In [2]:

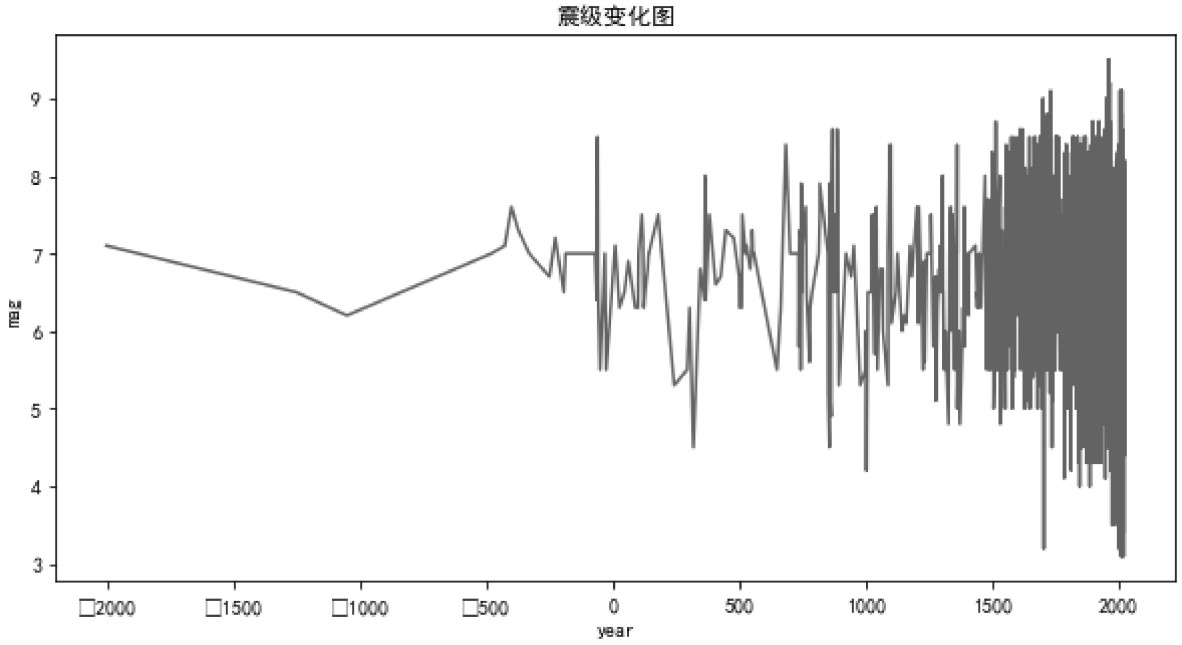
```
#1 这一题温晓然教我思路方法
import pandas as pd
import matplotlib.pyplot as plt

# 1.1 ------------------------------
# 将tsv文件读作Sig_Eqs对象
print("1.1 ------------------------------")
Sig_Eqs = pd.read_csv("earthquakes-2022-10-31_19-00-23_+0800.tsv", delimiter = '\t')

# 获取国家列和死亡人数列
cols = Sig_Eqs[['Country','Deaths']]
cols = cols.fillna(0) # 填补空值
val = cols.iloc[1:,:].values # 去掉第一行空行，返回数组

deaths = {} # 创建字典
for i in range(len(val)):
    country_name = val[i][0]
    deaths[country_name] = deaths.get(country_name, 0) + val[i][1]

# 以第1列（死亡总数）为依据排序
res = sorted(deaths.items(), key=lambda x: x[1],reverse=True)

# 输出前20
print('The top 20 countries:')
for i in range(20):
    print(i+1, '\t{0}\t{1}'.format(res[i][0],res[i][1]))

# 1.2 ------------------------------
print("1.2 ------------------------------")
colsYM = Sig_Eqs[['Year', 'Mag']]
colsYM = colsYM[colsYM['Mag'] > 3]
year = colsYM.iloc[1:,0].values
mag = colsYM.iloc[1:,1].values

fig=plt.figure(figsize=(10,5))
plt.rcParams['font.sans-serif'] = ['SimHei'] # 使图例显示为中文黑体
plt.plot(year,mag, ls='-')
plt.title('震级变化图')
plt.xlabel('year')
plt.ylabel('mag')
plt.show()
```

```
# 1.3 --------------------------------
# (1)给定国家自公元前2150年以来的地震总数
# (2)该国有史以来最大地震发生的日期和地点
print("1.3 -----------------------------")

cols3 = Sig_Eqs[['Country','Mag','Location Name','Year','Mo','Dy','Hr','Mn','Sec']]
cols3 = cols3.fillna(0)
val3 = cols3.iloc[1:, :].values

def CountEq_LargestEq(input):
    # 获取最大值
    c = 0
    location = ''
    date = ''
    num = 0
    for i in range(len(val3)):
        if val3[i][0] == input:
            if val3[i][1] > c:
                c = val3[i][1]
                location = val3[i][2]
                date = str(int(val3[i][3])) + "/" + str(int(val3[i][4])) + "/" + str(int(val3[i][5])) + " " + str(int(val3[i][6]))
                num = num + 1
    return num, date, location

country_nd = [] # 存储不重复的国家名
for i in range(len(val3)):
    if val3[i][0] in country_nd:
        continue
    else:
        country_nd.append(val3[i][0])

# 依次调用函数，传入所有国家
num = []
date = []
location = []

for c in country_nd:
    res_CL = CountEq_LargestEq(c)
    num.append(res_CL[0])
    date.append(res_CL[1])
    location.append(res_CL[2])

df3 = pd.DataFrame({'国家':country_nd, '地震总次数':num, '最大地震的日期':date, '最大地震的地点':location})
df3 = df3.sort_values(by=['地震总次数'],ascending=False)
```

```
# df3.to_csv("output.csv",index=False,encoding='GBK')
print(df3)
```

```
1.1 --------------------------------
The top 20 countries:
1       CHINA   2075019.0
2       TURKEY  1134569.0
3       IRAN    1011446.0
4       ITALY   498477.0
5       SYRIA   439224.0
6       HAITI   323474.0
7       AZERBAIJAN      317219.0
8       JAPAN   278142.0
9       ARMENIA 191890.0
10      PAKISTAN        145083.0
11      IRAQ    136200.0
12      ECUADOR 135479.0
13      TURKMENISTAN    117412.0
14      PERU    102219.0
15      ISRAEL  90388.0
16      PORTUGAL        83531.0
17      GREECE  79174.0
18      CHILE   64276.0
19      INDIA   63491.0
20      TAIWAN  57135.0
1.2 --------------------------------
```

```
C:\Users\dell\anaconda3\lib\site-packages\IPython\core\pylabtools.py:151: UserWarning: Glyph 8722 (\N{MINUS SIGN}) missing from cur
rent font.
  fig.canvas.print_figure(bytes_io, **kw)
```


震级变化图
mag
year
9
8
7
6
5
4
3
□2000
□1500
□1000
□500
0
500
1000
1500
2000

```
1.3 ----------------------------
                国家  地震总次数            最大地震的日期  \
5             ITALY     8  1915/1/13 6:52:38
68        INDONESIA     6  2004/12/26 0:58:53
72           TAIWAN     6   1920/6/5 4:21:28
73           CANADA     5   1949/8/22 4:1:12
8             INDIA     5  1950/8/15 14:9:30
..              ...   ...                ...
99         BARBADOS     0
96          GRENADA     0
50          IRELAND     0
91   CANARY ISLANDS     0
113     MONTSERRAT     0

                                      最大地震的地点
5             ITALY:  MARSICA, AVEZZANO, ABRUZZI
68   INDONESIA:  SUMATRA:  ACEH:  OFF WEST COAST
72                                        TAIWAN
73              CANADA:  QUEEN CHARLOTTE ISLANDS
8                                    INDIA-CHINA
..                                           ...
99
96
50
91
113

[157 rows x 4 columns]
```

In [ ]:

In [10]:
```
#2
import matplotlib.pyplot as plt
import pandas as pd

df = pd.read_csv('Baoan_Weather_1998_2022.csv')
df=df[['DATE','TMP']]
df = df.astype({'TMP':'string'})
df=df[df['TMP'].str.contains(',')]
a = []
for i in df['TMP']:
    j = i.split(',', 1)
    a.append(int(j[0])/10)
```

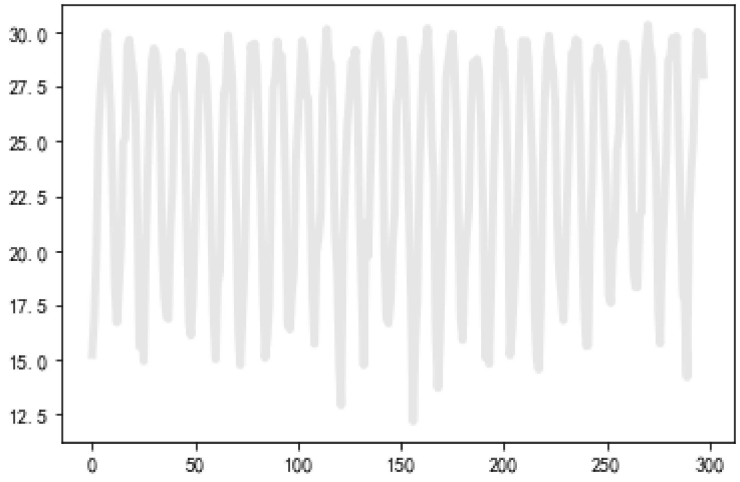
```
df['DATE'] = pd.to_datetime(df['DATE'])
df['TMP'] = a
print(df['TMP'])
df=df[(df['TMP'].between(-70,70,'both'))]  #一位网友教我数据筛选
df1= df.set_index(df['DATE'],drop=True)         #设置日期为索引,并删除原来的日期列
df_m=df1.resample('M').mean().to_period('M')
print(df_m)

#绘图命令
plt.plot(range(len(df_m)), df_m['TMP'], lw=4, ls='-', c='b', alpha=0.1)
plt.plot()
#show出图形
plt.show()
```

```
C:\Users\dell\AppData\Local\Temp\ipykernel_16628\3554481891.py:5: DtypeWarning: Columns (4,8,9,10,11,14,15,24,25,27,29,31,34,37,38,40,41,45,49,50) have mixed types. Specify dtype option on import or set low_memory=False.
  df = pd.read_csv('Baoan_Weather_1998_2022.csv')
```

```
0         18.6
1         22.0
2         24.0
3         22.1
4         24.0
          ...
235669    21.0
235670    20.1
235671    20.0
235672    20.0
235673    20.0
Name: TMP, Length: 235674, dtype: float64
```

DATE	TMP
1998-01	15.233447
1998-02	16.875304
1998-03	19.971246
1998-04	25.228365
1998-05	27.098454
...	...
2022-06	27.971803
2022-07	30.005550
2022-08	28.919057
2022-09	29.866772
2022-10	28.035110

[298 rows x 1 columns]

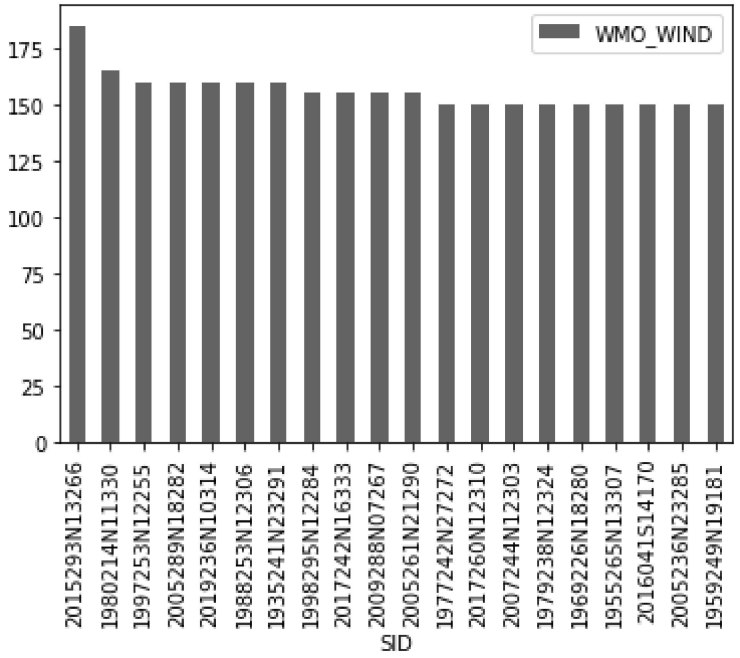


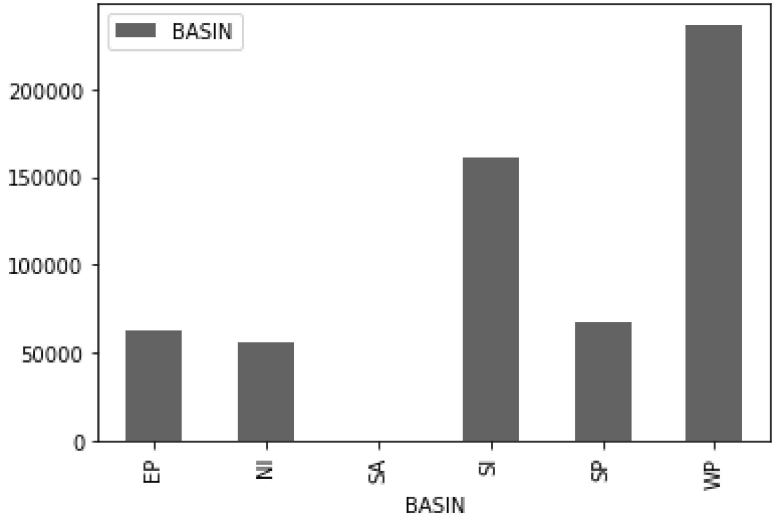
In [ ]:

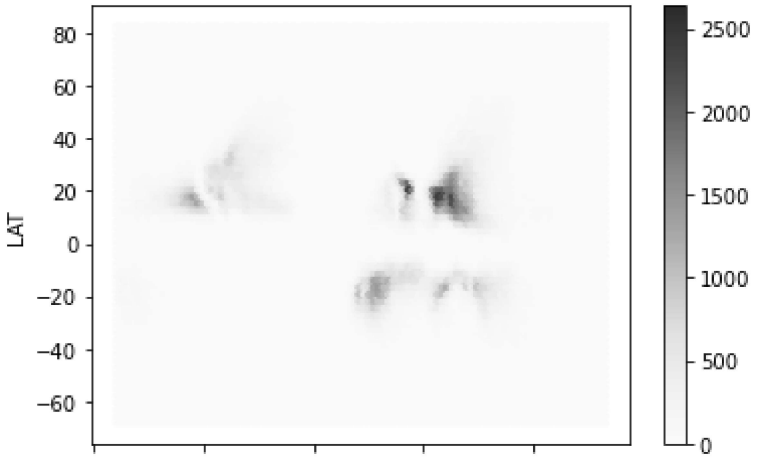
In [8]:
```
#3.1  网友卢弘毅教我这题主要思路，函数定义。
import pandas as pd
df = pd.read_csv('ibtracs.ALL.list.v04r00.csv',
                 usecols=range(17),
                 skiprows=[1, 2],
                 parse_dates=['ISO_TIME'],
                 na_values=['NOT_NAMED', 'NAME'])
df.head()
wind = df['WMO_WIND'].fillna(0)
wind[wind==' ']=0
wind[wind!=0]
df['WMO_WIND']=wind
df['WMO_WIND']=pd.to_numeric(df['WMO_WIND'])
gdf = df.groupby('SID').agg({'WMO_WIND':'max'}).sort_values(by='WMO_WIND',ascending=False)
gdf.head(10)
#3.2
plot_df = df.groupby('SID').agg({'WMO_WIND':'max'}).sort_values(by='WMO_WIND',ascending=False).head(20)
plot_df.plot.bar()
#3.3
df.groupby("BASIN").agg({'BASIN':'count'}).plot.bar()
#3.4
df.plot.hexbin(x="LON",y='LAT',C=None)
```

```
C:\Users\dell\AppData\Local\Temp\ipykernel_14236\2752024157.py:3: DtypeWarning: Columns (5) have mixed types. Specify dtype option on import or set low_memory=False.
  df = pd.read_csv('ibtracs.ALL.list.v04r00.csv',
```

Out[8]:
```
<AxesSubplot:xlabel='LON', ylabel='LAT'>
```

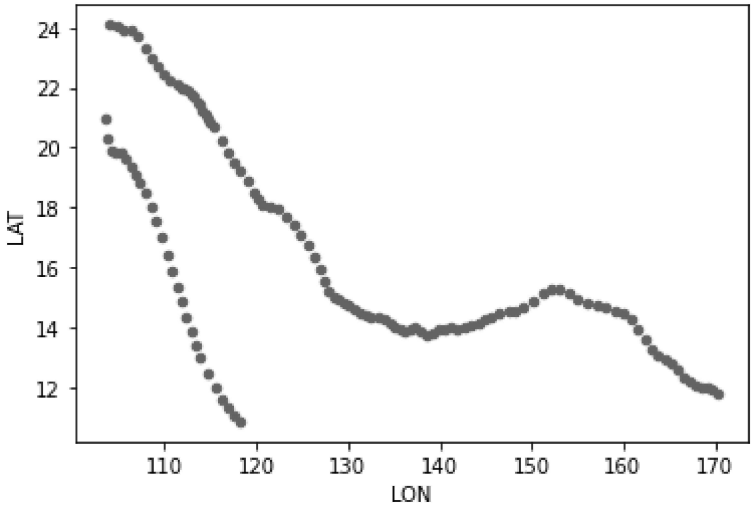

WMO_WIND
175
150
125
100
75
50
25
0
2015293N13266
1980214N11330
1997253N12255
2005289N18282
2019236N10314
1988253N12306
1935241N23291
1998295N12284
2017242N16333
2009288N07267
2005261N21290
1977242N27272
2017260N12310
2007244N12303
1979238N12324
1969226N18280
1955265N13307
2016041S14170
2005236N23285
1959249N19181
SID


BASIN
200000
150000
100000
50000
0
EP
NI
SA
SI
SP
WP
BASIN



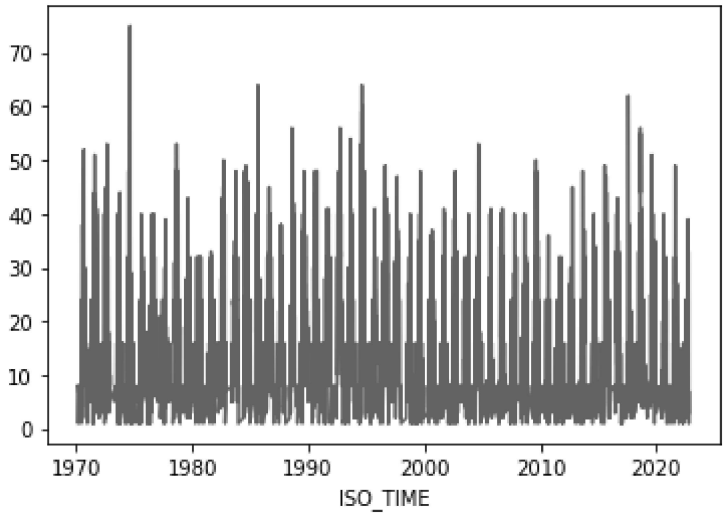
In [9]:
```
#3.5
df[df['NAME']=='MANGKHUT'].plot.scatter(x="LON",y="LAT")
```

Out[9]: <AxesSubplot:xlabel='LON', ylabel='LAT'>



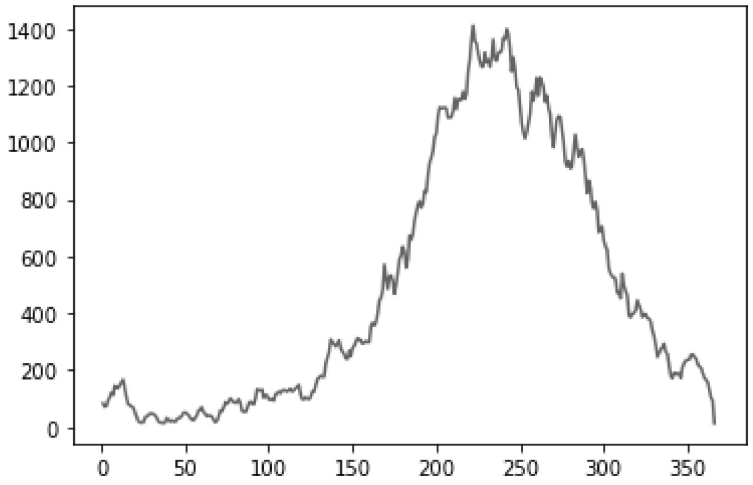
In [14]:
```
#3.6 3.7
df = df[((df['BASIN']=='WP') | (df['BASIN']=='EP')) & (df['SEASON']>=1970)]
df.head()
df.groupby([df['ISO_TIME'].dt.date]).count()['NUMBER'].plot()
```

Out[14]: <AxesSubplot:xlabel='ISO_TIME'>



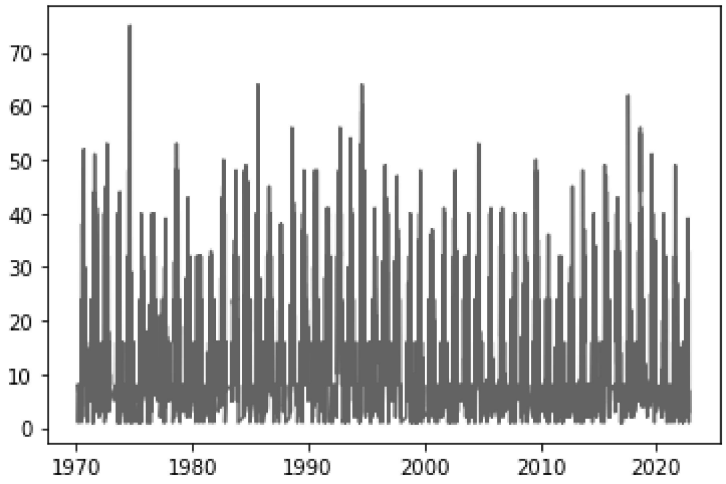
In [15]:
```
# 3.8
#没理解题目，洪悦告诉我day of year指的是这一天是在一年中的第几天，
#所以3这题是先归并计算一年中某一天历史上所有数据记录的总数，然后再进行气候分析
import matplotlib.pyplot as plt
df["DAY_OF_YEAR"] = df["ISO_TIME"].dt.day_of_year
data_point_counts = df.groupby(["DAY_OF_YEAR"]).size()
plt.plot(data_point_counts)
# Then alaysis the climatology of data_point_counts
```

Out[15]: [<matplotlib.lines.Line2D at 0x1eeabf04490>]



In [16]:
```
#3.9
# Data from climatology??感觉是统计历史线上每一天的数据，然后套专业公式计算异常值，按date归并（洪悦指导）
df["DATE"] = df["ISO_TIME"].dt.date
daily_counts = df.groupby(["DATE"]).size()
plt.plot(daily_counts)
# Then analysis anomaly
```

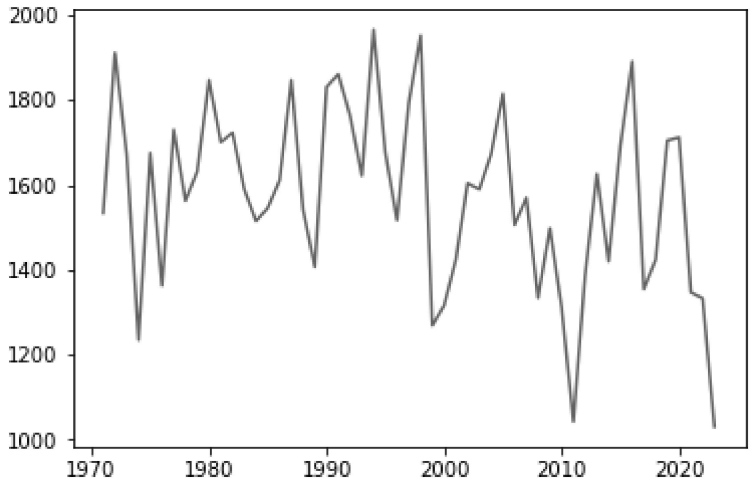
Out[16]:
```
[<matplotlib.lines.Line2D at 0x1eeabd24f70>]
```



In [17]:
```
# 3.10
# Data from anomaly 洪悦告诉我用resample('Y')
```

```
daily_counts = df.groupby(["ISO_TIME"]).size()
sampling_data = daily_counts.resample('Y').size()
plt.plot(sampling_data)
```

Out[17]: [<matplotlib.lines.Line2D at 0x1eea3c46fd0>]



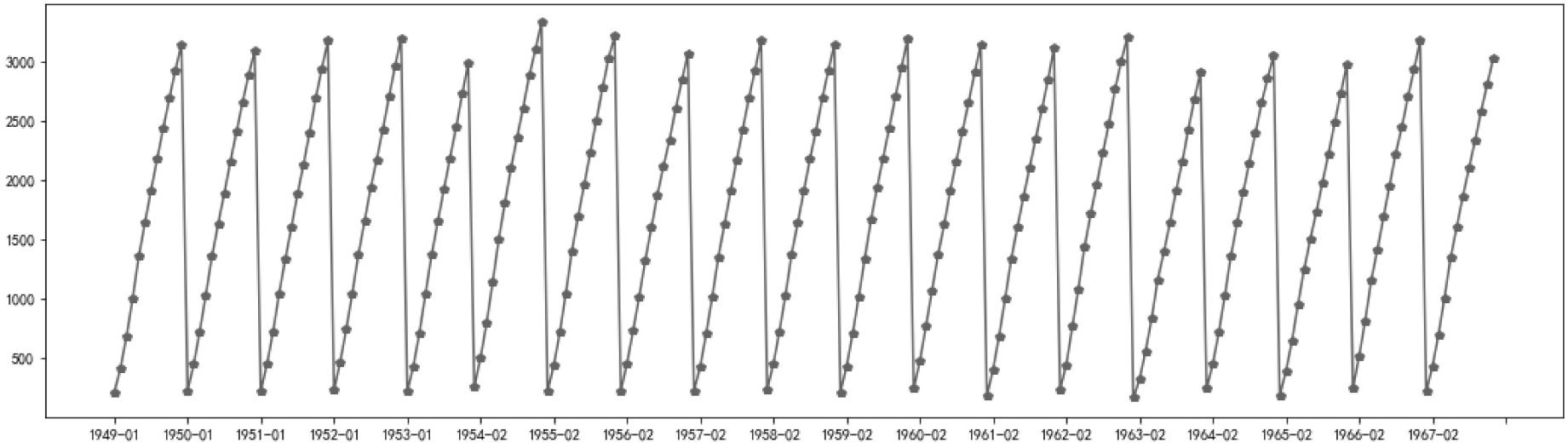
In [ ]:

In [11]:
```
#4 选择了一个数据关于Number days with greater than 0.91 inch(0.25mm)of precipitation
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import matplotlib.ticker as ticker

# 4.1
def get_data():
    file = pd.read_csv('RPW00041207.csv')
    file = np.array(file)
    # print(file.shape)

    bool = pd.notnull(file)

    new_file = []
    for index, line_bool in enumerate(bool):
        # print(sum(line_bool[:26]))
        if sum(line_bool[:26]) >= 26:
            new_file.append(file[index, :])
```

```
    return np.array(new_file)

# 4.2
def huitu(file):
    x = file[:, 1]
    y = file[:, 6]
    fig = plt.figure(figsize=(18, 5))

    plt.plot(x, y, 'p-')
    plt.gca().xaxis.set_major_locator(ticker.MultipleLocator(12))
    plt.show()

 # 4.3
def T_attributes():
    file = pd.read_csv('RPW00041207.csv')
    file = np.array(file)
    length = file.shape[0]

    useful_data = file[:, 1].reshape(length, 1)
    for i in [52, 54, 56]:
        useful_data = np.hstack((useful_data, file[:, i].reshape(length, 1)))

    date = []
    for i in useful_data[:, 0]:
        data = i.split('-')
        date.append(data)
    date = np.array(date)
    # print(date)

    years = np.unique(date[:, 0])

    highest_month_max_t = {}  # 每年的最大月最高气温
    for y in years:
        for idx, i in enumerate(date):
            if i[0] == y:
                if y not in highest_month_max_t.keys():
                    highest_month_max_t[y] = -10000

                t = float(useful_data[idx, 2])
                if t > highest_month_max_t[y]:
                    highest_month_max_t[y] = t

    lowest_month_min_t = {}  # 每年的最小月最低气温
```

```
for y in years:
    for idx, i in enumerate(date):
        if i[0] == y:
            if y not in lowest_month_min_t.keys():
                lowest_month_min_t[y] = 10000

            t = float(useful_data[idx, 3])
            if t < lowest_month_min_t[y]:
                lowest_month_min_t[y] = t

max_month_ave_t = {}  # 每年的最大月平均气温
for y in years:
    for idx, i in enumerate(date):
        if i[0] == y:
            if y not in max_month_ave_t.keys():
                max_month_ave_t[y] = -10000

            t = float(useful_data[idx, 1])
            if t > max_month_ave_t[y]:
                max_month_ave_t[y] = t

min_month_ave_t = {}  # 每年的最小月平均气温
for y in years:
    for idx, i in enumerate(date):
        if i[0] == y:
            if y not in min_month_ave_t.keys():
                min_month_ave_t[y] = 10000

            t = float(useful_data[idx, 1])
            if t < min_month_ave_t[y]:
                min_month_ave_t[y] = t

year_ave_t = {}  # 年平均气温
for y in years:
    sum = 0
    month = 0
    for idx, i in enumerate(date):
        if i[0] == y:
            if y not in year_ave_t.keys():
                year_ave_t[y] = 0
            t = float(useful_data[idx, 1])
            sum += t
            month += 1
    year_ave_t[y] = round(sum / month, 3)
```

```
    return highest_month_max_t, lowest_month_min_t, max_month_ave_t, min_month_ave_t, year_ave_t


if __name__ == '__main__':
    file = get_data()
    huitu(file)

    p1, p2, p3, p4, p5 = T_attributes()
    print('统计以下变量信息:')
    print("每年的最大月最高气温:{}".format(p1))
    print("每年的最小月最低气温:{}".format(p2))
    print("每年的最大月平均气温:{}".format(p3))
    print("每年的最小月平均气温:{}".format(p4))
    print("年平均气温:{}".format(p5))

#每年温度最高值在1949-1967年之间波动变化，年平均气温波动幅度不大，较为稳定。
```



统计以下变量信息:
每年的最大月最高气温:{'1949': 35.11, '1950': 34.11, '1951': 34.59, '1952': 34.38, '1953': 34.76, '1954': 35.24, '1955': 34.82, '1956': 32.11, '1957': 34.22, '1958': 33.86, '1959': 33.93, '1960': 32.83, '1961': 33.5, '1962': 34.38, '1963': 33.81, '1964': 33.92, '1965': 33.65, '1966': 34.48, '1967': 33.99}
每年的最小月最低气温:{'1949': 20.0, '1950': 20.21, '1951': 20.54, '1952': 20.97, '1953': 20.25, '1954': 21.52, '1955': 20.45, '1956': 21.46, '1957': 21.02, '1958': 21.53, '1959': 20.98, '1960': 21.88, '1961': 19.93, '1962': 20.67, '1963': 19.33, '1964': 20.54, '1965': 19.55, '1966': 21.78, '1967': 21.11}
每年的最大月平均气温:{'1949': 29.75, '1950': 28.87, '1951': 29.05, '1952': 29.01, '1953': 29.43, '1954': 29.92, '1955': 29.83, '1956': 28.12, '1957': 29.14, '1958': 29.42, '1959': 29.32, '1960': 28.76, '1961': 28.98, '1962': 29.7, '1963': 29.0, '1964': 29.28, '1965': 28.67, '1966': 29.69, '1967': 29.36}
每年的最小月平均气温:{'1949': 25.02, '1950': 24.88, '1951': 25.49, '1952': 25.71, '1953': 25.2, '1954': 25.62, '1955': 24.34, '1956': 25.25, '1957': 25.36, '1958': 25.59, '1959': 25.07, '1960': 25.78, '1961': 24.11, '1962': 25.02, '1963': 23.46, '1964': 24.56, '1965': 24.14, '1966': 25.74, '1967': 25.32}
年平均气温:{'1949': 26.927, '1950': 26.811, '1951': 27.038, '1952': 27.055, '1953': nan, '1954': 27.439, '1955': 27.124, '1956': 26.714, '1957': 27.038, '1958': 26.931, '1959': 27.085, '1960': 26.974, '1961': 26.854, '1962': 27.118, '1963': 26.273, '1964': 26.651, '1965': 26.477, '1966': 27.055, '1967': 26.605}

In [ ]: