Lab 7 demo

In [1]:
```
# Install package for obtaining USGS streamflow data
!pip install -U dataretrieval
```

```
Requirement already satisfied: dataretrieval in /Library/Frameworks/Python.f
ramework/Versions/3.9/lib/python3.9/site-packages (0.7)
Requirement already satisfied: pandas in /Library/Frameworks/Python.framewor
k/Versions/3.9/lib/python3.9/site-packages (from dataretrieval) (1.4.1)
Requirement already satisfied: requests in /Library/Frameworks/Python.framew
ork/Versions/3.9/lib/python3.9/site-packages (from dataretrieval) (2.25.0)
Requirement already satisfied: numpy>=1.18.5 in /Library/Frameworks/Python.f
ramework/Versions/3.9/lib/python3.9/site-packages (from pandas->dataretrieva
l) (1.22.2)
Requirement already satisfied: python-dateutil>=2.8.1 in /Library/Frameworks
/Python.framework/Versions/3.9/lib/python3.9/site-packages (from pandas->dat
aretrieval) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /Library/Frameworks/Python.fr
amework/Versions/3.9/lib/python3.9/site-packages (from pandas->dataretrieval
) (2021.3)
Requirement already satisfied: chardet<4,>=3.0.2 in /Library/Frameworks/Pyth
on.framework/Versions/3.9/lib/python3.9/site-packages (from requests->datare
trieval) (3.0.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /Library/Frameworks/
Python.framework/Versions/3.9/lib/python3.9/site-packages (from requests->da
taretrieval) (1.26.2)
Requirement already satisfied: certifi>=2017.4.17 in /Library/Frameworks/Pyt
hon.framework/Versions/3.9/lib/python3.9/site-packages (from requests->datar
etrieval) (2020.11.8)
Requirement already satisfied: idna<3,>=2.5 in /Library/Frameworks/Python.fr
amework/Versions/3.9/lib/python3.9/site-packages (from requests->dataretriev
al) (2.10)
Requirement already satisfied: six>=1.5 in /Library/Frameworks/Python.framew
ork/Versions/3.9/lib/python3.9/site-packages (from python-dateutil>=2.8.1->p
andas->dataretrieval) (1.16.0)
```

In [2]:
```
# Import the functions for downloading data from NWIS
import dataretrieval.nwis as nwis

# Specify the USGS site code
site = '03339000'

# Get instantaneous values (iv)
df = nwis.get_record(sites=site, service='dv', start='2020-10-01', end='2021
df
```

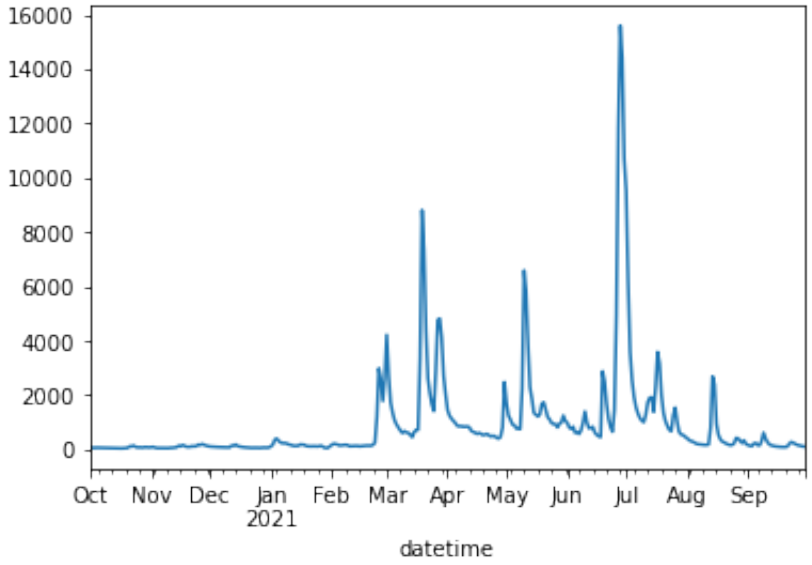
Out[2]:

datetime	00010_Mean	00010_Mean_cd	site_no	00060_Mean	00060_Mean_cd	0
2020-10-01 00:00:00+00:00	14.9	A	03339000	75.7	A	
2020-10-02 00:00:00+00:00	14.5	A	03339000	66.0	A	
2020-10-03 00:00:00+00:00	14.2	A	03339000	60.2	A	
2020-10-04 00:00:00+00:00	14.4	A	03339000	68.8	A	
2020-10-05 00:00:00+00:00	13.4	A	03339000	66.8	A	
...	...	...	...	...	...	
2021-09-26 00:00:00+00:00	18.7	A	03339000	174.0	A	
2021-09-27 00:00:00+00:00	20.2	A	03339000	155.0	A	
2021-09-28 00:00:00+00:00	21.6	A	03339000	132.0	A	
2021-09-29 00:00:00+00:00	22.3	A	03339000	117.0	A	
2021-09-30 00:00:00+00:00	22.6	A	03339000	111.0	A	

365 rows × 41 columns

In [3]:
```
# Simple plot
df['00060_Mean'].plot()
```

Out[3]:
```
<AxesSubplot:xlabel='datetime'>
```



Question 1

In [4]:
```
# Specify the USGS site code (USGS 14211720 WILLAMETTE RIVER AT PORTLAND, OR
site = '14211720'

# Get instantaneous values (iv)
df_portland = nwis.get_record(sites=site, service='dv', start='2019-01-02',
df_portland
```

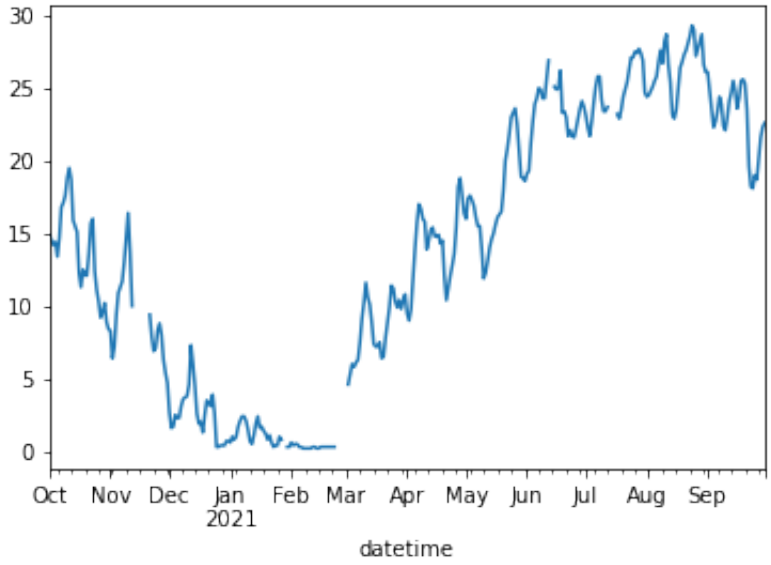
Out[4]:

datetime	00010_Maximum	00010_Maximum_cd	site_no	00010_Minimum	00010_M
2019-01-02 00:00:00+00:00	7.1	A	14211720	6.4	
2019-01-03 00:00:00+00:00	6.4	A	14211720	6.0	
2019-01-04 00:00:00+00:00	6.0	A	14211720	5.9	
2019-01-05 00:00:00+00:00	6.3	A	14211720	5.9	
2019-01-06 00:00:00+00:00	6.6	A	14211720	6.3	
...	...	...	...	...	
2021-07-24 00:00:00+00:00	24.1	A	14211720	23.5	
2021-07-25 00:00:00+00:00	24.1	A	14211720	23.4	
2021-07-26 00:00:00+00:00	24.1	A	14211720	23.5	
2021-07-27 00:00:00+00:00	24.4	A	14211720	23.6	
2021-07-28 00:00:00+00:00	24.5	A	14211720	23.8	

939 rows × 47 columns

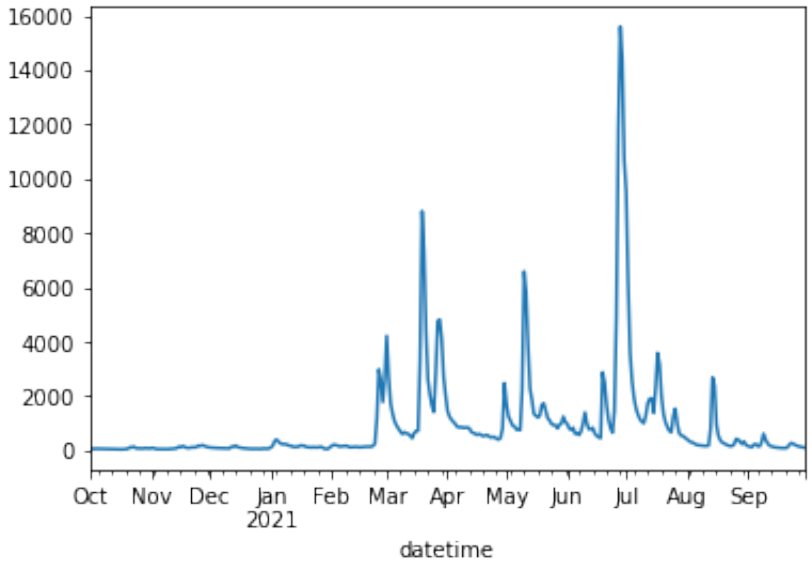
In [5]:
```
# Simple plot (Temperature, water, degrees Celsius)
# https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=1421172
df['00010_Mean'].plot()
```

Out[5]:
```
<AxesSubplot:xlabel='datetime'>
```



In [6]:
```
# Simple plot ()
# https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=1421172
df['00060_Mean'].plot()
```

Out[6]: <AxesSubplot:xlabel='datetime'>



Question 2: HTML tables

In [7]:
```
# Specify the USGS site code (USGS 14211720 WILLAMETTE RIVER AT PORTLAND, OR
site = '14211720'

# Get instantaneous values (iv)
# Date Oct 31, 2020 and Sep 30, 2021
df_portland = nwis.get_record(sites=site, service='dv', start='2021-09-30',
df_portland
```

Out[7]:

datetime	00010_Maximum	00010_Maximum_cd	site_no	00010_Minimum	00010_M
2021-09-30 00:00:00+00:00	17.2	P	14211720	17.1	
2021-10-01 00:00:00+00:00	17.2	P	14211720	16.8	
2021-10-02 00:00:00+00:00	16.8	P	14211720	16.5	
2021-10-03 00:00:00+00:00	16.5	P	14211720	16.0	
2021-10-04 00:00:00+00:00	16.0	P	14211720	15.7	
2021-10-05 00:00:00+00:00	15.9	P	14211720	15.5	
2021-10-06 00:00:00+00:00	15.5	P	14211720	15.3	
2021-10-07 00:00:00+00:00	15.4	P	14211720	15.1	
2021-10-08 00:00:00+00:00	15.1	P	14211720	15.0	
2021-10-09 00:00:00+00:00	15.0	P	14211720	14.8	
2021-10-10 00:00:00+00:00	14.8	P	14211720	14.4	
2021-10-11 00:00:00+00:00	14.4	P	14211720	14.0	
2021-10-12 00:00:00+00:00	14.0	P	14211720	13.6	
2021-10-13 00:00:00+00:00	13.6	P	14211720	13.3	
2021-10-14 00:00:00+00:00	13.3	P	14211720	13.2	
2021-10-15 00:00:00+00:00	13.5	P	14211720	13.1	

2021-10-16 00:00:00+00:00	13.4	P	14211720	13.1
2021-10-17 00:00:00+00:00	13.3	P	14211720	13.0
2021-10-18 00:00:00+00:00	13.1	P	14211720	12.8
2021-10-19 00:00:00+00:00	12.9	P, [4]	14211720	12.8
2021-10-20 00:00:00+00:00	13.1	P	14211720	12.9
2021-10-21 00:00:00+00:00	13.2	P	14211720	13.0
2021-10-22 00:00:00+00:00	13.4	P	14211720	13.2
2021-10-23 00:00:00+00:00	13.3	P	14211720	13.2
2021-10-24 00:00:00+00:00	13.2	P	14211720	12.8
2021-10-25 00:00:00+00:00	12.8	P	14211720	12.4
2021-10-26 00:00:00+00:00	12.4	P	14211720	12.3
2021-10-27 00:00:00+00:00	12.4	P	14211720	12.1
2021-10-28 00:00:00+00:00	12.1	P	14211720	11.9
2021-10-29 00:00:00+00:00	12.1	P	14211720	11.9
2021-10-30 00:00:00+00:00	12.0	P	14211720	11.7
2021-10-31 00:00:00+00:00	12.0	P	14211720	11.7

32 rows × 47 columns

In [8]:
```
# Calculate Mean for Portland
df_portland['00060_Mean'].mean()
```

Out[8]:
```
13064.193548387097
```

In [9]:
```
# Specify the USGS site code (USGS 14211720 WILLAMETTE RIVER AT PORTLAND, OR
site = '14163900'

# Get instantaneous values (iv)
# Date Oct 31, 2020 and Sep 30, 2021
df_Walterville = nwis.get_record(sites=site, service='dv', start='2021-09-30
df_Walterville
```

Out[9]:

datetime	00010_Maximum	00010_Maximum_cd	site_no	00010_exo wq monitor_Maximum	monito
2021-09-30 00:00:00+00:00	11.8	P	14163900	11.8	
2021-10-01 00:00:00+00:00	13.0	P	14163900	13.1	
2021-10-02 00:00:00+00:00	12.9	P	14163900	12.9	
2021-10-03 00:00:00+00:00	12.6	P	14163900	12.7	
2021-10-04 00:00:00+00:00	12.0	P	14163900	12.0	
2021-10-05 00:00:00+00:00	11.2	P	14163900	11.2	
2021-10-06 00:00:00+00:00	11.8	P	14163900	11.9	
2021-10-07 00:00:00+00:00	11.1	P	14163900	11.1	
2021-10-08 00:00:00+00:00	10.7	P	14163900	10.7	
2021-10-09 00:00:00+00:00	11.2	P	14163900	11.2	
2021-10-10 00:00:00+00:00	11.3	P	14163900	11.3	
2021-10-11 00:00:00+00:00	10.9	P	14163900	10.9	
2021-10-12 00:00:00+00:00	9.7	P	14163900	9.8	
2021-10-13 00:00:00+00:00	10.2	P	14163900	10.3	
2021-10-14 00:00:00+00:00	10.8	P	14163900	10.8	
2021-10-15					

00:00:00+00:00	11.0	P	14163900	11.0
2021-10-16 00:00:00+00:00	11.0	P	14163900	11.1
2021-10-17 00:00:00+00:00	10.4	P	14163900	10.4
2021-10-18 00:00:00+00:00	10.5	P	14163900	10.5
2021-10-19 00:00:00+00:00	10.6	P	14163900	10.7
2021-10-20 00:00:00+00:00	10.8	P	14163900	10.8
2021-10-21 00:00:00+00:00	10.7	P	14163900	10.6
2021-10-22 00:00:00+00:00	10.7	P	14163900	10.7
2021-10-23 00:00:00+00:00	11.1	P	14163900	11.2
2021-10-24 00:00:00+00:00	11.3	P	14163900	11.3
2021-10-25 00:00:00+00:00	10.7	P	14163900	10.7
2021-10-26 00:00:00+00:00	10.6	P	14163900	10.6
2021-10-27 00:00:00+00:00	10.8	P	14163900	10.8
2021-10-28 00:00:00+00:00	11.3	P	14163900	11.3
2021-10-29 00:00:00+00:00	11.4	P	14163900	11.4
2021-10-30 00:00:00+00:00	10.9	P	14163900	10.9
2021-10-31 00:00:00+00:00	10.2	P	14163900	10.2

32 rows × 57 columns

In [10]:
```
# Calculate Mean for Walterville
df_Walterville['00060_Mean'].mean()
```

Out[10]:
```
1566.25
```

In [11]:
```
# Specify the USGS site code (USGS 14211720 WILLAMETTE RIVER AT PORTLAND, OR
site = '12422500'

# Get instantaneous values (iv)
# Date Oct 31, 2020 and Sep 30, 2021
df_Spokane = nwis.get_record(sites=site, service='dv', start='2021-09-30', e
df_Spokane
```

Out[11]:

datetime	00060_Mean	00060_Mean_cd	site_no	00065_Mean	00065_Mean_cd
2021-09-30 00:00:00+00:00	1170.0	P	12422500	17.67	P
2021-10-01 00:00:00+00:00	1190.0	P	12422500	17.69	P
2021-10-02 00:00:00+00:00	1190.0	P	12422500	17.68	P
2021-10-03 00:00:00+00:00	1180.0	P	12422500	17.68	P
2021-10-04 00:00:00+00:00	1260.0	P	12422500	17.75	P
2021-10-05 00:00:00+00:00	1450.0	P	12422500	17.92	P
2021-10-06 00:00:00+00:00	1460.0	P	12422500	17.94	P
2021-10-07 00:00:00+00:00	1480.0	P	12422500	17.95	P
2021-10-08 00:00:00+00:00	1500.0	P	12422500	17.97	P
2021-10-09 00:00:00+00:00	1510.0	P	12422500	17.98	P
2021-10-10 00:00:00+00:00	1520.0	P	12422500	17.99	P
2021-10-11 00:00:00+00:00	1560.0	P	12422500	18.01	P
2021-10-12 00:00:00+00:00	1560.0	P	12422500	18.02	P
2021-10-13 00:00:00+00:00	1580.0	P	12422500	18.03	P
2021-10-14 00:00:00+00:00	1600.0	P	12422500	18.05	P
2021-10-15 00:00:00+00:00	1590.0	P	12422500	18.04	P

2021-10-16 00:00:00+00:00	1600.0	P	12422500	18.05	P
2021-10-17 00:00:00+00:00	1600.0	P	12422500	18.05	P
2021-10-18 00:00:00+00:00	1600.0	P	12422500	18.05	P
2021-10-19 00:00:00+00:00	1620.0	P	12422500	18.07	P
2021-10-20 00:00:00+00:00	1690.0	P	12422500	18.12	P
2021-10-21 00:00:00+00:00	2020.0	P	12422500	18.36	P
2021-10-22 00:00:00+00:00	2080.0	P	12422500	18.40	P
2021-10-23 00:00:00+00:00	2120.0	P	12422500	18.42	P
2021-10-24 00:00:00+00:00	2130.0	P	12422500	18.44	P
2021-10-25 00:00:00+00:00	2170.0	P	12422500	18.46	P
2021-10-26 00:00:00+00:00	2200.0	P	12422500	18.48	P
2021-10-27 00:00:00+00:00	2180.0	P	12422500	18.47	P
2021-10-28 00:00:00+00:00	2210.0	P	12422500	18.48	P
2021-10-29 00:00:00+00:00	2250.0	P	12422500	18.51	P
2021-10-30 00:00:00+00:00	2210.0	P	12422500	18.49	P
2021-10-31 00:00:00+00:00	2250.0	P	12422500	18.51	P

In [12]:
```
# Calculate Mean for Spokane
df_Spokane['00060_Mean'].mean()
```

Out[12]:
```
1710.3125
```

In [13]:
```
# Website for mean value
#https://waterdata.usgs.gov/nwis/dv?cb_00060=on&format=gif_stats&site_no=142
```

HTML Table

Site Name	Site Number	Mean Daily Discharge
Willamette River, Portland, Oregon	14211720	13064
McKenzie River near Walterville, Oregon	14163900	1566
Spokane River at Spokane, Washington	12422500	1710

In [14]:
```
# Import packages
import numpy as np
import pandas as pd
import folium
```

In [15]:
```
# Read HTML table data
mountains = pd.read_html('https://en.wikipedia.org/wiki/List_of_mountain_pea
mountains
```

Out[15]:
```
[                                                    0
 0  Map this section's coordinates using: OpenStre...
 1                      Download coordinates as: KML,
     Rank                              Mountain peak         Mountain range  \
 0      1                Mount Hood[6][7][8][9][a]          Cascade Range
 1      2      Mount Jefferson[10][11][12][13][b]          Cascade Range
 2      3            South Sister[14][15][16][17]          Cascade Range
 3      4         North Sister[18][19][20][21][c]          Cascade Range
 4      5        Middle Sister[22][23][24][25][d]          Cascade Range
 5      6        Sacajawea Peak[26][27][28][e][f]      Wallowa Mountains
 6      7          Steens Mountain[29][30][31][g]        Steens Mountain
 7      8        Aneroid Mountain[32][33][34][35]      Wallowa Mountains
 8      9               Twin Peaks[36][37][38][h]      Wallowa Mountains
 9     10            Red Mountain[39][40][41][42]      Wallowa Mountains
 10    11  Mount McLoughlin[43][44][45][46][i][j]          Cascade Range
 11    12             Elkhorn Peak[47][48][49][k]      Wallowa Mountains
 12    13          Mount Thielsen[50][51][52][53]          Cascade Range
 13    14               Broken Top[54][55][56][l]          Cascade Range
 14    15         Rock Creek Butte[57][58][59][m]      Elkhorn Mountains
 15    16          Mount Bachelor[60][61][62][63]          Cascade Range
 16    17  Strawberry Mountain[64][65][66][67][n]       Strawberry Range
 17    18             Mount Scott[68][69][70][71]          Cascade Range
 18    19            Diamond Peak[72][73][74][75]          Cascade Range
 19    20      Pueblo Mountain[76][77][78][79][o]       Pueblo Mountains
 20    21          Crane Mountain[80][81][82][83]       Warner Mountains
 21    22           Drake Peak[84][85][86][87][p]       Warner Mountains
 22    23         Mount Bailey[88][89][90][91][q]          Cascade Range
 23    24       Gearhart Mountain[92][93][94][95]      Gearhart Mountain
 24    25             Aspen Butte[96][97][98][99]          Cascade Range
 25    26     Yamsay Mountain[100][101][102][103]  Cascade Volcanic Arc
 26    27     Vinegar Hill[104][105][106][107][r]    Greenhorn Mountains
```

27	28	Pelican Butte[108][109][110][111]	Cascade Range
28	29	Lookout Mountain[112][113][114][s]	Strawberry Range
29	30	Warner Peak[115][116][117][118][t]	Hart Mountain
30	31	Paulina Peak[119][120][121][122][u]	Paulina Mountains

	Elevation	Prominence	Isolation
0	3428.8 m	2349 m	92.2 km
1	3201 m	1767 m	77.5 km
2	3158.5 m	1705 m	63.4 km
3	3075 m	837 m	7 km
4	3064 m	382 m	1.8 km
5	3000 m	1949 m	202 km
6	2968 m	1336 m	201 km
7	2958.7 m	647 m	9.48 km
8	2950 m	610 m	7.79 km
9	2913.8 m	610 m	11.84 km
10	2895 m	1364 m	111.8 km
11	2816 m	567 m	5.32 km
12	2799.4 m	1025 m	81.1 km
13	2798 m	669 m	5.52 km
14	2777 m	1364 m	69.9 km
15	2764 m	818 m	11.02 km
16	2756.1 m	1253 m	74.2 km
17	2722.9 m	920 m	25.9 km
18	2666.4 m	952 m	41.4 km
19	2633.3 m	927 m	45.5 km
20	2575.8 m	718 m	71.4 km
21	2564 m	779 m	28.1 km
22	2553.3 m	908 m	12.49 km
23	2550.6 m	1049 m	65.7 km
24	2503.83 m	947 m	23.7 km
25	2499.3 m	970 m	53.1 km
26	2482 m	884 m	23.5 km
27	2449.8 m	669 m	15.98 km
28	2450 m	650 m	10.73 km
29	2445.8 m	648 m	35.6 km
30	2435 m	981 m	46.5 km

	Location
0	.mw-parser-output .geo-default,.mw-parser-outp...
1	44°40′27″N 121°47′59″W / 44.6743°N 121.7996°W
2	44°06′13″N 121°46′09″W / 44.1035°N 121.7693°W
3	44°10′00″N 121°46′20″W / 44.1666°N 121.7723°W
4	44°08′54″N 121°47′02″W / 44.1483°N 121.7840°W
5	45°14′42″N 117°17′34″W / 45.2450°N 117.2929°W
6	42°38′11″N 118°34′36″W / 42.6364°N 118.5767°W
7	45°12′11″N 117°10′30″W / 45.2030°N 117.1750°W
8	45°18′17″N 117°20′43″W / 45.3046°N 117.3452°W
9	45°03′52″N 117°14′46″W / 45.0644°N 117.2460°W
10	42°26′40″N 122°18′56″W / 42.4445°N 122.3156°W
11	45°13′20″N 117°23′48″W / 45.2223°N 117.3968°W
12	43°09′10″N 122°03′59″W / 43.1528°N 122.0665°W
13	44°04′59″N 121°41′58″W / 44.0830°N 121.6994°W

```
14    44°49’00”N 118°06’14”W / 44.8168°N 118.1039°W
15    43°58’46”N 121°41’19”W / 43.9794°N 121.6885°W
16    44°18’44”N 118°43’00”W / 44.3123°N 118.7166°W
17    42°55’22”N 122°00’58”W / 42.9229°N 122.0162°W
18    43°31’15”N 122°08’59”W / 43.5207°N 122.1496°W
19    42°05’58”N 118°39’02”W / 42.0995°N 118.6506°W
20    42°03’46”N 120°14’27”W / 42.0628°N 120.2408°W
21    42°18’00”N 120°07’26”W / 42.3001°N 120.1238°W
22    43°09’18”N 122°13’12”W / 43.1551°N 122.2200°W
23    42°29’46”N 120°52’38”W / 42.4960°N 120.8773°W
24    42°18’56”N 122°05’15”W / 42.3155°N 122.0876°W
25    42°55’50”N 121°21’39”W / 42.9306°N 121.3607°W
26    44°42’50”N 118°33’42”W / 44.7138°N 118.5617°W
27    42°30’48”N 122°08’43”W / 42.5134°N 122.1453°W
28    44°17’20”N 118°29’43”W / 44.2889°N 118.4954°W
29    42°27’35”N 119°44’29”W / 42.4597°N 119.7414°W
30    43°41’21”N 121°15’18”W / 43.6892°N 121.2549°W  ,
                                                     0
0  Map this section's coordinates using: OpenStre...
1                      Download coordinates as: KML,
    Rank                              Mountain peak        Mountain range  \
0      1                      Mount Hood[6][7][8][9][a]        Cascade Range
1      2                Sacajawea Peak[26][27][28][e][f]    Wallowa Mountains
2      3              Mount Jefferson[10][11][12][13][b]        Cascade Range
3      4                South Sister[123][124][125][126]        Cascade Range
4      5              Rock Creek Butte[57][58][59][v][m]    Elkhorn Mountains
5      6          Mount McLoughlin[43][44][45][46][i][j]        Cascade Range
6      7                  Steens Mountain[29][30][31][g]      Steens Mountain
7      8          Strawberry Mountain[64][65][66][67][n]     Strawberry Range
8      9                   Brandy Peak[127][128][129][w]    Klamath Mountains
9     10               Gearhart Mountain[92][93][94][95]    Gearhart Mountain
10    11                  Mount Thielsen[50][51][52][53]        Cascade Range
11    12                  Marys Peak[130][131][132][133]   Oregon Coast Range
12    13             Paulina Peak[119][120][121][122][u]     Paulina Mountains
13    14             Yamsay Mountain[100][101][102][103]  Cascade Volcanic Arc
14    15            Mount Ashland[134][135][136][137][x]   Siskiyou Mountains
15    16                    Diamond Peak[72][73][74][75]        Cascade Range
16    17  Big Lookout Mountain[138][139][140][141]        Blue Mountains
17    18                     Aspen Butte[96][97][98][99]        Cascade Range
18    19                 Black Butte[142][143][144][145]        Cascade Range
19    20               Pueblo Mountain[76][77][78][79][o]     Pueblo Mountains
20    21                    Rogers Peak[146][147][y][z]   Oregon Coast Range
21    22                    Mount Scott[68][69][70][71]        Cascade Range
22    23                 Mount Bailey[88][89][90][91][q]        Cascade Range
23    24              Vinegar Hill[104][105][106][107][r]        Blue Mountains
24    25                   Laurel Mountain[148][149][150]   Oregon Coast Range
25    26             North Sister[151][152][153][154][aa]        Cascade Range
26    27                   Mount Bachelor[60][61][62][63]        Cascade Range
27    28                Pearsoll Peak[155][156][157][158]    Klamath Mountains
28    29                  Maiden Peak[159][160][161][162]        Cascade Range
29    30  Mount Washington[163][164][165][166][ab]        Cascade Range

    Elevation Prominence Isolation  \
```

0	3428.8 m	2349 m	92.2 km
1	3000 m	1949 m	202 km
2	3201 m	1767 m	77.5 km
3	3158.5 m	1705 m	63.4 km
4	2777 m	1364 m	69.9 km
5	2895 m	1364 m	111.8 km
6	2968 m	1336 m	201 km
7	2756.1 m	1253 m	74.2 km
8	1616 m	1109 m	54.2 km
9	2550.6 m	1049 m	65.7 km
10	2799.4 m	1025 m	81.1 km
11	1250.2 m	1023 m	78.2 km
12	2435 m	981 m	46.5 km
13	2499.3 m	970 m	53.1 km
14	2297 m	961 m	48.9 km
15	2666.4 m	952 m	41.4 km
16	2172 m	948 m	26.6 km
17	2503.83 m	947 m	23.7 km
18	1962.9 m	941 m	17.4 km
19	2633.3 m	927 m	45.5 km
20	1131 m	925 m	97.9 km
21	2722.9 m	920 m	25.9 km
22	2553.3 m	908 m	12.49 km
23	2482 m	884 m	23.5 km
24	1094.8 m	868 m	45.4 km
25	3075 m	837 m	7 km
26	2764 m	818 m	11.02 km
27	1556.9 m	811 m	31.1 km
28	2384.4 m	792 m	19.01 km
29	2377 m	785 m	16.33 km

	Location
0	45°22’25”N 121°41’45”W / 45.3735°N 121.6959°W
1	45°14’42”N 117°17’34”W / 45.2450°N 117.2929°W
2	44°40’27”N 121°47’59”W / 44.6743°N 121.7996°W
3	44°06’13”N 121°46’09”W / 44.1035°N 121.7693°W
4	44°49’00”N 118°06’14”W / 44.8168°N 118.1039°W
5	42°26’40”N 122°18’56”W / 42.4445°N 122.3156°W
6	42°38’11”N 118°34’36”W / 42.6364°N 118.5767°W
7	44°18’44”N 118°43’00”W / 44.3123°N 118.7166°W
8	42°35’51”N 123°52’49”W / 42.5976°N 123.8803°W
9	42°29’46”N 120°52’38”W / 42.4960°N 120.8773°W
10	43°09’10”N 122°03’59”W / 43.1528°N 122.0665°W
11	44°30’16”N 123°33’08”W / 44.5045°N 123.5523°W
12	43°41’21”N 121°15’18”W / 43.6892°N 121.2549°W
13	42°55’50”N 121°21’39”W / 42.9306°N 121.3607°W
14	42°04’51”N 122°43’01”W / 42.0807°N 122.7169°W
15	43°31’15”N 122°08’59”W / 43.5207°N 122.1496°W
16	44°36’32”N 117°16’42”W / 44.6089°N 117.2782°W
17	42°18’56”N 122°05’15”W / 42.3155°N 122.0876°W
18	44°23’59”N 121°38’08”W / 44.3997°N 121.6355°W
19	42°05’58”N 118°39’02”W / 42.0995°N 118.6506°W
20	45°39’54”N 123°32’53”W / 45.6649°N 123.5481°W

```
21  42°55’22”N 122°00’58”W / 42.9229°N 122.0162°W
22  43°09’18”N 122°13’12”W / 43.1551°N 122.2200°W
23  44°42’50”N 118°33’42”W / 44.7138°N 118.5617°W
24  44°55’24”N 123°34’24”W / 44.9233°N 123.5732°W
25  44°10’00”N 121°46’20”W / 44.1666°N 121.7723°W
26  43°58’46”N 121°41’19”W / 43.9794°N 121.6885°W
27  42°17’55”N 123°50’47”W / 42.2987°N 123.8464°W
28  43°37’36”N 121°57’53”W / 43.6268°N 121.9648°W
29  44°19’56”N 121°50’19”W / 44.3321°N 121.8385°W  ,
                                                    0
0  Map this section's coordinates using: OpenStre...
1                      Download coordinates as: KML,
    Rank                            Mountain peak        Mountain range  \
0      1         Sacajawea Peak[26][27][28][e][f]     Wallowa Mountains
1      2           Steens Mountain[29][30][31][g]       Steens Mountain
2      3  Mount McLoughlin[43][44][45][46][i][j]         Cascade Range
3      4              Rogers Peak[146][147][y][z]    Oregon Coast Range
4      5                Mount Hood[6][7][8][9][a]         Cascade Range
5      6           Mount Thielsen[50][51][52][53]         Cascade Range
6      7           Marys Peak[130][131][132][133]    Oregon Coast Range
7      8       Mount Jefferson[10][11][12][13][b]         Cascade Range
8      9  Strawberry Mountain[64][65][66][67][n]       Strawberry Range
9     10       Lookout Mountain[167][168][ac][ad]       Ochoco Mountains
10    11           Crane Mountain[80][81][82][83]       Warner Mountains
11    12       Rock Creek Butte[57][58][59][v][m]     Elkhorn Mountains
12    13        Gearhart Mountain[92][93][94][95]     Gearhart Mountain
13    14         South Sister[123][124][125][126]         Cascade Range
14    15            Brandy Peak[127][128][129][w]     Klamath Mountains
15    16             Black Mountain[169][170][ae]        Blue Mountains
16    17     Yamsay Mountain[100][101][102][103]  Cascade Volcanic Arc
17    18    Mount Ashland[134][135][136][137][x]    Siskiyou Mountains
18    19     Paulina Peak[119][120][121][122][u]     Paulina Mountains
19    20      Pueblo Mountain[76][77][78][79][o]      Pueblo Mountains
20    21          Laurel Mountain[148][149][150]    Oregon Coast Range
21    22        Snow Mountain[171][172][173][174]      Columbia Plateau
22    23             Diamond Peak[72][73][74][75]         Cascade Range
23    24       Roman Nose Mountain[175][176][177]    Oregon Coast Range
24    25       Warner Peak[115][116][117][118][t]         Hart Mountain
25    26       Cottonwood Mountain[178][179][180]        Blue Mountains
26    27           Saddle Mountain[181][182][183]    Oregon Coast Range
27    28         Beatys Butte[184][185][186][187]           Beatys Butte
28    29        Bald Mountain[188][189][190][191]         Bald Mountain
29    30         Yainax Butte[192][193][194][195]          Yainax Butte

   Elevation Prominence Isolation  \
0     3000 m     1949 m    202 km
1     2968 m     1336 m    201 km
2     2895 m     1364 m  111.8 km
3     1131 m      925 m   97.9 km
4   3428.8 m     2349 m   92.2 km
5   2799.4 m     1025 m   81.1 km
6   1250.2 m     1023 m   78.2 km
7     3201 m     1767 m   77.5 km
```

8	2756.1 m	1253 m	74.2 km
9	2112 m	742 m	73.7 km
10	2575.8 m	718 m	71.4 km
11	2777 m	1364 m	69.9 km
12	2550.6 m	1049 m	65.7 km
13	3158.5 m	1705 m	63.4 km
14	1616 m	1109 m	54.2 km
15	2034 m	546 m	53.1 km
16	2499.3 m	970 m	53.1 km
17	2297 m	961 m	48.9 km
18	2435 m	981 m	46.5 km
19	2633.3 m	927 m	45.5 km
20	1094.8 m	868 m	45.4 km
21	2184 m	653 m	45 km
22	2666.4 m	952 m	41.4 km
23	873.41 m	643 m	41.4 km
24	2445.8 m	648 m	35.6 km
25	1976.9 m	583 m	35.1 km
26	1002.3 m	714 m	34.9 km
27	2414.6 m	626 m	34.7 km
28	2254.5 m	708 m	34.6 km
29	2203.8 m	634 m	34.1 km

	Location
0	45°14’42”N 117°17’34”W / 45.2450°N 117.2929°W
1	42°38’11”N 118°34’36”W / 42.6364°N 118.5767°W
2	42°26’40”N 122°18’56”W / 42.4445°N 122.3156°W
3	45°39’54”N 123°32’53”W / 45.6649°N 123.5481°W
4	45°22’25”N 121°41’45”W / 45.3735°N 121.6959°W
5	43°09’10”N 122°03’59”W / 43.1528°N 122.0665°W
6	44°30’16”N 123°33’08”W / 44.5045°N 123.5523°W
7	44°40’27”N 121°47’59”W / 44.6743°N 121.7996°W
8	44°18’44”N 118°43’00”W / 44.3123°N 118.7166°W
9	44°19’37”N 120°22’23”W / 44.3270°N 120.3730°W
10	42°03’46”N 120°14’27”W / 42.0628°N 120.2408°W
11	44°49’00”N 118°06’14”W / 44.8168°N 118.1039°W
12	42°29’46”N 120°52’38”W / 42.4960°N 120.8773°W
13	44°06’13”N 121°46’09”W / 44.1035°N 121.7693°W
14	42°35’51”N 123°52’49”W / 42.5976°N 123.8803°W
15	45°12’47”N 119°17’45”W / 45.2131°N 119.2958°W
16	42°55’50”N 121°21’39”W / 42.9306°N 121.3607°W
17	42°04’51”N 122°43’01”W / 42.0807°N 122.7169°W
18	43°41’21”N 121°15’18”W / 43.6892°N 121.2549°W
19	42°05’58”N 118°39’02”W / 42.0995°N 118.6506°W
20	44°55’24”N 123°34’24”W / 44.9233°N 123.5732°W
21	43°58’13”N 119°29’46”W / 43.9704°N 119.4962°W
22	43°31’15”N 122°08’59”W / 43.5207°N 122.1496°W
23	43°54’44”N 123°44’18”W / 43.9121°N 123.7383°W
24	42°27’35”N 119°44’29”W / 42.4597°N 119.7414°W
25	44°10’08”N 117°39’44”W / 44.1688°N 117.6621°W
26	45°58’09”N 123°41’07”W / 45.9691°N 123.6853°W
27	42°23’09”N 119°19’55”W / 42.3859°N 119.3320°W
28	43°16’27”N 121°21’20”W / 43.2743°N 121.3555°W

```
 29  42°19′34″N 121°16′09″W / 42.3262°N 121.2691°W  ,
    .mw-parser-output .navbar{display:inline;font-size:88%;font-weight:norma
l}.mw-parser-output .navbar-collapse{float:left;text-align:left}.mw-parser-o
utput .navbar-boxtext{word-spacing:0}.mw-parser-output .navbar ul{display:in
line-block;white-space:nowrap;line-height:inherit}.mw-parser-output .navbar-
brackets::before{margin-right:-0.125em;content:"[ "}.mw-parser-output .navba
r-brackets::after{margin-left:-0.125em;content:" ]"}.mw-parser-output .navba
r li{word-spacing:-0.125em}.mw-parser-output .navbar a>span,.mw-parser-outpu
t .navbar a>abbr{text-decoration:inherit}.mw-parser-output .navbar-mini abbr
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rit}.mw-parser-output .navbar-ct-full{font-size:114%;margin:0 7em}.mw-parser
-output .navbar-ct-mini{font-size:114%;margin:0 4em}vte State of Oregon  \
 0                                      Salem (capital)
 1                                               Topics
 2                                              Society
 3                                              Regions
 4                                              Western
 5                                              Eastern
 6                                             Southern
 7                                                Shared
 8                                          Metro areas
 9                                       Largest cities
 10                                             Counties
 11          Oregon portal • Pacific Northwest portal

    .mw-parser-output .navbar{display:inline;font-size:88%;font-weight:norma
l}.mw-parser-output .navbar-collapse{float:left;text-align:left}.mw-parser-o
utput .navbar-boxtext{word-spacing:0}.mw-parser-output .navbar ul{display:in
line-block;white-space:nowrap;line-height:inherit}.mw-parser-output .navbar-
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r li{word-spacing:-0.125em}.mw-parser-output .navbar a>span,.mw-parser-outpu
t .navbar a>abbr{text-decoration:inherit}.mw-parser-output .navbar-mini abbr
{font-variant:small-caps;border-bottom:none;text-decoration:none;cursor:inhe
rit}.mw-parser-output .navbar-ct-full{font-size:114%;margin:0 7em}.mw-parser
-output .navbar-ct-mini{font-size:114%;margin:0 4em}vte State of Oregon.1  \
 0                                      Salem (capital)
 1   Index Outline Climate Geography fauna beaches ...
 2   Culture Crime Demographics Economy Education G...
 3   Western Northwest Oregon Oregon Coast Portland...
 4   Northwest Oregon Oregon Coast Portland Metro T...
 5   Harney Basin High Desert Palouse Treasure Vall...
 6                                         Rogue Valley
 7   The Cascades Columbia Gorge Columbia River Col...
 8   Albany–Corvallis Bend–Prineville Eugene–Spring...
 9   Portland Salem Eugene Gresham Hillsboro Beaver...
 10  Baker Benton Clackamas Clatsop Columbia Coos C...
 11          Oregon portal • Pacific Northwest portal

    .mw-parser-output .navbar{display:inline;font-size:88%;font-weight:norma
l}.mw-parser-output .navbar-collapse{float:left;text-align:left}.mw-parser-o
utput .navbar-boxtext{word-spacing:0}.mw-parser-output .navbar ul{display:in
line-block;white-space:nowrap;line-height:inherit}.mw-parser-output .navbar-
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brackets::before{margin-right:-0.125em;content:"[ "}.mw-parser-output .navba
r-brackets::after{margin-left:-0.125em;content:" ]"}.mw-parser-output .navba
r li{word-spacing:-0.125em}.mw-parser-output .navbar a>span,.mw-parser-outpu
t .navbar a>abbr{text-decoration:inherit}.mw-parser-output .navbar-mini abbr
{font-variant:small-caps;border-bottom:none;text-decoration:none;cursor:inhe
rit}.mw-parser-output .navbar-ct-full{font-size:114%;margin:0 7em}.mw-parser
-output .navbar-ct-mini{font-size:114%;margin:0 4em}vte State of Oregon.2
 0                                    Salem (capital)
 1                                                NaN
 2                                                NaN
 3                                                NaN
 4                                                NaN
 5                                                NaN
 6                                                NaN
 7                                                NaN
 8                                                NaN
 9                                                NaN
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 11           Oregon portal • Pacific Northwest portal
,
           0                                                     1
 0   Western  Northwest Oregon Oregon Coast Portland Metro T...
 1   Eastern  Harney Basin High Desert Palouse Treasure Vall...
 2  Southern                                          Rogue Valley
 3    Shared  The Cascades Columbia Gorge Columbia River Col...,
              vteThe 24 highest major summits of Oregon  \
 0  .mw-parser-output .div-col{margin-top:0.3em;co...

            vteThe 24 highest major summits of Oregon.1
 0  .mw-parser-output .div-col{margin-top:0.3em;co...  ,
   vteThe 104 highest major summits of the United States of America  \
 0  Denali Mount Saint Elias Mount Foraker Mount B...

   vteThe 104 highest major summits of the United States of America.1
 0  Denali Mount Saint Elias Mount Foraker Mount B...                  ,
   vteThe 126 most prominent summits of the United States of America  \
 0  Denali Mauna Kea Mount Rainier Mount Fairweath...

   vteThe 126 most prominent summits of the United States of America.1
 0  Denali Mauna Kea Mount Rainier Mount Fairweath...                  ,
   vteThe 113 most isolated major summits of the United States of America  \
 0  Denali Mauna Kea Mount Whitney Mount Mitchell ...

   vteThe 113 most isolated major summits of the United States of America.1
 0  Denali Mauna Kea Mount Whitney Mount Mitchell ...
,
   vteMountain peaks of the United States of America  \
 0                                          States
 1                                 Federal district
 2                                    Insular areas

   vteMountain peaks of the United States of America.1
 0  Alabama Alaska Arizona Arkansas California Col...
```

```
1                                    Washington, D.C.
2  American Samoa Guam Northern Mariana Islands P...    ]
```

In [16]:
```
# Print number of tables on webpage
len(mountains)
```

Out[16]:
```
13
```

In [17]:
```
# We would like the table that contains the highest summits of Oregon which
mountain_stats = mountains[1]
```

In [18]:
```
# Some wrangling
mountain_stats['Location'] = mountain_stats['Location'].str.replace(mountain
```

In [19]:
```
mountain_stats
```

Out[19]:

	Rank	Mountain peak	Mountain range	Elevation	Prominence	Isolation	Location
0	1	Mount Hood[6][7][8][9][a]	Cascade Range	3428.8 m	2349 m	92.2 km	45°22′25″N 121°41′45″W / 45.3735°N 121.6959°W
1	2	Mount Jefferson[10][11][12][13][b]	Cascade Range	3201 m	1767 m	77.5 km	44°40′27″N 121°47′59″W / 44.6743°N 121.7996°W
2	3	South Sister[14][15][16][17]	Cascade Range	3158.5 m	1705 m	63.4 km	44°06′13″N 121°46′09″W / 44.1035°N 121.7693°W
3	4	North Sister[18][19][20][21][c]	Cascade Range	3075 m	837 m	7 km	44°10′00″N 121°46′20″W / 44.1666°N 121.7723°W
4	5	Middle Sister[22][23][24][25][d]	Cascade Range	3064 m	382 m	1.8 km	44°08′54″N 121°47′02″W / 44.1483°N 121.7840°W
5	6	Sacajawea Peak[26][27][28][e][f]	Wallowa Mountains	3000 m	1949 m	202 km	45°14′42″N 117°17′34″W / 45.2450°N 117.2929°W
6	7	Steens Mountain[29][30][31][g]	Steens Mountain	2968 m	1336 m	201 km	42°38′11″N 118°34′36″W / 42.6364°N 118.5767°W
		Aneroid	Wallowa				45°12′11″N 117°10′30″W

7	8	Mountain[32][33][34][35]	Mountains	2958.7 m	647 m	9.48 km	/ 45.2030°N 117.1750°W
8	9	Twin Peaks[36][37][38][h]	Wallowa Mountains	2950 m	610 m	7.79 km	45°18′17″N 117°20′43″W / 45.3046°N 117.3452°W
9	10	Red Mountain[39][40][41][42]	Wallowa Mountains	2913.8 m	610 m	11.84 km	45°03′52″N 117°14′46″W / 45.0644°N 117.2460°W
10	11	Mount McLoughlin[43][44][45][46][i][j]	Cascade Range	2895 m	1364 m	111.8 km	42°26′40″N 122°18′56″W / 42.4445°N 122.3156°W
11	12	Elkhorn Peak[47][48][49][k]	Wallowa Mountains	2816 m	567 m	5.32 km	45°13′20″N 117°23′48″W / 45.2223°N 117.3968°W
12	13	Mount Thielsen[50][51][52][53]	Cascade Range	2799.4 m	1025 m	81.1 km	43°09′10″N 122°03′59″W / 43.1528°N 122.0665°W
13	14	Broken Top[54][55][56][l]	Cascade Range	2798 m	669 m	5.52 km	44°04′59″N 121°41′58″W / 44.0830°N 121.6994°W
14	15	Rock Creek Butte[57][58][59][m]	Elkhorn Mountains	2777 m	1364 m	69.9 km	44°49′00″N 118°06′14″W / 44.8168°N 118.1039°W
15	16	Mount Bachelor[60][61][62][63]	Cascade Range	2764 m	818 m	11.02 km	43°58′46″N 121°41′19″W / 43.9794°N 121.6885°W
16	17	Strawberry Mountain[64][65][66][67][n]	Strawberry Range	2756.1 m	1253 m	74.2 km	44°18′44″N 118°43′00″W / 44.3123°N 118.7166°W
17	18	Mount Scott[68][69][70][71]	Cascade Range	2722.9 m	920 m	25.9 km	42°55′22″N 122°00′58″W / 42.9229°N 122.0162°W
18	19	Diamond Peak[72][73][74][75]	Cascade Range	2666.4 m	952 m	41.4 km	43°31′15″N 122°08′59″W / 43.5207°N 122.1496°W
							42°05′58″N

19	20	Pueblo Mountain[76][77][78][79][o]	Pueblo Mountains	2633.3 m	927 m	45.5 km	118°39′02″W / 42.0995°N 118.6506°W
20	21	Crane Mountain[80][81][82][83]	Warner Mountains	2575.8 m	718 m	71.4 km	42°03′46″N 120°14′27″W / 42.0628°N 120.2408°W
21	22	Drake Peak[84][85][86][87][p]	Warner Mountains	2564 m	779 m	28.1 km	42°18′00″N 120°07′26″W / 42.3001°N 120.1238°W
22	23	Mount Bailey[88][89][90][91][q]	Cascade Range	2553.3 m	908 m	12.49 km	43°09′18″N 122°13′12″W / 43.1551°N 122.2200°W
23	24	Gearhart Mountain[92][93][94][95]	Gearhart Mountain	2550.6 m	1049 m	65.7 km	42°29′46″N 120°52′38″W / 42.4960°N 120.8773°W
24	25	Aspen Butte[96][97][98][99]	Cascade Range	2503.83 m	947 m	23.7 km	42°18′56″N 122°05′15″W / 42.3155°N 122.0876°W
25	26	Yamsay Mountain[100][101][102][103]	Cascade Volcanic Arc	2499.3 m	970 m	53.1 km	42°55′50″N 121°21′39″W / 42.9306°N 121.3607°W
26	27	Vinegar Hill[104][105][106][107][r]	Greenhorn Mountains	2482 m	884 m	23.5 km	44°42′50″N 118°33′42″W / 44.7138°N 118.5617°W
27	28	Pelican Butte[108][109][110][111]	Cascade Range	2449.8 m	669 m	15.98 km	42°30′48″N 122°08′43″W / 42.5134°N 122.1453°W
28	29	Lookout Mountain[112][113][114][s]	Strawberry Range	2450 m	650 m	10.73 km	44°17′20″N 118°29′43″W / 44.2889°N 118.4954°W
29	30	Warner Peak[115][116][117][118][t]	Hart Mountain	2445.8 m	648 m	35.6 km	42°27′35″N 119°44′29″W / 42.4597°N 119.7414°W
30	31	Paulina Peak[119][120][121][122][u]	Paulina Mountains	2435 m	981 m	46.5 km	43°41′21″N 121°15′18″W / 43.6892°N 121.2549°W

In [20]:
```
mountain_stats.dtypes
```

Out[20]:
```
Rank               int64
Mountain peak     object
Mountain range    object
Elevation         object
Prominence        object
Isolation         object
Location          object
dtype: object
```

In [21]:
```
# Have a look at the location object
mountain_stats['Location'].iloc[0]
```

Out[21]:
```
'45°22′25″N 121°41′45″W\ufeff / \ufeff45.3735°N 121.6959°W'
```

In [22]:
```
# The latitude is string position 27 to 34
lat1 = mountain_stats['Location'].iloc[0][27:34]

# The longitude is string position 37 to 45
lon1 = mountain_stats['Location'].iloc[0][37:45]
```

In [23]:
```
# Convert to float and multiple by -1
float(mountain_stats['Location'].iloc[0][37:45]) * -1
```

Out[23]:
```
-121.6959
```

In [24]:
```
# To get these data from every row, we can write a quick for loop
coords = []
for i in range(len(mountain_stats)):
    lat = float(mountain_stats['Location'].iloc[i][27:34])
    lon = float(mountain_stats['Location'].iloc[i][37:45]) * -1
    coords.append((lat, lon))
coords
```

Out[24]:
```
[(45.3735, -121.6959),
 (44.6743, -121.7996),
 (44.1035, -121.7693),
 (44.1666, -121.7723),
 (44.1483, -121.784),
 (45.245, -117.2929),
 (42.6364, -118.5767),
 (45.203, -117.175),
 (45.3046, -117.3452),
 (45.0644, -117.246),
 (42.4445, -122.3156),
 (45.2223, -117.3968),
 (43.1528, -122.0665),
 (44.083, -121.6994),
 (44.8168, -118.1039),
 (43.9794, -121.6885),
 (44.3123, -118.7166),
 (42.9229, -122.0162),
 (43.5207, -122.1496),
 (42.0995, -118.6506),
 (42.0628, -120.2408),
 (42.3001, -120.1238),
 (43.1551, -122.22),
 (42.496, -120.8773),
 (42.3155, -122.0876),
 (42.9306, -121.3607),
 (44.7138, -118.5617),
 (42.5134, -122.1453),
 (44.2889, -118.4954),
 (42.4597, -119.7414),
 (43.6892, -121.2549)]
```

In [25]:
```
map = folium.Map(location=[44, -121], zoom_start=7)
for i in range(0, len(coords)):
    folium.Marker(coords[i]).add_to(map)
map
```

Out[25]: Make this Notebook Trusted to load map: File -> Trust Notebook

In [26]:
```
# Get elevation value as a float
float(mountain_stats['Elevation'].iloc[0][:-2])
```

Out[26]:
```
3428.8
```

In [27]:
```
# To get these data from every row, we can write another quick for loop
elevation = []
for i in range(len(mountain_stats)):
    elev = float(mountain_stats['Elevation'].iloc[i][:-2])
    elevation.append(elev)
elevation
```

Out[27]:
```
[3428.8,
 3201.0,
 3158.5,
 3075.0,
 3064.0,
 3000.0,
 2968.0,
 2958.7,
 2950.0,
 2913.8,
 2895.0,
 2816.0,
 2799.4,
 2798.0,
 2777.0,
 2764.0,
 2756.1,
 2722.9,
 2666.4,
 2633.3,
 2575.8,
 2564.0,
 2553.3,
 2550.6,
 2503.83,
 2499.3,
 2482.0,
 2449.8,
 2450.0,
 2445.8,
 2435.0]
```

In [28]:
```
map = folium.Map(location=[44, -121], zoom_start=7)
for i in range(0, len(coords)):
    folium.Marker(coords[i], popup=elevation[i]).add_to(map)
map
```

Out[28]: Make this Notebook Trusted to load map: File -> Trust Notebook

Question 3

In [29]:
```
mountain_stats.dtypes
```

Out[29]:
```
Rank              int64
Mountain peak    object
Mountain range   object
Elevation        object
Prominence       object
Isolation        object
Location         object
dtype: object
```

In [30]:
```
mountain_stats.Isolation
```

Out[30]:
```
0      92.2 km
1      77.5 km
2      63.4 km
3         7 km
4       1.8 km
5       202 km
6       201 km
7      9.48 km
8      7.79 km
9     11.84 km
10    111.8 km
11     5.32 km
12     81.1 km
13     5.52 km
14     69.9 km
15    11.02 km
16     74.2 km
17     25.9 km
18     41.4 km
19     45.5 km
20     71.4 km
21     28.1 km
22    12.49 km
23     65.7 km
24     23.7 km
25     53.1 km
26     23.5 km
27    15.98 km
28    10.73 km
29     35.6 km
30     46.5 km
Name: Isolation, dtype: object
```

In [31]:
```
# Get elevation value as a float
float(mountain_stats['Isolation'].iloc[0][:-2])
```

Out[31]:
```
92.2
```

In [32]:
```
# Convert isolation into float
#To get these data from every row, we can write another quick for loop
isolation = []
for i in range(len(mountain_stats)):
    iso = float(mountain_stats['Isolation'].iloc[i][:-2])
    isolation.append(iso)
isolation
```

Out[32]:
```
[92.2,
 77.5,
 63.4,
 7.0,
 1.8,
 202.0,
 201.0,
 9.48,
 7.79,
 11.84,
 111.8,
 5.32,
 81.1,
 5.52,
 69.9,
 11.02,
 74.2,
 25.9,
 41.4,
 45.5,
 71.4,
 28.1,
 12.49,
 65.7,
 23.7,
 53.1,
 23.5,
 15.98,
 10.73,
 35.6,
 46.5]
```

In [33]:
```
# Displays the Isolation data
map = folium.Map(location=[44, -121], zoom_start=7)
for i in range(0, len(coords)):
    folium.Marker(coords[i], popup=isolation[i]).add_to(map)
map
```

Out[33]: Make this Notebook Trusted to load map: File -> Trust Notebook

In [34]:
```
# Have a look at the mountain peak
mountain_stats['Mountain peak'].iloc[0]
name = mountain_stats['Mountain peak'].iloc[0].rsplit('[')[0]
name
```

Out[34]: 'Mount Hood'

In [35]:
```
names =[]
for i in range(len(mountain_stats)):
    name = mountain_stats['Mountain peak'].iloc[i].rsplit('[')[0]
    names.append(name)
names
```

Out[35]:
```
['Mount Hood',
 'Mount Jefferson',
 'South Sister',
 'North Sister',
 'Middle Sister',
 'Sacajawea Peak',
 'Steens Mountain',
 'Aneroid Mountain',
 'Twin Peaks',
 'Red Mountain',
 'Mount McLoughlin',
 'Elkhorn Peak',
 'Mount Thielsen',
 'Broken Top',
 'Rock Creek Butte',
 'Mount Bachelor',
 'Strawberry Mountain',
 'Mount Scott',
 'Diamond Peak',
 'Pueblo Mountain',
 'Crane Mountain',
 'Drake Peak',
 'Mount Bailey',
 'Gearhart Mountain',
 'Aspen Butte',
 'Yamsay Mountain',
 'Vinegar Hill',
 'Pelican Butte',
 'Lookout Mountain',
 'Warner Peak',
 'Paulina Peak']
```

In [36]:
```
# Mountain name and/or isolation value
map = folium.Map(location=[44, -121], zoom_start=7)
for i in range(0, len(coords)):
    popups= names[i] # + (' Isolation value: ') + str(isolation[i])
    folium.Marker(coords[i], popup= popups).add_to(map)
map
```

Out[36]: Make this Notebook Trusted to load map: File -> Trust Notebook

In [37]:
```
# Install webdriver_manager: https://github.com/SergeyPirogov/webdriver_mana
!pip install -U webdriver_manager
```

```
Requirement already satisfied: webdriver_manager in /Library/Frameworks/Pyth
on.framework/Versions/3.9/lib/python3.9/site-packages (3.5.3)
Requirement already satisfied: crayons in /Library/Frameworks/Python.framewo
rk/Versions/3.9/lib/python3.9/site-packages (from webdriver_manager) (0.4.0)
Requirement already satisfied: configparser in /Library/Frameworks/Python.fr
amework/Versions/3.9/lib/python3.9/site-packages (from webdriver_manager) (5
.2.0)
Requirement already satisfied: requests in /Library/Frameworks/Python.framew
ork/Versions/3.9/lib/python3.9/site-packages (from webdriver_manager) (2.25.
0)
Requirement already satisfied: colorama in /Library/Frameworks/Python.framew
ork/Versions/3.9/lib/python3.9/site-packages (from crayons->webdriver_manage
r) (0.4.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /Library/Frameworks/
Python.framework/Versions/3.9/lib/python3.9/site-packages (from requests->we
bdriver_manager) (1.26.2)
Requirement already satisfied: idna<3,>=2.5 in /Library/Frameworks/Python.fr
amework/Versions/3.9/lib/python3.9/site-packages (from requests->webdriver_m
anager) (2.10)
Requirement already satisfied: certifi>=2017.4.17 in /Library/Frameworks/Pyt
hon.framework/Versions/3.9/lib/python3.9/site-packages (from requests->webdr
iver_manager) (2020.11.8)
Requirement already satisfied: chardet<4,>=3.0.2 in /Library/Frameworks/Pyth
on.framework/Versions/3.9/lib/python3.9/site-packages (from requests->webdri
ver_manager) (3.0.4)
```

In [38]:
```
# Import packages
from selenium import webdriver
from selenium.webdriver.chrome.service import Service
from selenium.webdriver.common.by import By
from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC
from webdriver_manager.chrome import ChromeDriverManager
```

In [39]:
```
# Install Chrome webdriver
driver = webdriver.Chrome(service=Service(ChromeDriverManager().install()))

# Open a web browser at the following page
driver.get("https://en.wikipedia.org/wiki/Category:Ski_areas_and_resorts_in_
```

```
====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache
```

In [40]:
```
# Retrieve ski resort names
html_list = driver.find_element(By.ID, "mw-pages")
items = html_list.find_elements(By.TAG_NAME, "li")
```

In [41]:
```
ski_resort_names = []
for item in items:
    text = item.text
    print(text)
    ski_resort_names.append(text)
driver.close()
```

```
Anthony Lakes (ski area)
Mount Ashland Ski Area
Cooper Spur ski area
Ferguson Ridge Ski Area
Hoodoo (ski area)
Mount Ashland Ski Area Expansion
Mount Bachelor ski area
Mount Hood Meadows
Mount Hood Skibowl
Snow Bunny
Spout Springs Ski Area
Summit Pass (Oregon)
Timberline Lodge ski area
Warner Canyon
Willamette Pass Resort
```

In [51]:
```
# Define test URL
url = 'https://www.google.com/maps/place/Hoodoo+Ski+Area+Oregon/'

# Install Chrome webdriver
driver = webdriver.Chrome(service=Service(ChromeDriverManager().install()))

# Open URL
driver.get(url)
```

```
====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache
```

In [52]:
```
# Click search
element = WebDriverWait(driver, 10).until(EC.element_to_be_clickable((By.ID,
element.click()
```

In [53]:
```
# Retrieve the URL
link = driver.current_url

# We can find the first occurrence of a character by using the "find" methoc
link.find('@')
```

Out[53]:
```
58
```

In [54]:
```
print(driver.current_url)
```

```
https://www.google.com/maps/place/Hoodoo+Ski+Area/@44.4086439,-121.8736045,1
7z/data=!3m1!4b1!4m5!3m4!1s0x54bf374c3f8e7d9d:0x28cc775b14baa46b!8m2!3d44.40
86439!4d-121.8714158
```

In [55]:
```
split1 = link.rsplit('@', 1)
split1
```

Out[55]:
```
['https://www.google.com/maps/search/Hoodoo+Ski+Area+Oregon/',
 '44.0437848,-123.0675788,14z']
```

Error at split2, have re-run Install Chrome webdriver

Re-run these lines on line 51 then it will work

Define test URL

url = 'https://www.google.com/maps/place/Hoodoo+Ski+Area+Oregon/'

Install Chrome webdriver

driver = webdriver.Chrome(service=Service(ChromeDriverManager().install()))

Open URL

driver.get(url)

In [56]:
```
split2 = split1[1].rsplit(',', 1)
split2
```

Out[56]:
```
['44.0437848,-123.0675788', '14z']
```

In [57]:
```
split3 = split2[0].rsplit(',', 1)
split3
```

Out[57]:
```
['44.0437848', '-123.0675788']
```

In [58]:
```
# Here's the "one-liner"
lat, lon = link.rsplit('@', 1)[1].rsplit(',', 1)[0].rsplit(',', 1)
```

In [59]:
```
lat, lon
```

Out[59]:
```
('44.0437848', '-123.0675788')
```

In [60]:
```
driver.close()
```

In [61]:
```
ski_resort_coords = []
# Loop through every ski resort to find it's coordinates
for resort in ski_resort_names:

    # Define URL to search in Google Maps and add 'Oregon' in for good measu
    url = 'https://www.google.com/maps/place/' + resort + ' Oregon/'

    # Import web driver and search for ski resorts
    driver = webdriver.Chrome(service=Service(ChromeDriverManager().install(
    driver.get(url)

    # Click search
    element = WebDriverWait(driver, 20).until(EC.element_to_be_clickable((By
    element.click()

    # Make the web driver wait until the URL updates (i.e. contains the @ si
    WebDriverWait(driver, 20).until(EC.url_contains("@"))

    # Retrieve the URL
    link = driver.current_url

    # Split string
    lat, lon = link.rsplit('@', 1)[1].rsplit(',', 1)[0].rsplit(',', 1)

    # Append to list
    ski_resort_coords.append((lat, lon))

    # Close driver
    driver.close()
```

```
====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache
```

```
====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
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Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
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Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
```

```
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache
```

In [62]:

```
ski_resort_coords
```

Out[62]:

```
[('44.9629235', '-118.2357129'),
 ('42.081685', '-122.7069427'),
 ('45.4188458', '-121.6064525'),
 ('45.2816851', '-117.1148305'),
 ('44.4086439', '-121.8736045'),
 ('42.081685', '-122.7069427'),
 ('44.0028937', '-121.6812601'),
 ('45.3317552', '-121.6673735'),
 ('45.2943342', '-121.7896261'),
 ('45.2871418', '-121.7312302'),
 ('45.7552425', '-118.0536097'),
 ('44.0265109', '-123.4892255'),
 ('45.3311281', '-121.7131951'),
 ('42.237374', '-120.2968271'),
 ('43.600054', '-122.0387287')]
```

In [63]:

```
map = folium.Map(location=[44, -121], zoom_start=7)
for i in range(0, len(ski_resort_coords)):
    folium.Marker(ski_resort_coords[i], popup=ski_resort_names[i]).add_to(ma
map
```

Out[63]: Make this Notebook Trusted to load map: File -> Trust Notebook

Question 4

Question 4 (10 points)

- Write a script to automatically derive the geographic coordinates for the following addresses:
  - 1844 SW Morrison St, Portland, OR 97205
  - 800 Occidental Ave S, Seattle, WA 98134
  - 1001 Stadium Dr, Inglewood, CA 90301
  - 2700 Martin Luther King Jr Blvd, Eugene, OR 97401

You can **either** find each one individually **or** make a list of the addresses and use a for loop.

- Plot the coordinates of these addresses on an interactive map using `folium`

In [64]:
```
location_4 = ['1844 SW Morrison St, Portland, OR 97205', '800 Occidental Ave
coordinates_4 = []
# Loop through every ski resort to find it's coordinates
for loc_4 in location_4:

    # Define URL to search in Google Maps and add 'Oregon' in for good measu
    url = 'https://www.google.com/maps/place/' + loc_4

    # Import web driver and search for ski resorts
    driver = webdriver.Chrome(service=Service(ChromeDriverManager().install(
    driver.get(url)

    # Click search
    element = WebDriverWait(driver, 20).until(EC.element_to_be_clickable((By
    element.click()

    # Make the web driver wait until the URL updates (i.e. contains the @ si
    WebDriverWait(driver, 20).until(EC.url_contains("@"))

    # Retrieve the URL
    link = driver.current_url

    # Split string
    lat, lon = link.rsplit('@', 1)[1].rsplit(',', 1)[0].rsplit(',', 1)

    # Append to list
    coordinates_4.append((lat, lon))

    # Close driver
    driver.close()
```

```
====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache


====== WebDriver manager ======
Current google-chrome version is 98.0.4758
Get LATEST chromedriver version for 98.0.4758 google-chrome
Driver [/Users/jack/.wdm/drivers/chromedriver/mac64/98.0.4758.102/chromedriv
er] found in cache
```

In [65]:

```
#1844 SW Morrison St, Portland, OR 97205: 45.52181664425629, -122.6907800220
#800 Occidental Ave S, Seattle, WA 98134: 47.59349096388847, -122.3322722019
#1001 Stadium Dr, Inglewood, CA 90301: 33.953165071858955, -118.338534931191
#2700 Martin Luther King Jr Blvd, Eugene, OR 97401: 44.059621427301096, -123
```

In [66]:

```
coordinates_4
```

Out[66]:

```
[('45.5216776', '-122.693017'),
 ('47.5933101', '-122.3344609'),
 ('33.9530049', '-118.3407129'),
 ('44.0594287', '-123.0710918')]
```

In [67]:

```
map = folium.Map(location=[45.5, -121], zoom_start=7)
for i in range(0, len(coordinates_4)):
    folium.Marker(coordinates_4[i], popup=location_4[i]).add_to(map)
map
```

Out[67]: Make this Notebook Trusted to load map: File -> Trust Notebook

Question 5

In [68]:
```
# Import package
import xarray as xr

# Define filepath
fp = '/Users/jack/Documents/GitHub/geospatial-data-science/labs/lab7'

# Read data
xds = xr.open_dataset(fp + '/era_monthly_snowfall_2020.nc', decode_coords='a
```

In [69]:
```
xds
```

Out[69]: xarray.Dataset

▶ Dimensions: (**longitude**: 49, **latitude**: 25, **time**: 12)

▼ Coordinates:

longitude	(longitude)	float32	-128.0 -127....
latitude	(latitude)	float32	47.0 46.75 4...
time	(time)	datetime64[ns]	2020-01-01 ...

▼ Data variables:

sf	(time, latitude, longitude)	float32	...

▼ Attributes:

Conventions : CF-1.6

history : 2022-01-30 21:04:05 GMT by grib_to_netcdf-2.23.0: /opt/ecmwf/mars-client/bin/grib_to_netcdf -S param -o /cache/data6/adaptor.mars.internal-1643576645.547142-29574-12-6e006e1c-6452-4b43-8b38-b506dd10f98b.nc /cache/tmp/6e006e1c-6452-4b43-8b38-b506dd10f98b-adaptor.mars.internal-1643576640.5525317-29574-17-tmp.grib

In [70]:
```
xds.head()
```

Out[70]: xarray.Dataset

▶ Dimensions: (**longitude**: 5, **latitude**: 5, **time**: 5)

▼ Coordinates:

longitude	(longitude)	float32	-128.0 -127....	
latitude	(latitude)	float32	47.0 46.75 4...	
time	(time)	datetime64[ns]	2020-01-01 ...	

▼ Data variables:

sf	(time, latitude, longitude)	float32	-4.657e-10 ...	

▼ Attributes:

Conventions :	CF-1.6
history :	2022-01-30 21:04:05 GMT by grib_to_netcdf-2.23.0: /opt/ecmwf/mars-client/bin/grib_to_netcdf -S param -o /cache/data6/adaptor.mars.internal-1643576645.547142-29574-12-6e006e1c-6452-4b43-8b38-b506dd10f98b.nc /cache/tmp/6e006e1c-6452-4b43-8b38-b506dd10f98b-adaptor.mars.internal-1643576640.5525317-29574-17-tmp.grib

In [71]:
```
ashland = xds.sel(latitude = 42.081685, longitude= -122.7069427, method ='ne
hoodoo = xds.sel(latitude =44.4086439, longitude= -121.8736045, method ='nea
willammette = xds.sel(latitude =43.600054, longitude= -122.0387287, method =
```

In [72]:
```
ashland['sf'].values.sum()
```

Out[72]:
```
0.009228621
```

In [73]:
```
hoodoo['sf'].values.sum()
```

Out[73]:
```
0.018596929
```

In [74]:
```
willammette['sf'].values.sum()
```

Out[74]:
```
0.019636936
```

The ski resort that received **more** snowfall is Willammette Pass.

Extra Credit (Did not finished)

In [75]:
```
# Import package
import xarray as xr

# Define filepath
fp = '/Users/jack/Documents/GitHub/geospatial-data-science/labs/lab7'

# Read data
xds_2 = xr.open_dataset(fp + '/era_monthly_snowfall_1979_2020.nc', decode_cc
```

In [76]:
```
xds_2
```

Out[76]: xarray.Dataset

▶ Dimensions: (**longitude**: 49, **latitude**: 25, **time**: 504)

▼ Coordinates:

longitude	(longitude)	float32	-128.0 -127....	
latitude	(latitude)	float32	47.0 46.75 4...	
time	(time)	datetime64[ns]	1979-01-01	

▼ Data variables:

sf	(time, latitude, longitude)	float32	...	

▼ Attributes:

Conventions :	CF-1.6
history :	2022-01-30 21:07:38 GMT by grib_to_netcdf-2.23.0: /opt/ecmwf/mars-client/bin/grib_to_netcdf -S param -o /cache/data4/adaptor.mars.internal-1643576857.706256-30892-9-b95be943-bb21-4f41-9431-360954ab03da.nc /cache/tmp/b95be943-bb21-4f41-9431-360954ab03da-adaptor.mars.internal-1643576690.9933307-30892-10-tmp.grib

In [ ]:
```

```