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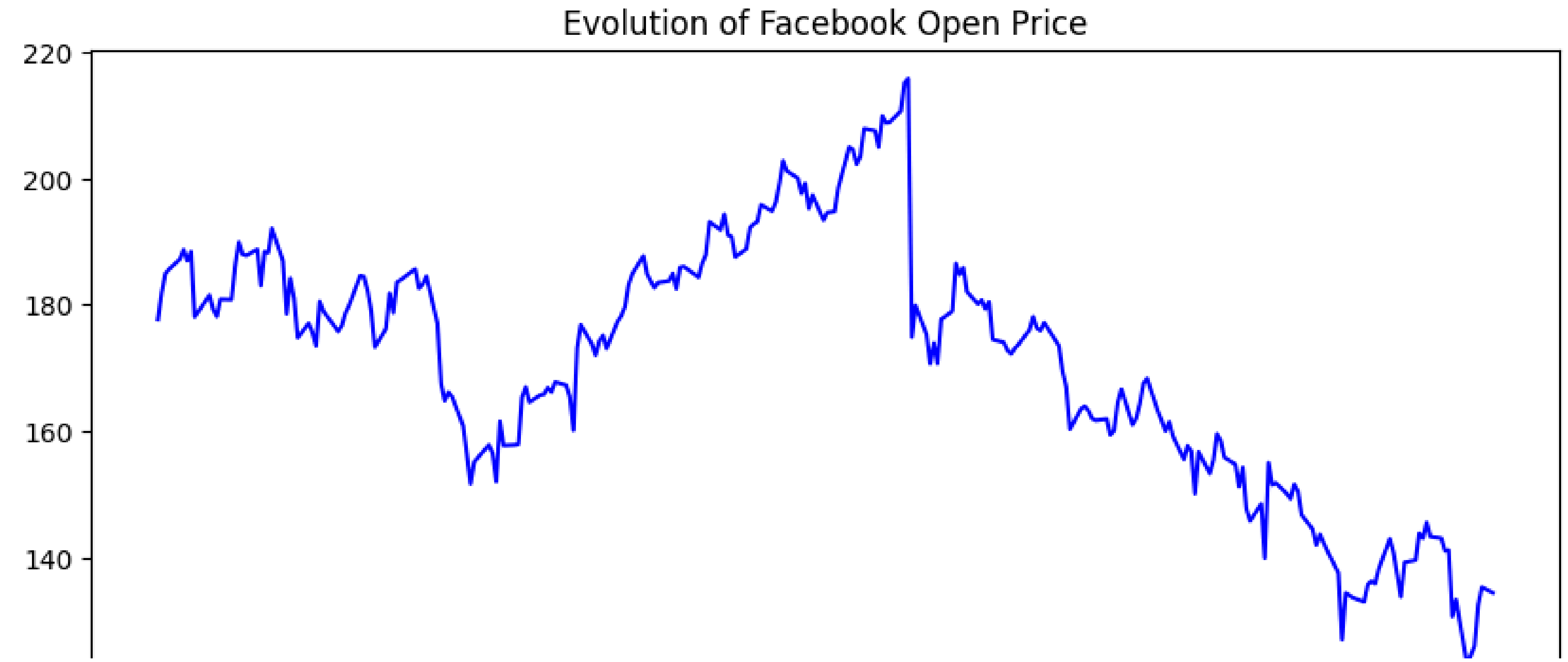
Setting Up

```
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
fb = pd.read_csv(
'data/fb_stock_prices_2018.csv', index_col='date', parse_dates=True
)
quakes = pd.read_csv('data/earthquakes.csv')
```

Evolution Over time

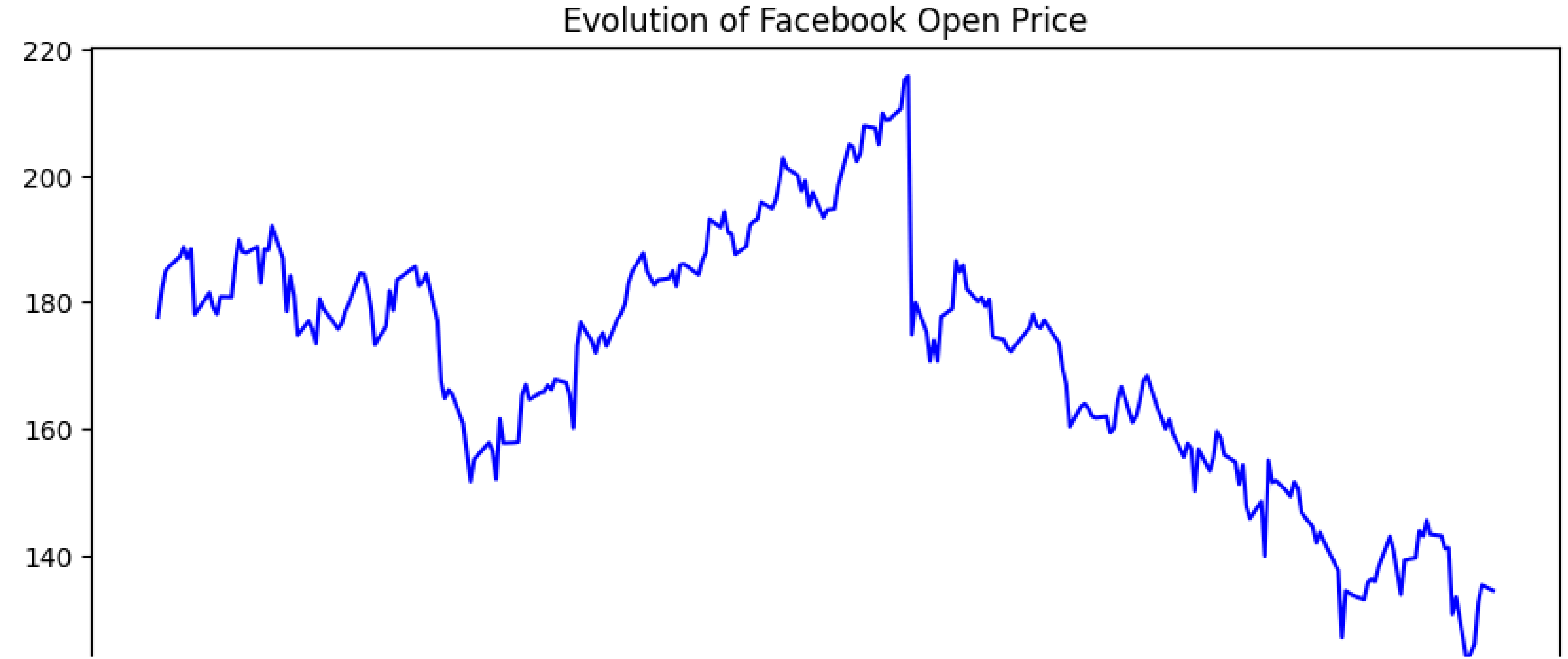
```
fb.plot(
    kind='line',
    y='open',
    figsize=(10, 5),
    style='b-',
    legend=False,
    title='Evolution of Facebook Open Price'
)
```

```
<Axes: title={'center': 'Evolution of Facebook Open Price'}, xlabel='date'>
```



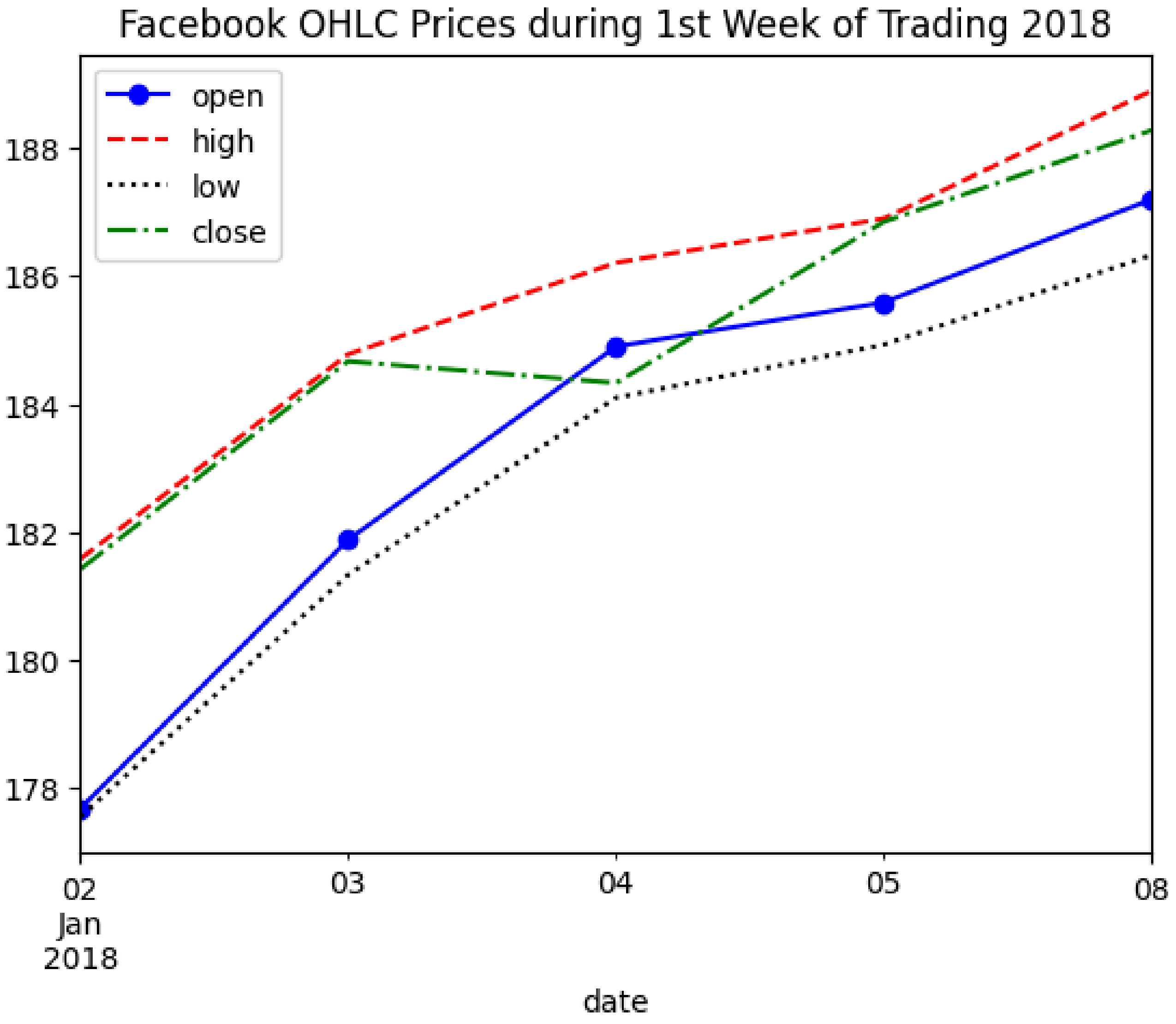
```
fb.plot(
    kind='line',
    y='open',
    figsize=(10, 5),
    color='blue',
    linestyle='solid',
    legend=False,
    title='Evolution of Facebook Open Price'
)
```

```
<Axes: title={'center': 'Evolution of Facebook Open Price'}, xlabel='date'>
```



```
fb.iloc[:5,].plot(
    y=['open', 'high', 'low', 'close'],
    style=['b-o', 'r--', 'k:', 'g-.'],
    title='Facebook OHLC Prices during 1st Week of Trading 2018'
)
```

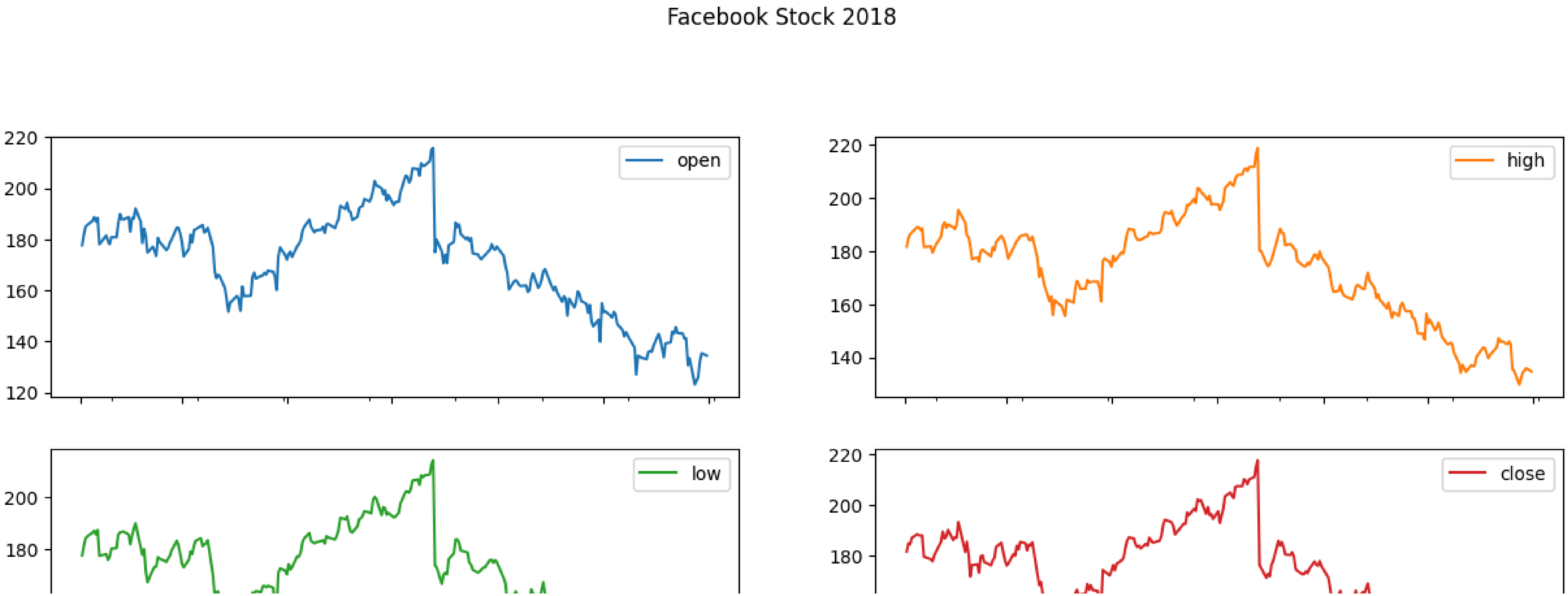
```
<Axes: title={'center': 'Facebook OHLC Prices during 1st Week of Trading 2018'}, xlabel='date'>
```



Creating Subplots

```
fb.plot(
kind='line',
subplots=True,
layout=(3,2),
figsize=(15,10),
title='Facebook Stock 2018'
)
```

```
array([[<Axes: xlabel='date'>, <Axes: xlabel='date'>],
       [<Axes: xlabel='date'>, <Axes: xlabel='date'>],
       [<Axes: xlabel='date'>, <Axes: xlabel='date'>]], dtype=object)
```

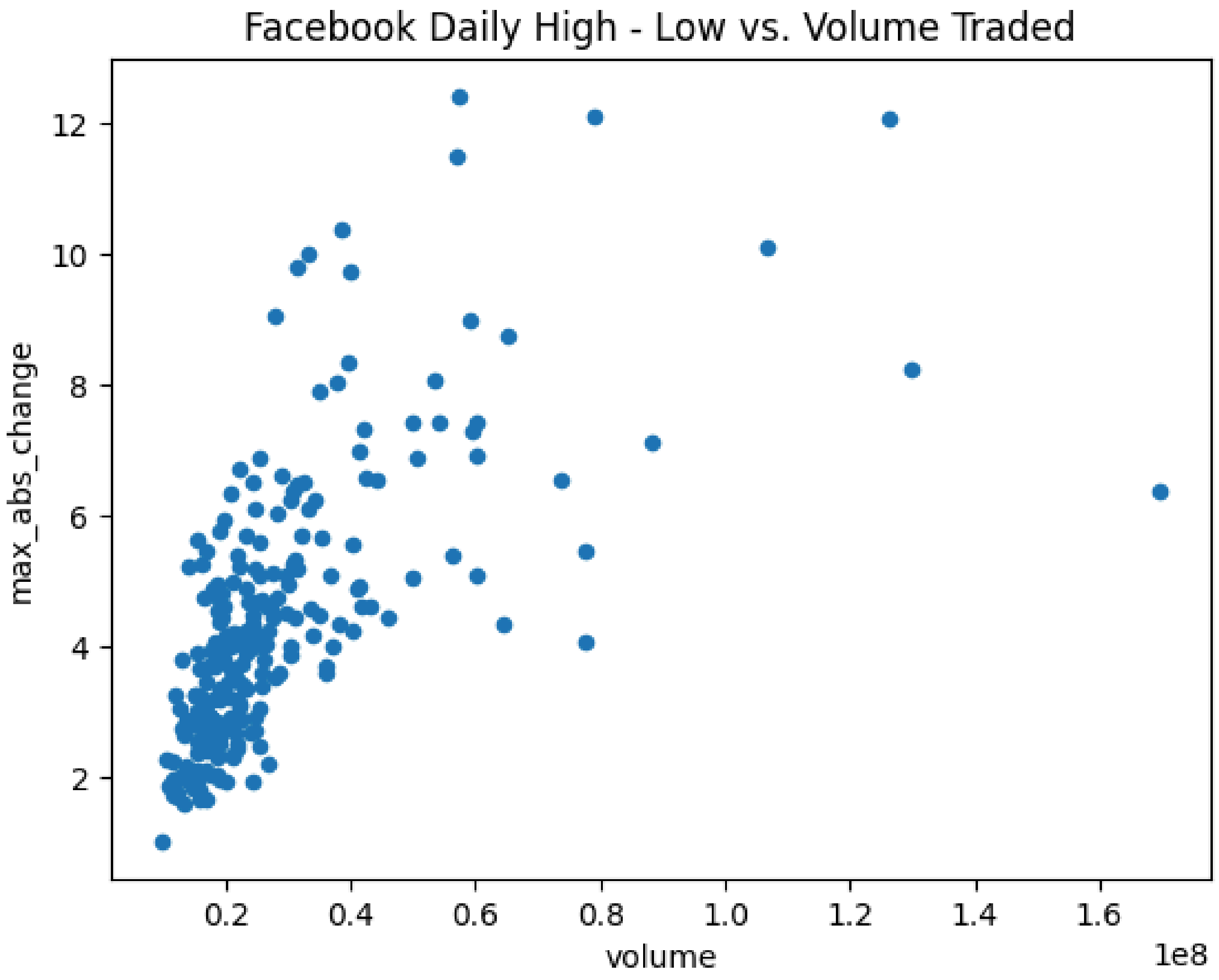


Visualizing relationships between variables

Scatter Plots

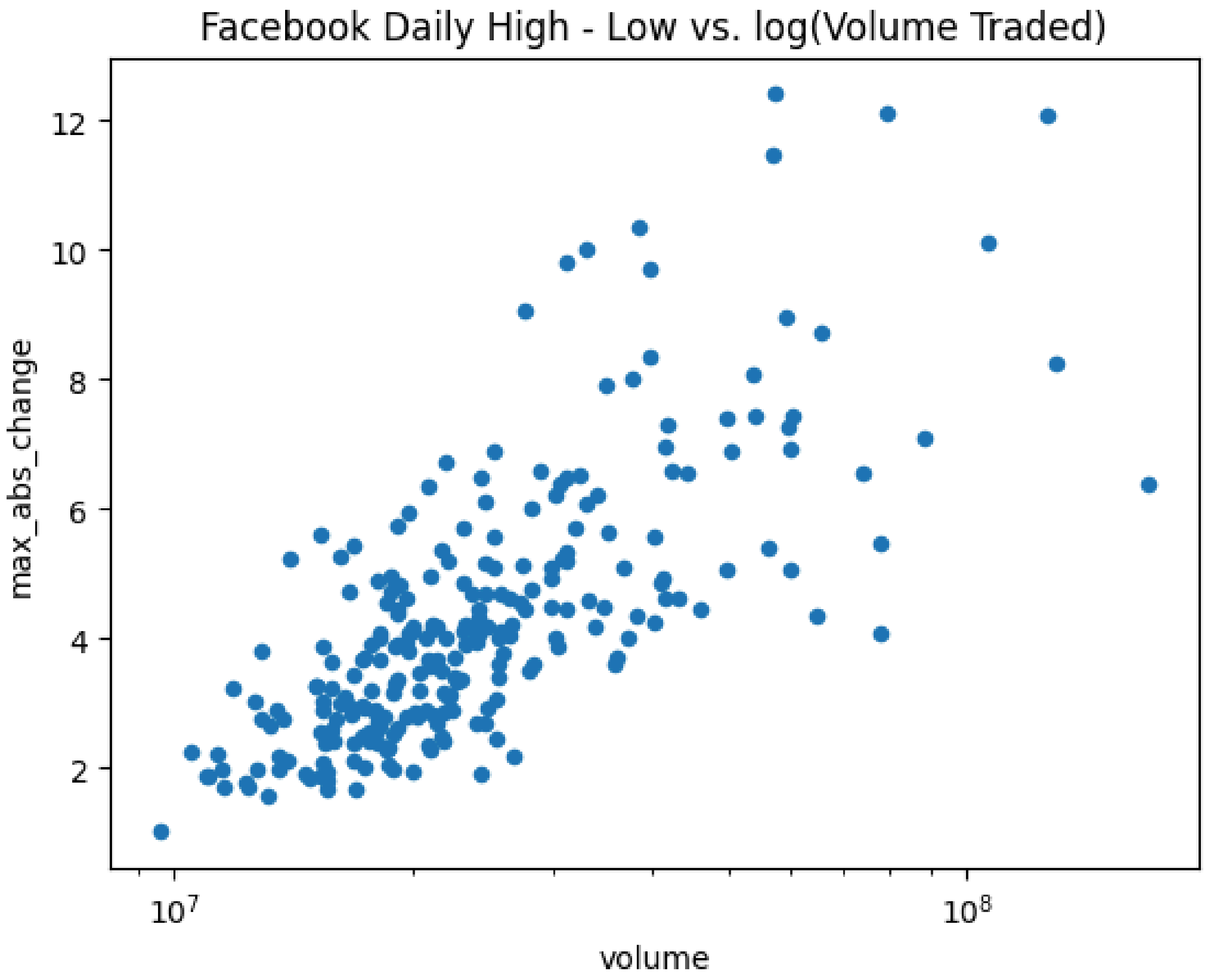
```
fb.assign(
max_abs_change=fb.high - fb.low
).plot(
    kind='scatter', x='volume', y='max_abs_change',
    title='Facebook Daily High - Low vs. Volume Traded'
)
```

```
<Axes: title={'center': 'Facebook Daily High - Low vs. Volume Traded'}, xlabel='volume', ylabel='max_abs_change'>
```



```
fb.assign(
max_abs_change=fb.high - fb.low
).plot(
    kind='scatter', x='volume', y='max_abs_change',
    title='Facebook Daily High - Low vs. log(Volume Traded)',
    logx=True
)
```

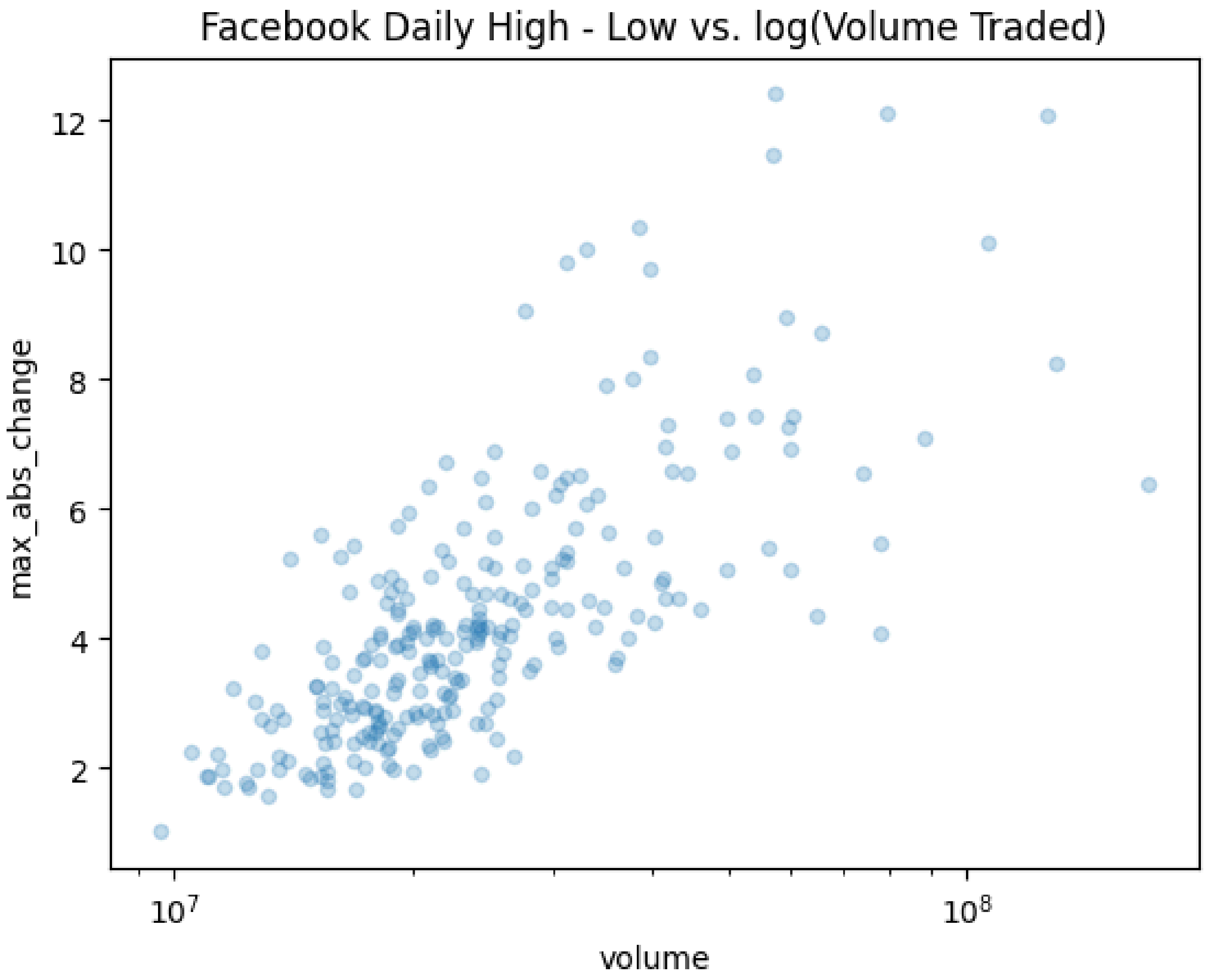
```
<Axes: title={'center': 'Facebook Daily High - Low vs. log(Volume Traded)'}, xlabel='volume', ylabel='max_abs_change'>
```



Adding transparency to plots with Alpha

```
fb.assign(
    max_abs_change=fb.high - fb.low
).plot(
    kind='scatter', x='volume', y='max_abs_change',
    title='Facebook Daily High - Low vs. log(Volume Traded)',
    logx=True, alpha=0.25
)
```

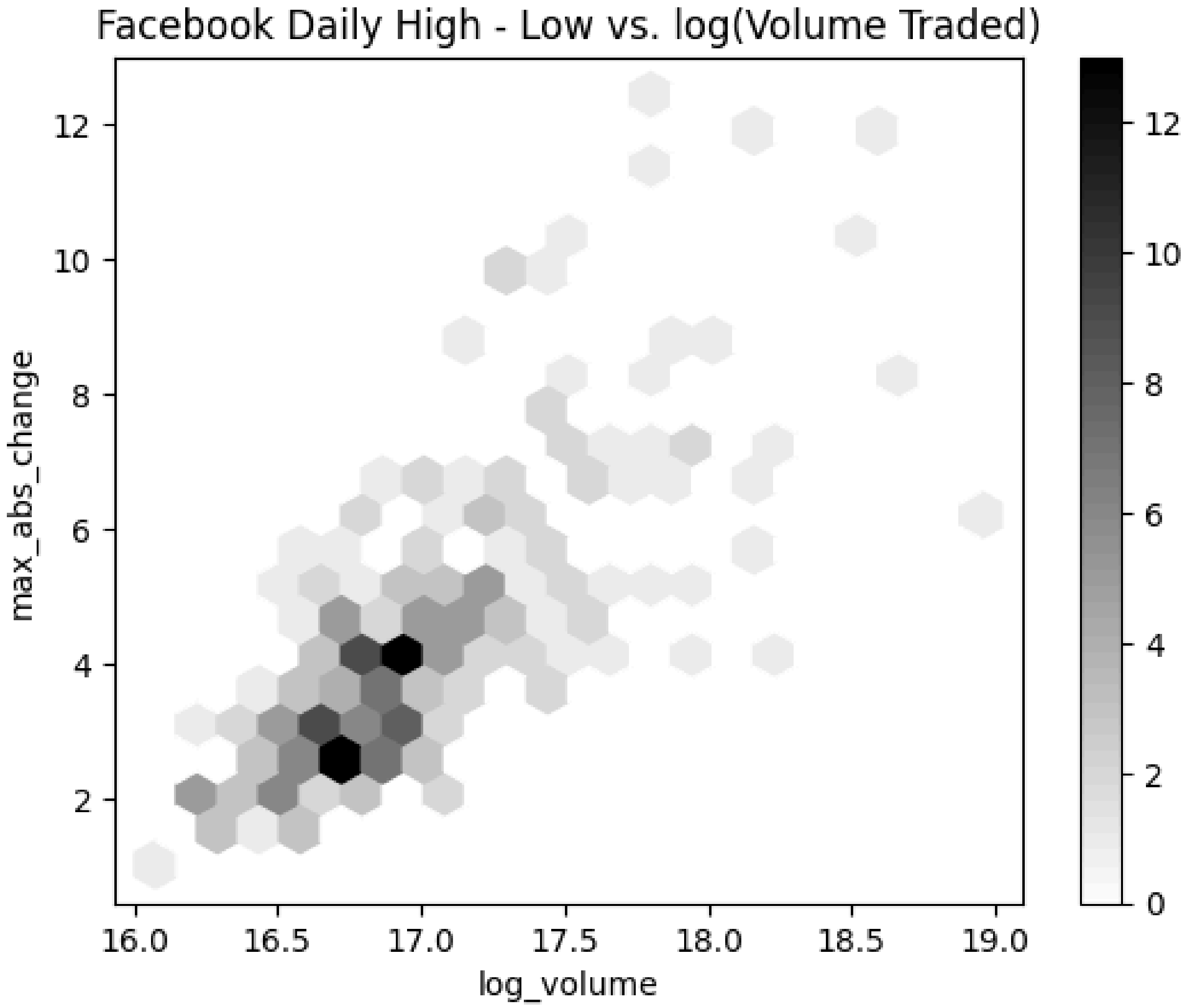
```
<Axes: title={'center': 'Facebook Daily High - Low vs. log(Volume Traded)'}, xlabel='volume', ylabel='max_abs_change'>
```



Hexbins

```
fb.assign(
    log_volume=np.log(fb.volume),
    max_abs_change=fb.high - fb.low
).plot(
    kind='hexbin',
    x='log_volume',
    y='max_abs_change',
    title='Facebook Daily High - Low vs. log(Volume Traded)',
    colormap='gray_r',
    gridsize=20,
    sharex=False
)
```

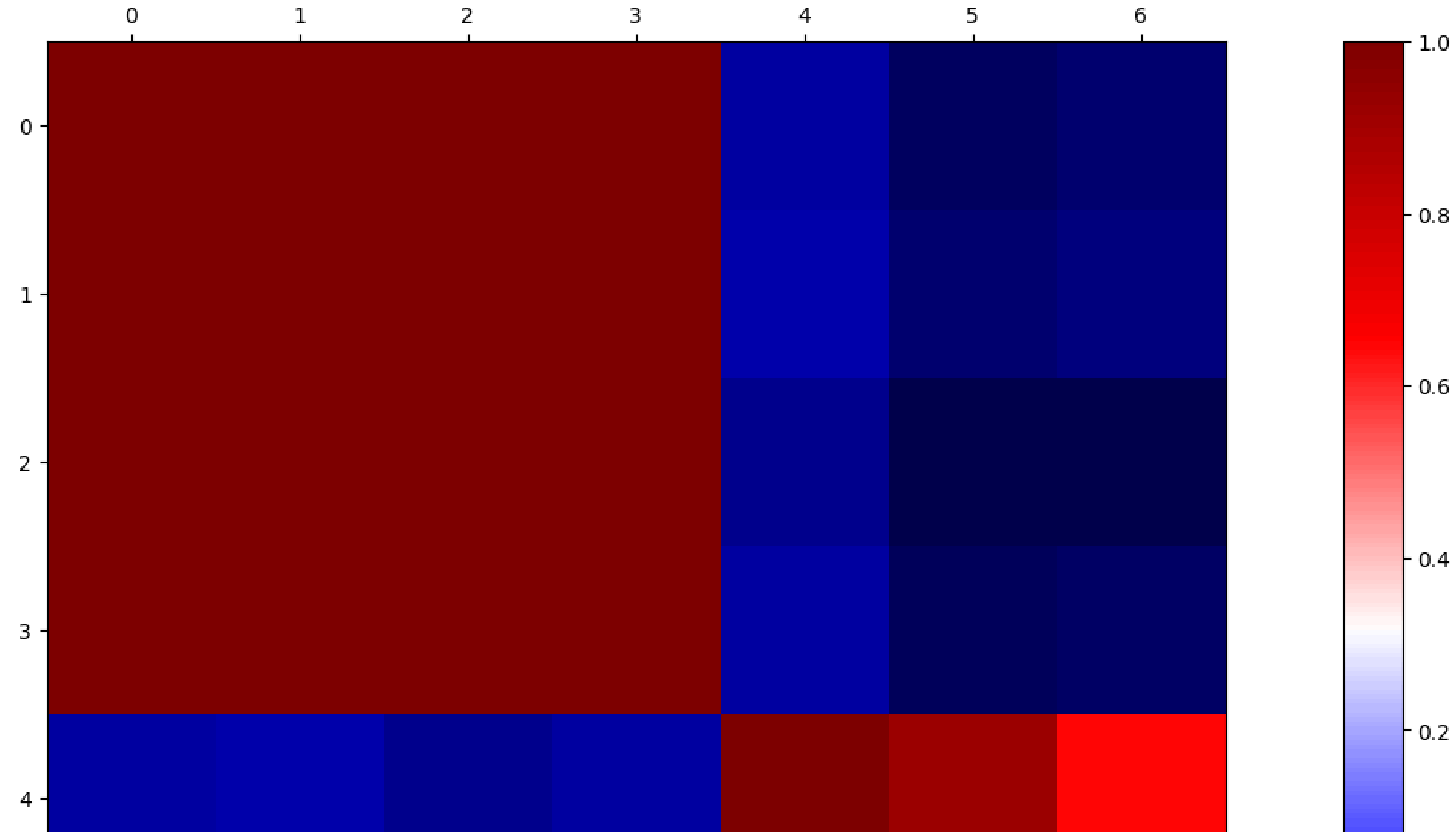
```
<Axes: title={'center': 'Facebook Daily High - Low vs. log(Volume Traded)'}, xlabel='log_volume', ylabel='max_abs_change'>
```



Visualizing Correlations with Heatmaps

```
fig, ax = plt.subplots(figsize=(20, 10))

fb_corr = fb.assign(
    log_volume=np.log(fb.volume),
    max_abs_change=fb.high - fb.low
).corr()

im = ax.matshow(fb_corr, cmap='seismic')
fig.colorbar(im).set_clim(-1, 1)

labels = [col.lower() for col in fb_corr.columns]
ax.set_xticklabels([''] + labels, rotation=45)
ax.set_yticklabels([''] + labels)
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-10-e3d32d707d2b> in <cell line: 9>()
      7 
      8 im = ax.matshow(fb_corr, cmap='seismic')
----> 9 fig.colorbar(im).set_clim(-1, 1)
     10 
     11 labels = [col.lower() for col in fb_corr.columns]

AttributeError: 'Colorbar' object has no attribute 'set_clim'
```



```
fb_corr.loc['max_abs_change', ['volume', 'log_volume']]
```

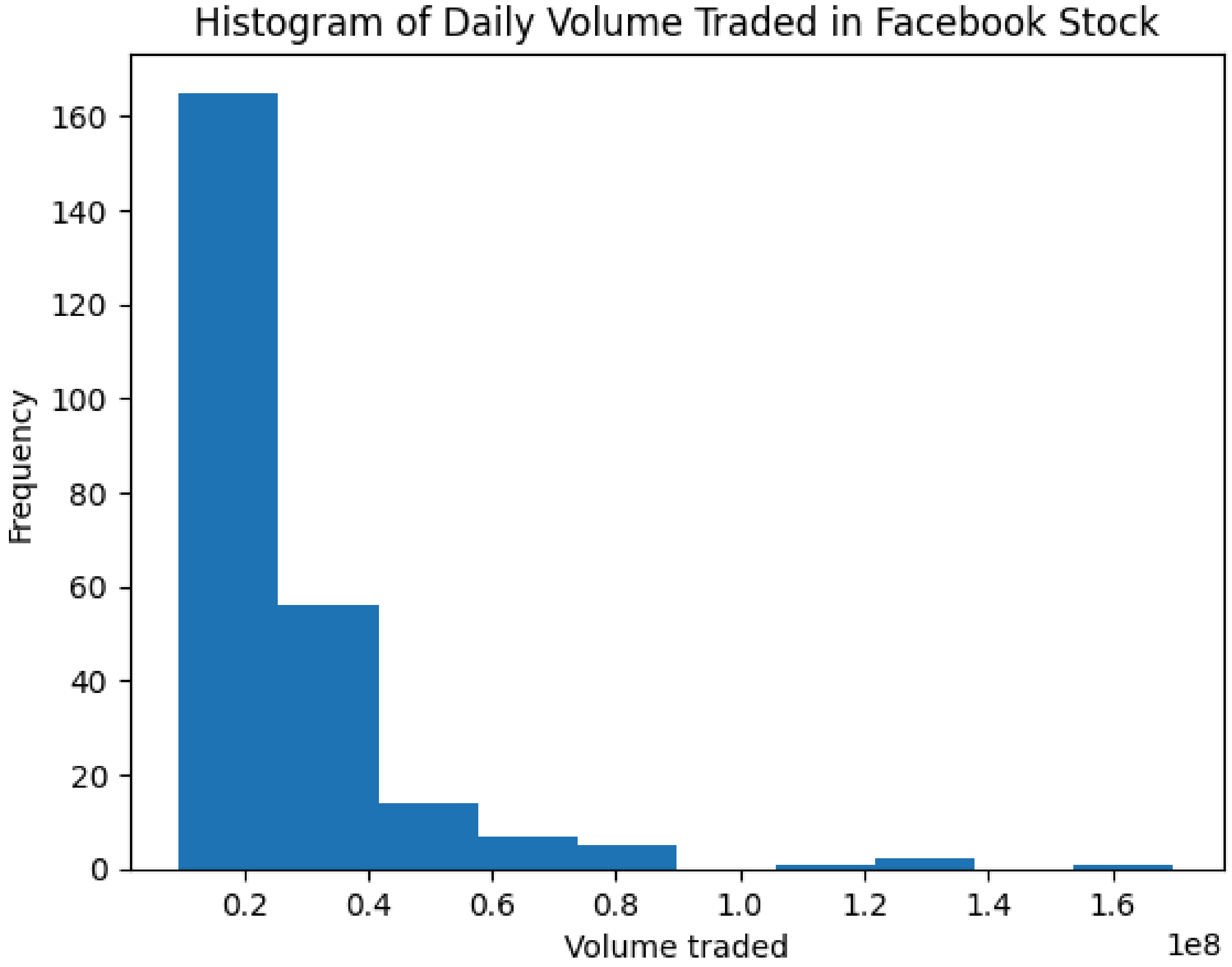
```
volume        0.642027
log_volume    0.731542
Name: max_abs_change, dtype: float64
```

Visualizing Distributions

Histograms

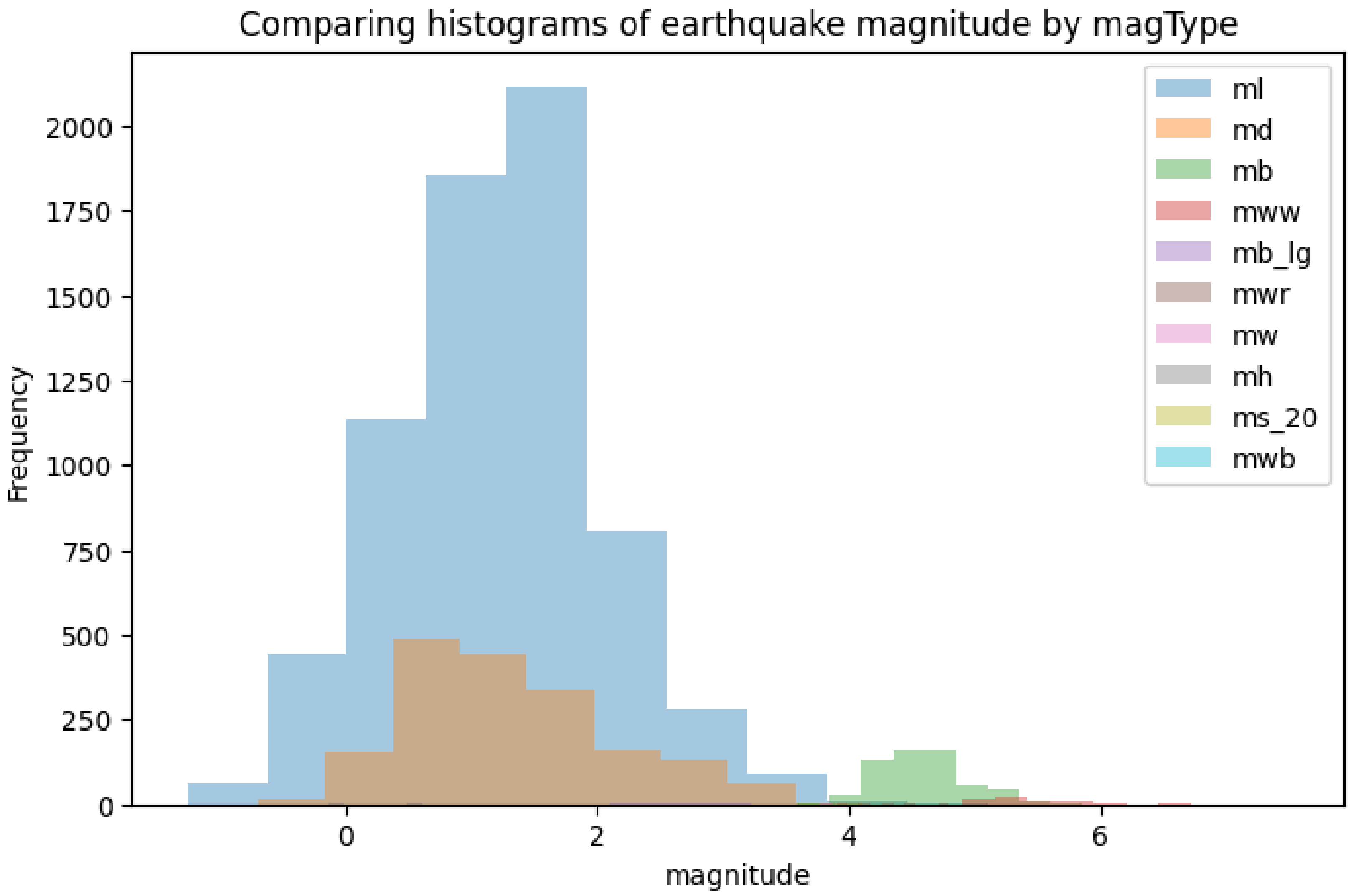
```
fb.volume.plot(
kind='hist',
title='Histogram of Daily Volume Traded in Facebook Stock'
)
plt.xlabel('Volume traded')
```

```
     Text(0.5, 0, 'Volume traded')
```



```
fig, axes = plt.subplots(figsize=(8, 5))
for magtype in quakes.magType.unique():
  data = quakes.query(f'magType == "{magtype}"').mag
  if not data.empty:
    data.plot(
        kind='hist', ax=axes, alpha=0.4,
        label=magtype, legend=True,
        title='Comparing histograms of earthquake magnitude by magType'
     )
plt.xlabel('magnitude')
```

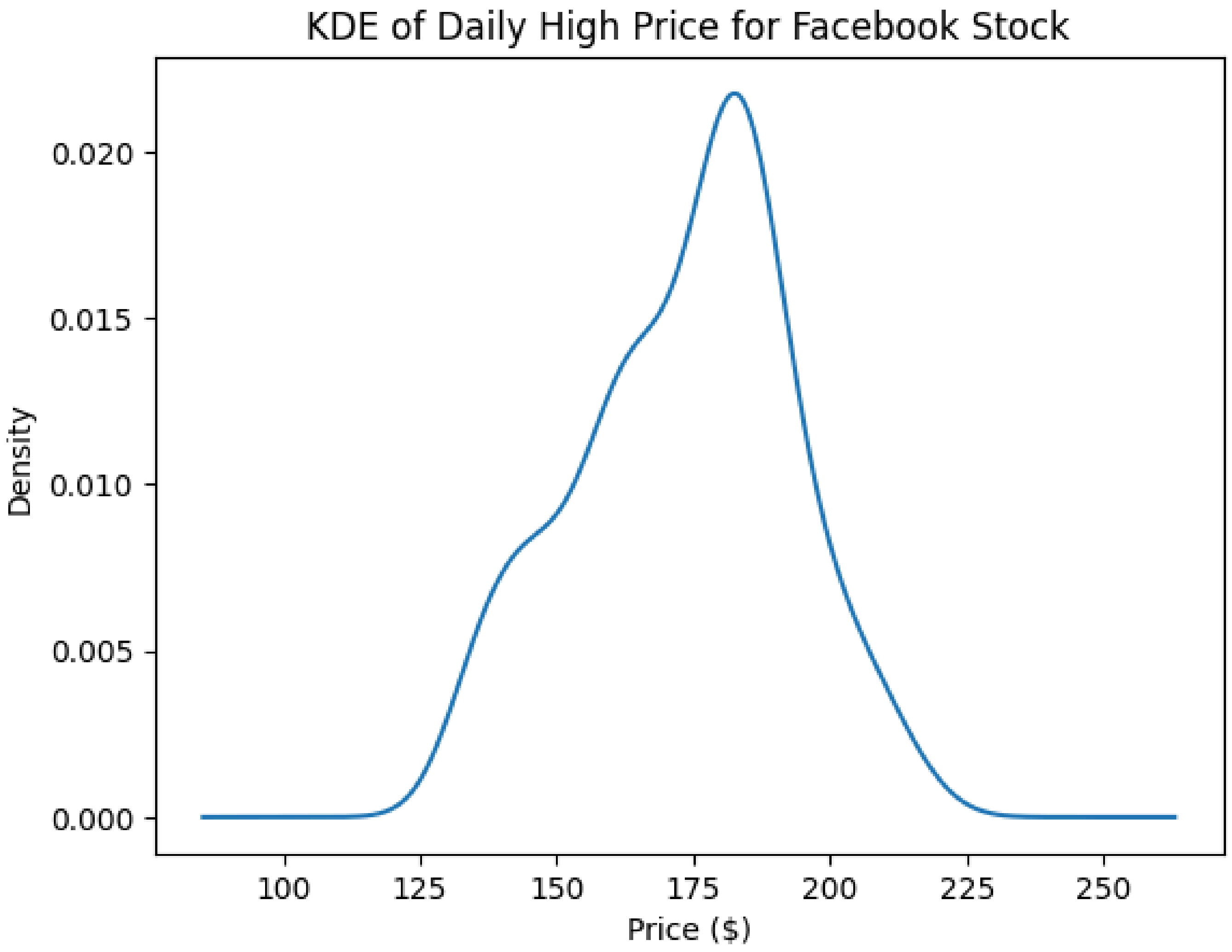
```
Text(0.5, 0, 'magnitude')
```



Kernel Density Estimation(KDE)

```
fb.high.plot(
kind='kde',
title='KDE of Daily High Price for Facebook Stock'
)
plt.xlabel('Price ($)')
```

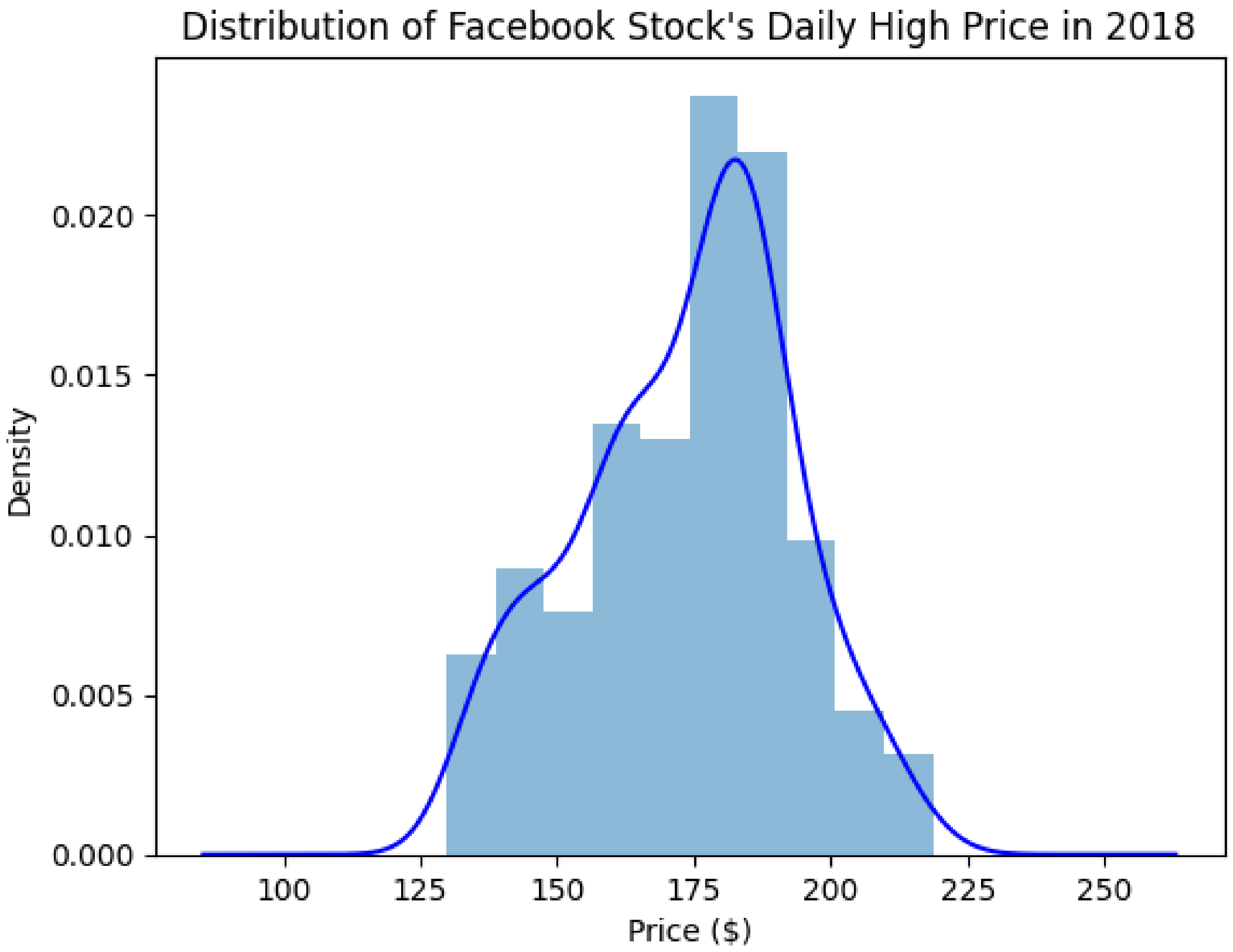
```
Text(0.5, 0, 'Price ($)')
```



Adding to the result of plot()

```
ax = fb.high.plot(kind='hist', density=True, alpha=0.5)
fb.high.plot(
    ax=ax, kind='kde', color='blue',
    title='Distribution of Facebook Stock\'s Daily High Price in 2018'
)
plt.xlabel('Price ($)')
```

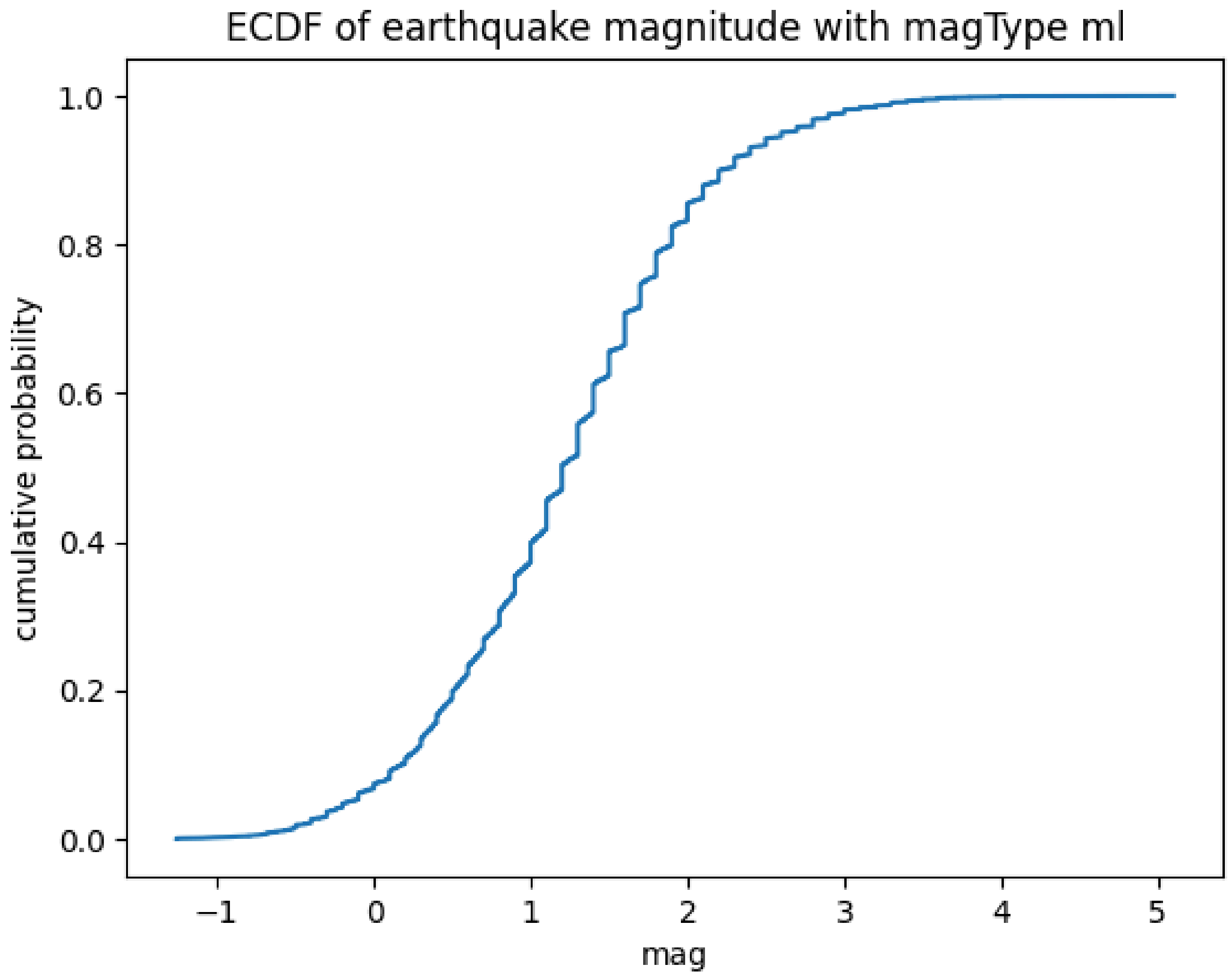
```
Text(0.5, 0, 'Price ($)')
```



Plotting the ECDF

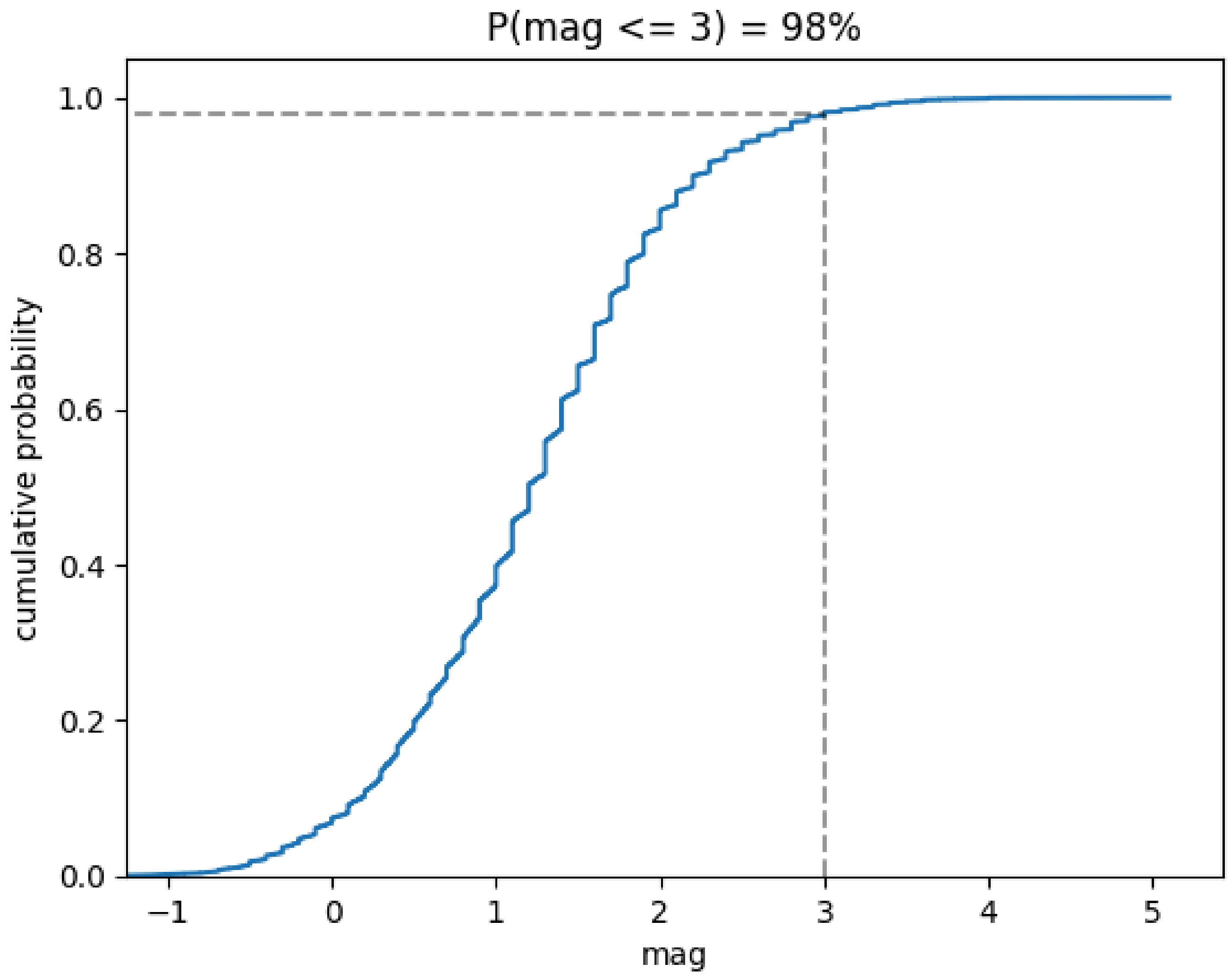
```
from statsmodels.distributions.empirical_distribution import ECDF

ecdf = ECDF(quakes.query('magType == "ml"').mag)
plt.plot(ecdf.x, ecdf.y)


plt.xlabel('mag') # add x-axis label
plt.ylabel('cumulative probability') # add y-axis label


plt.title('ECDF of earthquake magnitude with magType ml')
```

```
Text(0.5, 1.0, 'ECDF of earthquake magnitude with magType ml')
```



```
from statsmodels.distributions.empirical_distribution import ECDF
ecdf = ECDF(quakes.query('magType == "ml"').mag)
plt.plot(ecdf.x, ecdf.y)

# axis labels
plt.xlabel('mag') # add x-axis label
plt.ylabel('cumulative probability') # add y-axis label

# add reference lines for interpreting the ECDF for mag <= 3
plt.plot(
[3, 3], [0, .98], 'k--',
[-1.5, 3], [0.98, 0.98], 'k--', alpha=0.4
)

# set axis ranges
plt.ylim(0, None)
plt.xlim(-1.25, None)

# add a title
plt.title('P(mag <= 3) = 98%')
```

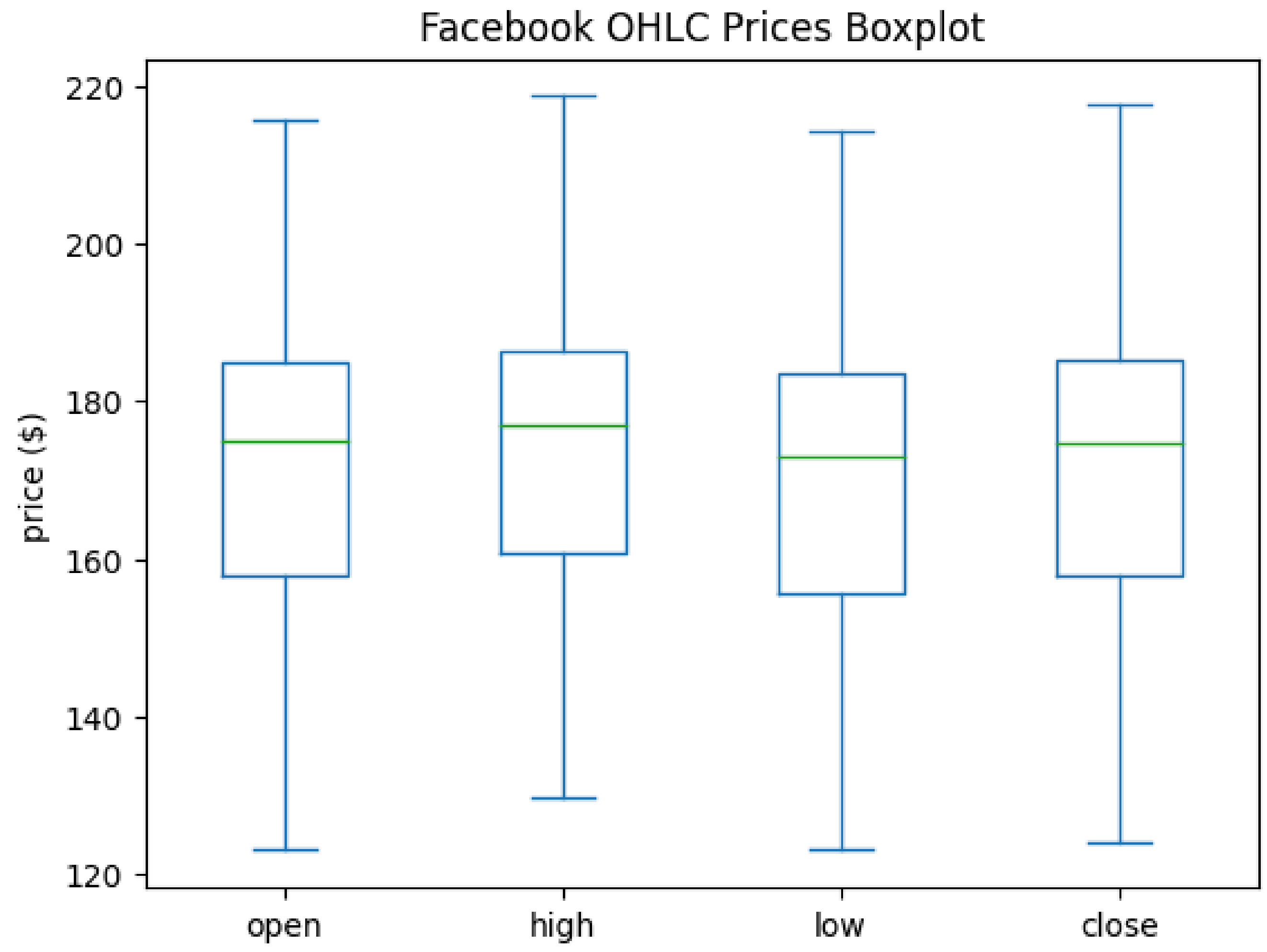
```
Text(0.5, 1.0, 'P(mag <= 3) = 98%')
```



Box Plots

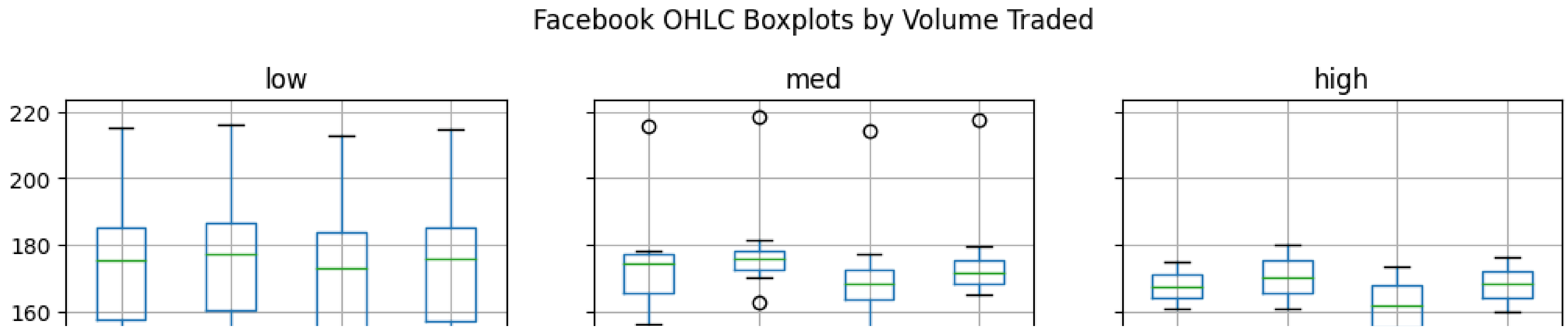
```
fb.iloc[:,:4].plot(kind='box', title='Facebook OHLC Prices Boxplot')
plt.ylabel('price ($)')
```

```
Text(0, 0.5, 'price ($)')
```



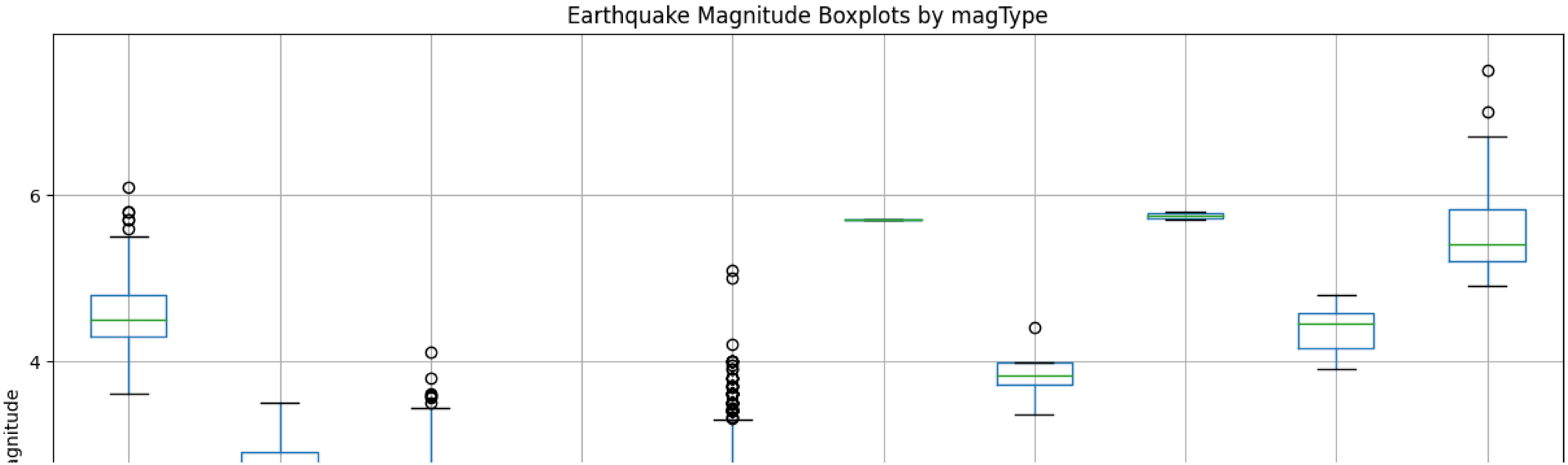
```
fb.assign(
    volume_bin=pd.cut(fb.volume, 3, labels=['low', 'med', 'high'])
).groupby('volume_bin').boxplot(
    column=['open', 'high', 'low', 'close'],
    layout=(1, 3), figsize=(12, 3)
)
plt.suptitle('Facebook OHLC Boxplots by Volume Traded', y=1.1)
```

```
Text(0.5, 1.1, 'Facebook OHLC Boxplots by Volume Traded')
```



```
quakes[['mag', 'magType']].groupby('magType').boxplot(
    figsize=(15, 8), subplots=False
)
plt.title('Earthquake Magnitude Boxplots by magType')
plt.ylabel('magnitude')
```

```
     Text(0, 0.5, 'magnitude')
```

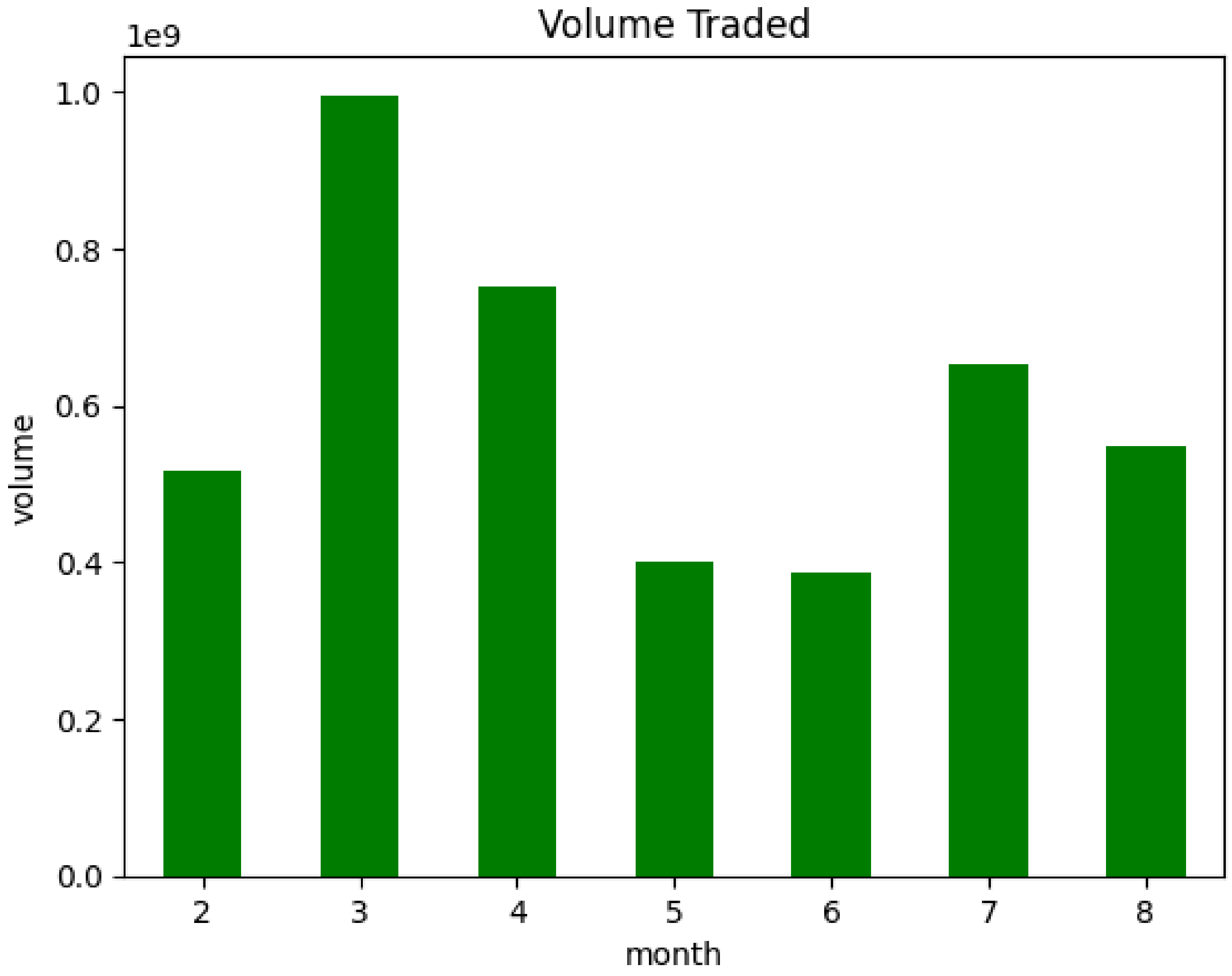


Counts and frequencies

Bar Charts

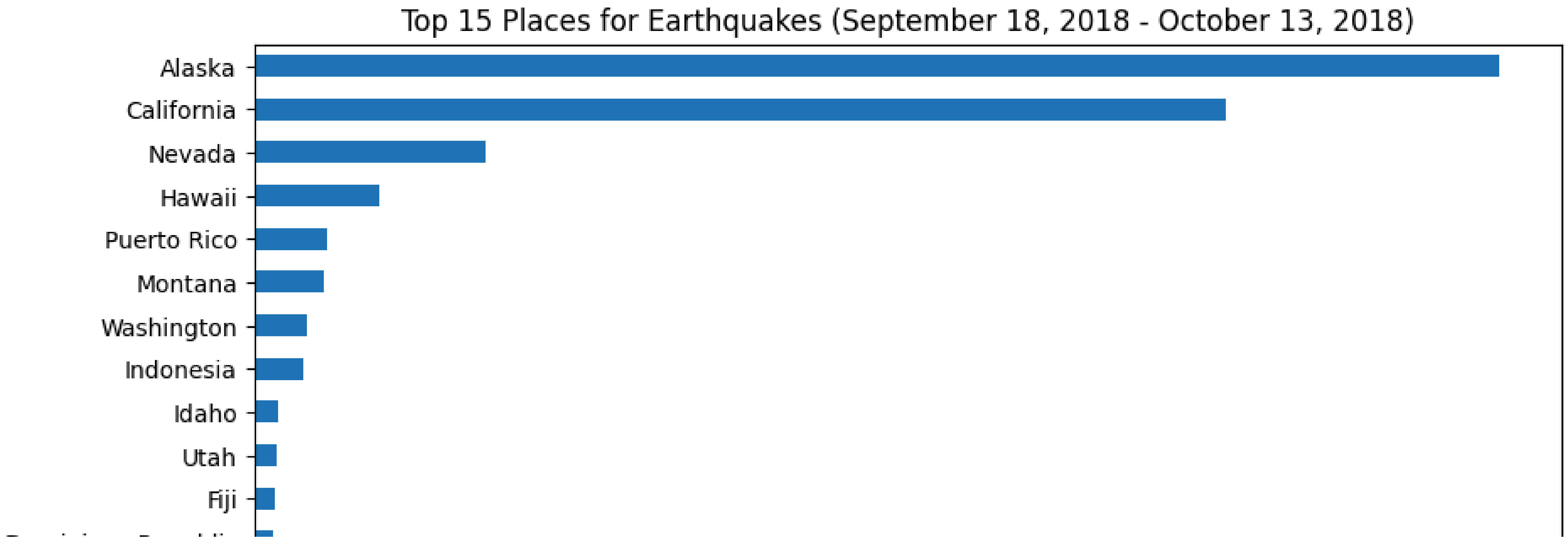
```
fb['2018-02':'2018-08'].assign(
month=lambda x: x.index.month
).groupby('month').sum().volume.plot.bar(
    color='green', rot=0, title='Volume Traded'
)
plt.ylabel('volume')
```

```
Text(0, 0.5, 'volume')
```



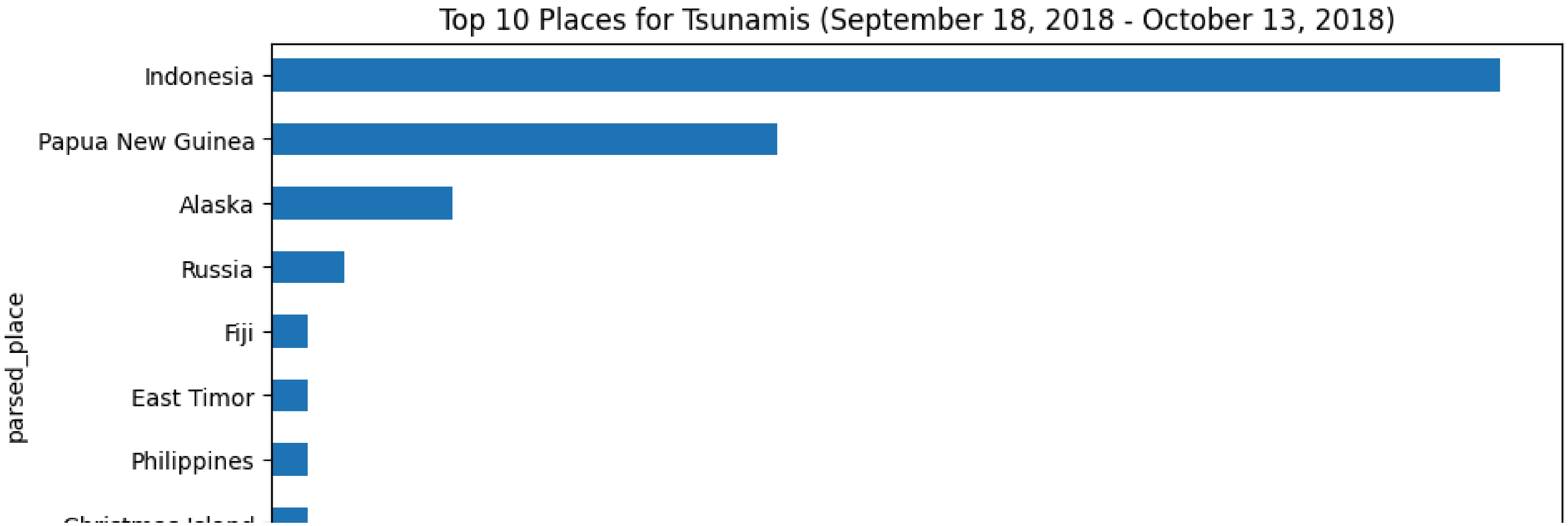
```
quakes.parsed_place.value_counts().iloc[14::-1,].plot(
    kind='barh', figsize=(10, 5),
    title='Top 15 Places for Earthquakes '\
    '(September 18, 2018 - October 13, 2018)'
)
plt.xlabel('earthquakes')
```

```
Text(0.5, 0, 'earthquakes')
```


Top 15 Places for Earthquakes (September 18, 2018 - October 13, 2018)

```
quakes.groupby('parsed_place').tsunami.sum().sort_values().iloc[-10::,].plot(
    kind='barh', figsize=(10, 5),
    title='Top 10 Places for Tsunamis '\
    '(September 18, 2018 - October 13, 2018)'
)
plt.xlabel('tsunamis')
```

```
Text(0.5, 0, 'tsunamis')
```


Top 10 Places for Tsunamis (September 18, 2018 - October 13, 2018)

```
indonesia_quakes = quakes.query('parsed_place == "Indonesia"').assign(
    time=lambda x: pd.to_datetime(x.time, unit='ms'),
    earthquake=1
).set_index('time').resample('1D').sum()

indonesia_quakes.index = indonesia_quakes.index.strftime('%b\n%d')

indonesia_quakes.plot(
    y=['earthquake', 'tsunami'], kind='bar', figsize=(15, 3), rot=0,
    label=['earthquakes', 'tsunamis'],
    title='Earthquakes and Tsunamis in Indonesia '\
    '(September 18, 2018 - October 13, 2018)'
)

plt.xlabel('date')
plt.ylabel('count')
```

```
<ipython-input-27-330cc7c00885>:4: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future version, numeric_only will defau
  ).set_index('time').resample('1D').sum()
Text(0, 0.5, 'count')
```

Earthquakes and Tsunamis in Indonesia (September 18, 2018 - October 13, 2018)
40
30
earthquakes
tsunamis

```
quakes.magType.value_counts().plot(
    kind='bar', title='Earthquakes Recorded per magType', rot=0
)

plt.xlabel('magType')
plt.ylabel('earthquakes')
```

```
Text(0, 0.5, 'earthquakes')
```