.786
1856	Vietnam	Ho Chi Mi	26.53	26.808
1857	Vietnam	Ho Chi Mi	26.51	26.75

5 year moving average

In [125]:

```
fav2=pd.read_csv("HCM.csv").dropna()
fav2
```

Out[125]:

Out[125]:

	year	country_x	city	avg_temp	MA
5	1843	Vietnam	Ho Chi Minh City	26.94	26.864
6	1844	Vietnam	Ho Chi Minh City	26.41	26.830
7	1845	Vietnam	Ho Chi Minh City	26.12	26.774
8	1846	Vietnam	Ho Chi Minh City	26.94	26.672
9	1847	Vietnam	Ho Chi Minh City	26.41	26.656
10	1850	Vietnam	Ho Chi Minh City	26.65	26.564
11	1851	Vietnam	Ho Chi Minh City	26.82	26.506
12	1852	Vietnam	Ho Chi Minh City	26.70	26.588
13	1853	Vietnam	Ho Chi Minh City	26.87	26.704
14	1854	Vietnam	Ho Chi Minh City	26.89	26.690
15	1855	Vietnam	Ho Chi Minh City	26.76	26.786
16	1856	Vietnam	Ho Chi Minh City	26.53	26.808
17	1857	Vietnam	Ho Chi Minh City	26.51	26.750
18	1858	Vietnam	Ho Chi Minh City	26.83	26.712
19	1859	Vietnam	Ho Chi Minh City	26.88	26.704
20	1860	Vietnam	Ho Chi Minh City	26.69	26.702
21	1861	Vietnam	Ho Chi Minh City	26.58	26.688
22	1862	Vietnam	Ho Chi Minh City	24.85	26.698
23	1863	Vietnam	Ho Chi Minh City	26.67	26.366
24	1864	Vietnam	Ho Chi Minh City	26.52	26.334
25	1865	Vietnam	Ho Chi Minh City	26.89	26.262
26	1866	Vietnam	Ho Chi Minh City	26.84	26.302
27	1867	Vietnam	Ho Chi Minh City	26.86	26.354
28	1868	Vietnam	Ho Chi Minh City	27.06	26.756
29	1869	Vietnam	Ho Chi Minh City	26.64	26.834
30	1870	Vietnam	Ho Chi Minh City	26.51	26.858
31	1871	Vietnam	Ho Chi Minh City	26.54	26.782
32	1872	Vietnam	Ho Chi Minh City	26.87	26.722
33	1873	Vietnam	Ho Chi Minh City	26.95	26.724
34	1874	Vietnam	Ho Chi Minh City	27.03	26.702
...	...	...	...	...	...
144	1984	Vietnam	Ho Chi Minh City	27.43	27.632
145	1985	Vietnam	Ho Chi Minh City	27.64	27.600
146	1986	Vietnam	Ho Chi Minh City	27.47	27.620
147	1987	Vietnam	Ho Chi Minh City	28.02	27.572
148	1988	Vietnam	Ho Chi Minh City	27.79	27.666
149	1989	Vietnam	Ho Chi Minh City	27.52	27.670
150	1990	Vietnam	Ho Chi Minh City	27.88	27.688
151	1991	Vietnam	Ho Chi Minh City	27.71	27.736
152	1992	Vietnam	Ho Chi Minh City	27.64	27.784
153	1993	Vietnam	Ho Chi Minh City	27.50	27.708
154	1994	Vietnam	Ho Chi Minh City	27.60	27.650
155	1995	Vietnam	Ho Chi Minh City	27.65	27.666
156	1996	Vietnam	Ho Chi Minh City	27.43	27.620
157	1997	Vietnam	Ho Chi Minh City	27.80	27.564
158	1998	Vietnam	Ho Chi Minh City	28.39	27.596
159	1999	Vietnam	Ho Chi Minh City	27.45	27.774
160	2000	Vietnam	Ho Chi Minh City	27.59	27.744

	year	country_x	city	avg_temp	MA
161	2001	Vietnam	Ho Chi Minh City	27.83	27.788
162	2002	Vietnam	Ho Chi Minh City	28.06	27.812
163	2003	Vietnam	Ho Chi Minh City	27.83	27.864
164	2004	Vietnam	Ho Chi Minh City	27.69	27.752
165	2005	Vietnam	Ho Chi Minh City	27.88	27.800
166	2006	Vietnam	Ho Chi Minh City	28.04	27.858
167	2007	Vietnam	Ho Chi Minh City	27.87	27.900
168	2008	Vietnam	Ho Chi Minh City	27.61	27.862
169	2009	Vietnam	Ho Chi Minh City	27.85	27.818
170	2010	Vietnam	Ho Chi Minh City	28.28	27.850
171	2011	Vietnam	Ho Chi Minh City	27.68	27.930
172	2012	Vietnam	Ho Chi Minh City	28.25	27.858
173	2013	Vietnam	Ho Chi Minh City	28.46	27.934

169 rows × 5 columns

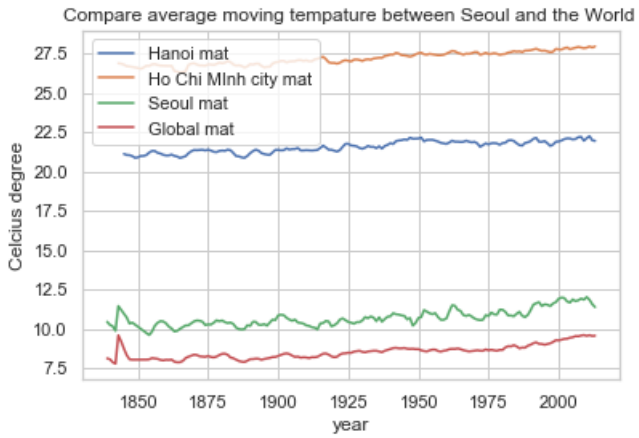
In [134]:

```
sns.lineplot(fav1["year"],fav1["ma"])
sns.lineplot(fav2["year"],fav2["MA"])
sns.lineplot(df_ma["year"],df_ma["Seoul_AM"])
sns.lineplot(df_ma["year"],df_ma["Global_AM"])

plt.legend(labels=["Hanoi mat ","Ho Chi MInh city mat","Seoul mat","Global mat"],loc="upper left")
plt.ylabel("Celcius degree")
plt.title("Compare average moving tempature between Seoul and the World ")
```

Out[134]:

```
Text(0.5, 1.0, 'Compare average moving tempature between Seoul and the World ')
```



Observation

my favorite city which are Hanoi and Ho Chi Minh city always have higher average moving temperature than the city I live ,the temperatures are going up but they are really slow compared to the world and Seoul