imports

In [2]:
```
import os
import requests
import json
import itertools
```

In [3]:
```
#Every request begins with the server's URL
SERVER = 'http://data.neonscience.org/api/v0/'
```

In [4]:
```
site_codes = [
    'UNDE',
    'WOOD',
    'CPER',
    'NIWO',
    'KONZ',
    'HARV',
    'SCBI',
    'OSBS',
    'TALL',
    'CLBJ',
    'SRER',
    'ONAQ',
    'SJER',
    'WREF',
    'YELL',
    'GUAN',
    'BONA',
    'TOOL',
    'PUUM',
    'ORNL'
]
```

In [6]:
```
#Define the url, using the sites/ endpoint
url = SERVER+'sites/'+site_codes[0]
print(url)
```

```
http://data.neonscience.org/api/v0/sites/UNDE
```

In [7]:
```
#Request the url
site_request = requests.get(url)

#Convert the request to Python JSON object
site_json = site_request.json()
```

In [8]:
```
#Use the 'keys' method to view the component of the uppermost json dictionary
site_json.keys()
```

Out[8]:
```
dict_keys(['data'])
```

In [9]:
```
#Access the 'data' component, and use the 'keys' method to view to componenets of the js
site_json['data'].keys()
```

Out[9]:
```
dict_keys(['siteCode', 'siteName', 'siteDescription', 'siteType', 'siteLatitude', 'siteL
ongitude', 'stateCode', 'stateName', 'domainCode', 'domainName', 'deimsId', 'releases',
'dataProducts'])
```

In [10]:
```
dict(itertools.islice(site_json['data'].items(),12))
```

Out[10]:
```
{'siteCode': 'UNDE',
 'siteName': 'University of Notre Dame Environmental Research Center NEON',
```

```
 'siteDescription': 'University of Notre Dame Environmental Research Center NEON',
 'siteType': 'CORE',
 'siteLatitude': 46.23391,
 'siteLongitude': -89.537254,
 'stateCode': 'MI',
 'stateName': 'Michigan',
 'domainCode': 'D05',
 'domainName': 'Great Lakes',
 'deimsId': 'https://deims.org/2f027d25-93c1-4af7-bfd1-36f2bbd24460',
 'releases': [{'release': 'RELEASE-2021',
   'generationDate': '2021-01-23T02:30:02Z',
   'url': 'https://data.neonscience.org/api/v0/releases/RELEASE-2021'},
  {'release': 'RELEASE-2022',
   'generationDate': '2022-01-20T17:39:46Z',
   'url': 'https://data.neonscience.org/api/v0/releases/RELEASE-2022'},
  {'release': 'RELEASE-2023',
   'generationDate': '2023-01-27T12:07:53Z',
   'url': 'https://data.neonscience.org/api/v0/releases/RELEASE-2023'}]}
```

In [11]:
```
#View a data product dictionary
site_json['data']['dataProducts'][-3]
```

Out[11]:
```
{'dataProductCode': 'DP3.30026.001',
 'dataProductTitle': 'Vegetation indices - spectrometer - mosaic',
 'availableMonths': ['2016-09', '2017-09', '2019-06', '2020-08'],
 'availableDataUrls': ['https://data.neonscience.org/api/v0/data/DP3.30026.001/UNDE/2016
-09',
  'https://data.neonscience.org/api/v0/data/DP3.30026.001/UNDE/2017-09',
  'https://data.neonscience.org/api/v0/data/DP3.30026.001/UNDE/2019-06',
  'https://data.neonscience.org/api/v0/data/DP3.30026.001/UNDE/2020-08'],
 'availableReleases': [{'release': 'RELEASE-2023',
   'availableMonths': ['2016-09', '2017-09', '2019-06', '2020-08']}]}
```

In [12]:
```
#View product code and name for every available data product
for product in site_json['data']['dataProducts']:
    print(product['dataProductCode'],product['dataProductTitle'])
```

```
DP1.00001.001 2D wind speed and direction
DP1.00002.001 Single aspirated air temperature
DP1.00003.001 Triple aspirated air temperature
DP1.00004.001 Barometric pressure
DP1.00005.001 IR biological temperature
DP1.00006.001 Precipitation
DP1.00013.001 Wet deposition chemical analysis
DP1.00014.001 Shortwave radiation (direct and diffuse pyranometer)
DP1.00022.001 Shortwave radiation (primary pyranometer)
DP1.00023.001 Shortwave and longwave radiation (net radiometer)
DP1.00024.001 Photosynthetically active radiation (PAR)
DP1.00033.001 Phenology images
DP1.00038.001 Stable isotopes in precipitation
DP1.00040.001 Soil heat flux plate
DP1.00041.001 Soil temperature
DP1.00042.001 Snow depth and understory phenology images
DP1.00043.001 Spectral sun photometer - calibrated sky radiances
DP1.00066.001 Photosynthetically active radiation (quantum line)
DP1.00094.001 Soil water content and water salinity
DP1.00095.001 Soil CO2 concentration
DP1.00096.001 Soil physical and chemical properties, Megapit
DP1.00098.001 Relative humidity
DP1.10003.001 Breeding landbird point counts
DP1.10010.001 Coarse downed wood log survey
DP1.10014.001 Coarse downed wood bulk density sampling
DP1.10017.001 Digital hemispheric photos of plot vegetation
DP1.10020.001 Ground beetle sequences DNA barcode
DP1.10022.001 Ground beetles sampled from pitfall traps
DP1.10023.001 Herbaceous clip harvest
```

```
DP1.10026.001 Plant foliar traits
DP1.10033.001 Litterfall and fine woody debris production and chemistry
DP1.10038.001 Mosquito sequences DNA barcode
DP1.10041.001 Mosquito pathogen status
DP1.10043.001 Mosquitoes sampled from CO2 traps
DP1.10047.001 Soil physical and chemical properties, distributed initial characterizatio
n
DP1.10055.001 Plant phenology observations
DP1.10058.001 Plant presence and percent cover
DP1.10064.001 Rodent pathogen status, hantavirus
DP1.10064.002 Rodent pathogen status, tick-borne
DP1.10066.001 Root biomass and chemistry, Megapit
DP1.10067.001 Root biomass and chemistry, periodic
DP1.10072.001 Small mammal box trapping
DP1.10076.001 Small mammal sequences DNA barcode
DP1.10081.001 Soil microbe community composition
DP1.10086.001 Soil physical and chemical properties, periodic
DP1.10092.001 Tick pathogen status
DP1.10093.001 Ticks sampled using drag cloths
DP1.10098.001 Vegetation structure
DP1.10104.001 Soil microbe biomass
DP1.10107.001 Soil microbe metagenome sequences
DP1.10108.001 Soil microbe marker gene sequences
DP1.10109.001 Soil microbe group abundances
DP1.10111.001 Site management and event reporting
DP1.30001.001 LiDAR slant range waveform
DP1.30003.001 Discrete return LiDAR point cloud
DP1.30006.001 Spectrometer orthorectified surface directional reflectance - flightline
DP1.30008.001 Spectrometer orthrorectified at-sensor radiance - flightline
DP1.30010.001 High-resolution orthorectified camera imagery
DP1.30012.001 Field spectral data
DP2.30011.001 Albedo - spectrometer - flightline
DP2.30012.001 LAI - spectrometer - flightline
DP2.30014.001 fPAR - spectrometer - flightline
DP2.30019.001 Canopy water indices - flightline
DP2.30026.001 Vegetation indices - spectrometer - flightline
DP3.30006.001 Spectrometer orthorectified surface directional reflectance - mosaic
DP3.30010.001 High-resolution orthorectified camera imagery mosaic
DP3.30011.001 Albedo - spectrometer - mosaic
DP3.30012.001 LAI - spectrometer - mosaic
DP3.30014.001 fPAR - spectrometer - mosaic
DP3.30015.001 Ecosystem structure
DP3.30019.001 Canopy water indices - mosaic
DP3.30024.001 Elevation - LiDAR
DP3.30025.001 Slope and Aspect - LiDAR
DP3.30026.001 Vegetation indices - spectrometer - mosaic
DP4.00001.001 Summary weather statistics
DP4.00200.001 Bundled data products - eddy covariance
```

In [13]:
```
PRODUCTCODE = 'DP1.10058.001'
```

In [14]:
```
#Get available months of Ecosystem structure data products for TEAK site
#Loop through the 'dataProducts' list items (each one is a dictionary) at the site
for product in site_json['data']['dataProducts']:
    #if a list item's 'dataProductCode' dict element equals the product code string
    if(product['dataProductCode'] == PRODUCTCODE):
        #print the available months
        print('Available Months: ',product['availableMonths'])
        print('URLs for each Month:')
        #print the available URLs
        for url in product['availableDataUrls']:
            print(url)
```

```
Available Months:  ['2014-06', '2014-07', '2015-06', '2015-07', '2016-06', '2016-07', '2
016-08', '2017-05', '2017-06', '2017-07', '2018-06', '2018-07', '2019-06', '2019-07', '2
```

```
020-06', '2020-07', '2020-10', '2021-06', '2021-07', '2022-06', '2022-07', '2022-08']
URLs for each Month:
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2014-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2014-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2015-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2015-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2016-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2016-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2016-08
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2017-05
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2017-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2017-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2018-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2018-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2019-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2019-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2020-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2020-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2020-10
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2021-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2021-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2022-06
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2022-07
https://data.neonscience.org/api/v0/data/DP1.10058.001/UNDE/2022-08
```

In [16]:
```
#Make Request
data_request = requests.get(SERVER+'data/'+PRODUCTCODE+'/'+site_codes[0]+'/'+'2018-06')
data_json = data_request.json()
```

In [17]:
```
#Print dict key for 'data' element of data JSON
print(data_json['data'].keys())
```

```
dict_keys(['productCode', 'siteCode', 'month', 'release', 'packages', 'files'])
```

In [21]:
```
#View keys and values in first file dict
for file in data_json['data']['files']:
    print('--------------------')
    for key in file.keys(): #Loop through keys of the data file dict
        print(key,':\t', file[key])
```

```
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_10m2Data100m2Data.2018-06.basic.20230112T002127
Z.csv
size :   186424
md5 :    1f76312158d377f8a0654edf038b0f33
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP1.10058.001.div_10m2Data100m2Da
ta.2018-06.basic.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.variables.20230112T002127Z.csv
size :   24071
md5 :    aa8753ef5d22f871758d18dd17a2851f
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP1.10058.001.variables.20230112T
002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_1m2Data.2018-06.basic.20230112T002127Z.csv
size :   413032
md5 :    88f1d11e05e9a5af0ebd58ac579c5ebd
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
```

```
E/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP1.10058.001.div_1m2Data.2018-0
6.basic.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.EML.20180611-20180614.20230127T120753Z.xml
size :   262566
md5 :    33da7c1f430ce7b07df9de7ea7242549
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/release/tag/RELEASE-2023/NEON.D
OM.SITE.DP1.10058.001/UNDE/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP1.1005
8.001.EML.20180611-20180614.20230127T120753Z.xml
--------------------
name :   NEON.D05.UNDE.DP0.10058.001.validation.20230112T002127Z.csv
size :   26966
md5 :    9c2d7ab7fc430dd5c8ae4baf366876fc
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP0.10058.001.validation.20230112
T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.readme.20230127T120753Z.txt
size :   15330
md5 :    2a1b8c723d79b8c1a4b88ba908a1fa3c
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/release/tag/RELEASE-2023/NEON.D
OM.SITE.DP1.10058.001/UNDE/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP1.1005
8.001.readme.20230127T120753Z.txt
--------------------
name :   NEON.D05.UNDE.DP0.10058.001.categoricalCodes.20230112T002127Z.csv
size :   12694
md5 :    1c9dd1cd2e4459b430eed80c182d58b3
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/basic/NEON.D05.UNDE.DP0.10058.001.categoricalCodes.20
230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_10m2Data100m2Data.2018-06.expanded.20230112T002
127Z.csv
size :   186424
md5 :    1f76312158d377f8a0654edf038b0f33
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.div_10m2Data100m
2Data.2018-06.expanded.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.variables.20230112T002127Z.csv
size :   24071
md5 :    aa8753ef5d22f871758d18dd17a2851f
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.variables.202301
12T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_voucher.expanded.20230112T002127Z.csv
size :   41322
md5 :    4371b08d9919d74fdacda2985e0afdac
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.div_voucher.expa
nded.20230112T002127Z.csv
```

```
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.readme.20230127T120753Z.txt
size :   15647
md5 :    31b7f8723f0376eea9a472b25c7e9583
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/release/tag/RELEASE-2023/NEON.D
OM.SITE.DP1.10058.001/UNDE/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.1
0058.001.readme.20230127T120753Z.txt
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_geneticarchive.expanded.20230112T002127Z.csv
size :   11700
md5 :    55a186989d726970c9e8575058af0844
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.div_geneticarchi
ve.expanded.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_1m2Data.2018-06.expanded.20230112T002127Z.csv
size :   413032
md5 :    88f1d11e05e9a5af0ebd58ac579c5ebd
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.div_1m2Data.2018
-06.expanded.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP0.10058.001.validation.20230112T002127Z.csv
size :   26966
md5 :    9c2d7ab7fc430dd5c8ae4baf366876fc
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP0.10058.001.validation.20230
112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.EML.20180611-20180614.20230127T120753Z.xml
size :   388983
md5 :    b26d720d05d5a9abdd45d6aad500b27b
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/release/tag/RELEASE-2023/NEON.D
OM.SITE.DP1.10058.001/UNDE/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.1
0058.001.EML.20180611-20180614.20230127T120753Z.xml
--------------------
name :   NEON.D05.UNDE.DP1.10058.001.div_morphospecies.expanded.20230112T002127Z.csv
size :   107489
md5 :    9c638e10968d8e4129289636ca872f8b
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP1.10058.001.div_morphospecie
s.expanded.20230112T002127Z.csv
--------------------
name :   NEON.D05.UNDE.DP0.10058.001.categoricalCodes.20230112T002127Z.csv
size :   12694
md5 :    1c9dd1cd2e4459b430eed80c182d58b3
crc32 :  None
crc32c :         None
url :    https://storage.googleapis.com/neon-publication/NEON.DOM.SITE.DP1.10058.001/UND
E/20180601T000000--20180701T000000/expanded/NEON.D05.UNDE.DP0.10058.001.categoricalCode
s.20230112T002127Z.csv
```

In [ ]:
```
import urllib.request
```

```
urllib.request.urlretrieve("http://www.example.com/songs/mp3.mp3", "mp3.mp3")
```