



neon
Operated by Battelle

A visual guide to accessing NEON data

Please view included slide notes throughout the presentation for additional details

Updated 6 February 2020

Slideshow Sections



Discover NEON Data

Explore and Download NEON Data from Data Portal

Special Cases for Downloading NEON Data

Understand Downloaded Data Structure

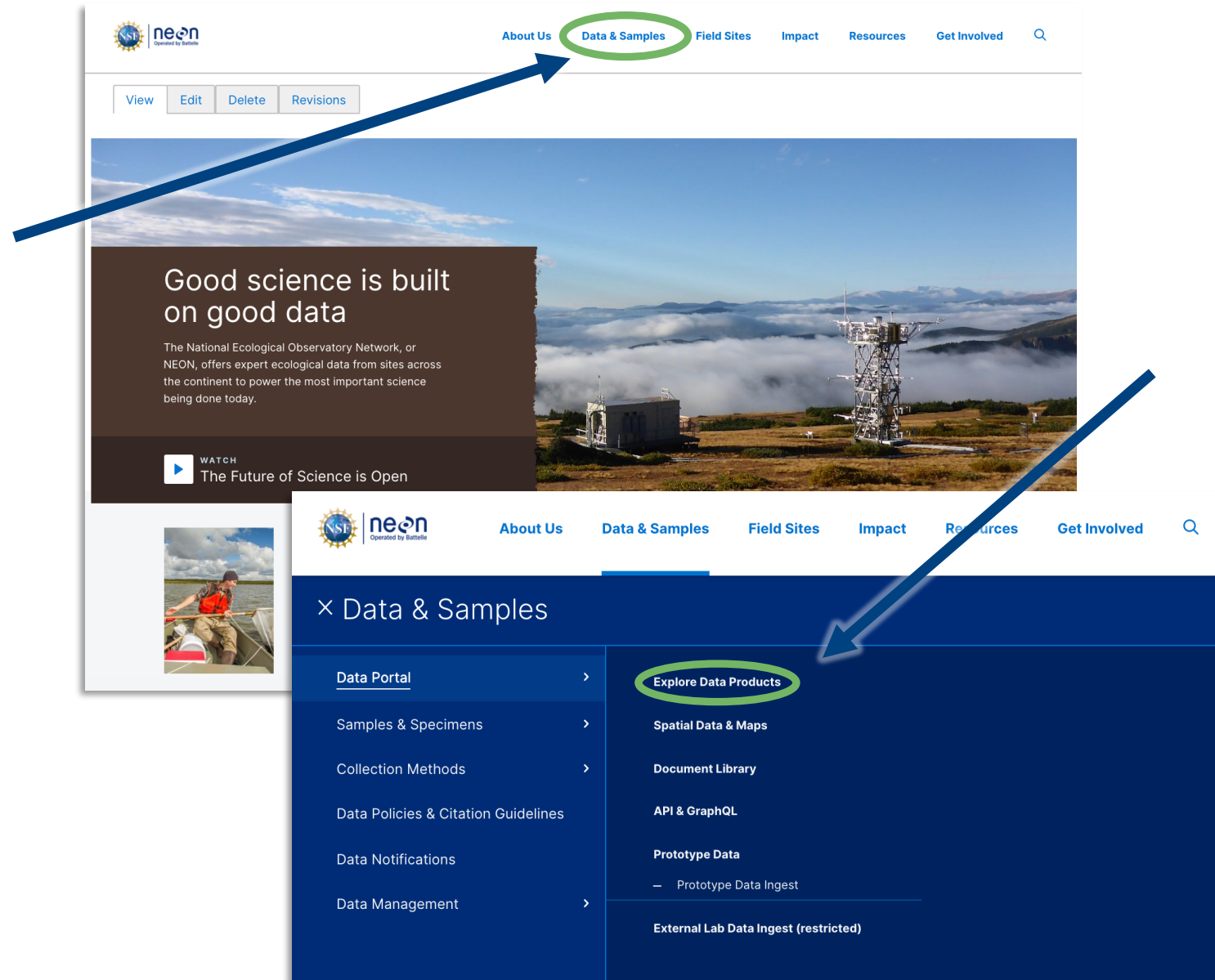
Additional Important Pages & Information

Discover NEON Data

- NEONScience.org
- NEONScience.org/data

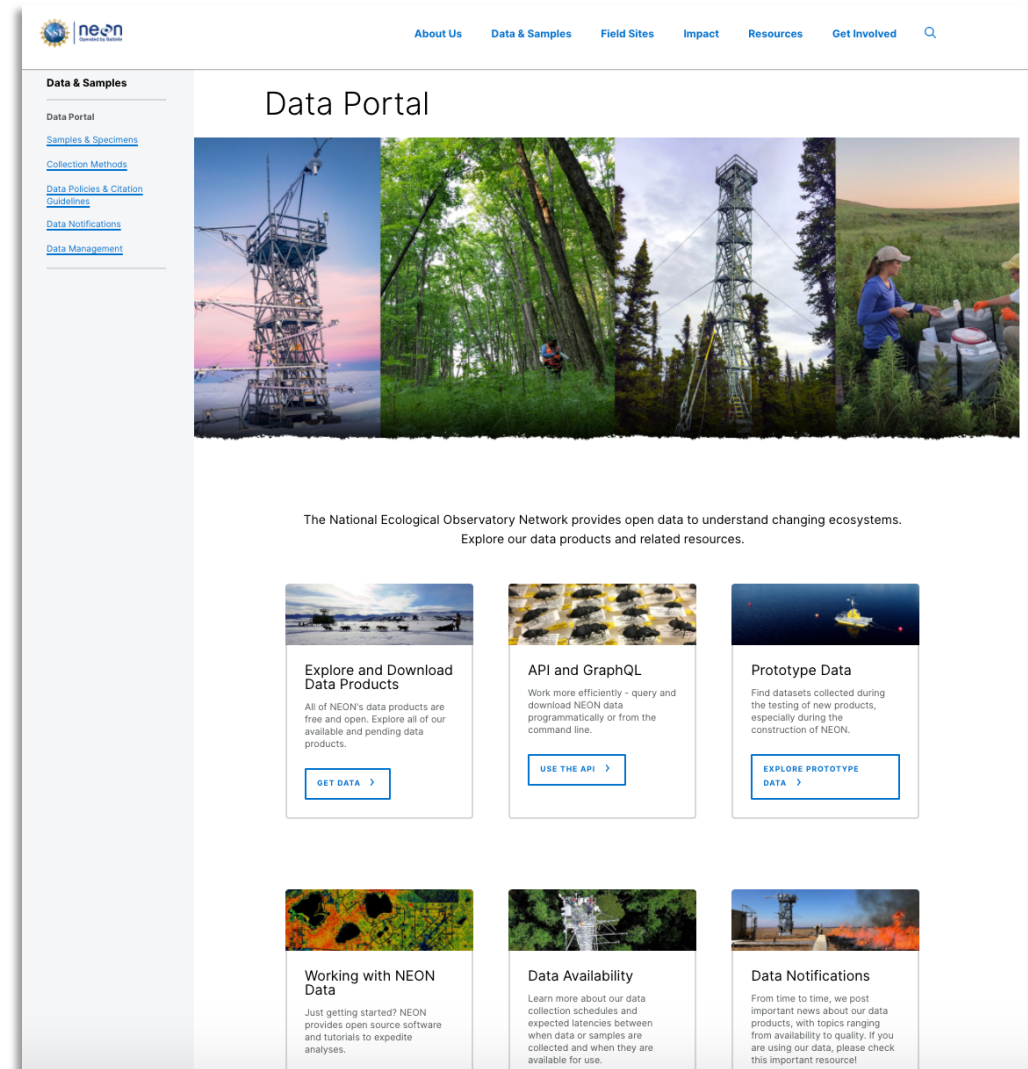
NEONScience.org

- Overview of data collection
- Field site maps
- Information for researchers
- Using NEON Infrastructure
- Access to the NEON Data Portal



NEONscience.org/data

- Explore and download data
- Information on programmatic access to NEON data
 - API
 - Code packages
- Access data product user guides, detailed protocols, and other important documents
- News on product updates and versions



Explore & Download Data From Portal

- Explore Data Page
 - Download Tabular Data Including:
 - Instrumented Sampling
 - Observational Sampling

Explore data

Step 1

Data Portal



The National Ecological Observatory Network provides open data to understand changing ecosystems.
Explore our data products and related resources.



Explore and Download Data Products

All of NEON's data products are free and open. Explore all of our available and pending data products.

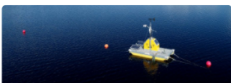
GET DATA >



API and GraphQL

Work more efficiently - query and download NEON data programmatically or from the command line.

USE THE API >



Prototype Data

Find datasets collected during the testing of new products, especially during the construction of NEON.

EXPLORE PROTOTYPE DATA >

Step 2

Filter

RESET ALL FILTERS

Search

Utah, "snow depth", 2020, etc...

Use several terms to match products having any term (term OR term). Quote terms to match phrases (e.g. "wind speed"). [Browse keywords](#) for ideas.

Release

Latest and Provisional

Data in the latest release in addition to provisional data (not yet in any release)

181 data products

Available Dates

Show products that have any data available between two dates.

FILTER ON AVAILABLE DATES...

Data Status

☐ Available 163

☐ Coming Soon 18

Visualizations

☐ Time Series Viewer 34

☐ AOP Data Viewer 2

Science Team

☐ Airborne Observation Platform (AOP) 29

☐ Aquatic Instrument System (AIS) 22

☐ Aquatic Observation System (AOS) 37

[Data & Samples](#) / [Data Portal](#) / Explore Data Products

Explore Data Products

All Products

181 products from 81 sites Data available Dec 2010 - Mar 2021

Download Full Catalog: [CSV](#) | [JSON](#) | [PDF](#)

Filtered Products

no filters currently applied

Sort

Available data products will always show above *Coming Soon* data products, except when sorting by search relevance.

by Product Name

↓

↑

Showing first 10 of 181 total products

2D wind speed and direction

DP1.00001.001

DOWNLOAD DATA

PRODUCT DETAILS

Two-dimensional wind speed and direction, available as two- and thirty-minute aggregations of 1 Hz observations. Observations are made by 2-D sonic anemometer sensors located at multiple heights on the tower infrastructure and by 2-D sonic anemometer sensors located on the aquatic meteorological station.

Available Dates

2013-09 through 2021-02

Data Themes

1

Visualize Data

TIME SERIES VIEWER

Key: ☒ Available ☐ No data

View By: [SUMMARY](#) [SITE](#) [STATE](#) [DOMAIN](#)



3D wind attitude and motion reference

DP1.00010.001

DOWNLOAD DATA

PRODUCT DETAILS

Measurement of 3D anemometer attitude and motion.

This data product is bundled into [Bundled data products - eddy covariance \(DP4.00200.001\)](#). It is not available as a standalone download. Data availability shown below reflects availability of the entire bundle.

Available Dates

Data Themes

Explore data: Filter to find data products of interest

Remove all filters

Filter by keyword

Filter by category

- Data status
- Themes
- States
- Domains
- Sites
- Data teams

The screenshot displays the NEON Data Portal interface. On the left, a 'Filter' sidebar contains sections for 'Search' (with a text input containing 'carbon'), 'Release' (set to 'Latest and Provisional'), 'Available Dates' (with a date range filter), 'Data Status' (checkboxes for 'Available' and 'Coming Soon'), 'Visualizations' (checkboxes for 'Time Series Viewer' and 'AOP Data Viewer'), and 'Science Team' (checkboxes for various observation and instrument systems). The main content area is titled 'Explore Data Products' and shows 'All Products' (181 products) and 'Filtered Products' (35 products). It includes a 'Sort' section, a 'Sediment chemical properties' data product entry with a 'DOWNLOAD DATA' button, and a 'Root stable isotopes' data product entry. A 'Data Themes' visualization shows a timeline from 2014 to 2021. A yellow box at the bottom of the 'Root stable isotopes' entry states: 'This data product has been split and bundled into more than one parent data product: Root biomass and chemistry, Megaplot (DP110066.001) and Root biomass and chemistry, periodic (DP110067.001). It is not available as a standalone download. Data availability information and product download is only available through the parent products.'

Results of searching for “carbon”

Explore data: Key information

The screenshot shows the NEON data portal interface for the product 'Chemical properties of surface water'. The interface includes a summary section, a product ID, available dates, a monthly availability bar chart, data themes, and buttons for downloading data and viewing product details. Annotations with arrows point to various parts of the interface:

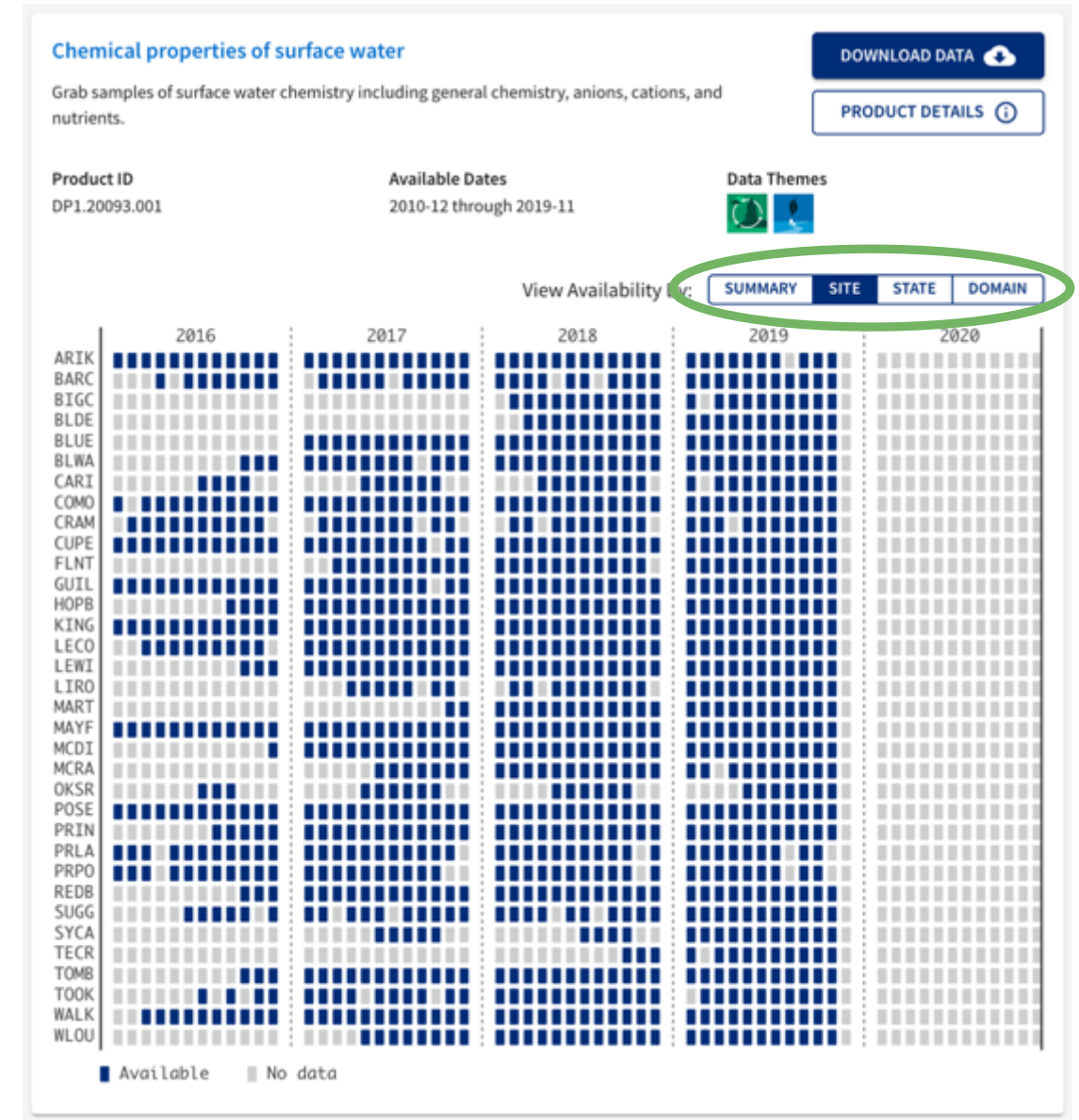
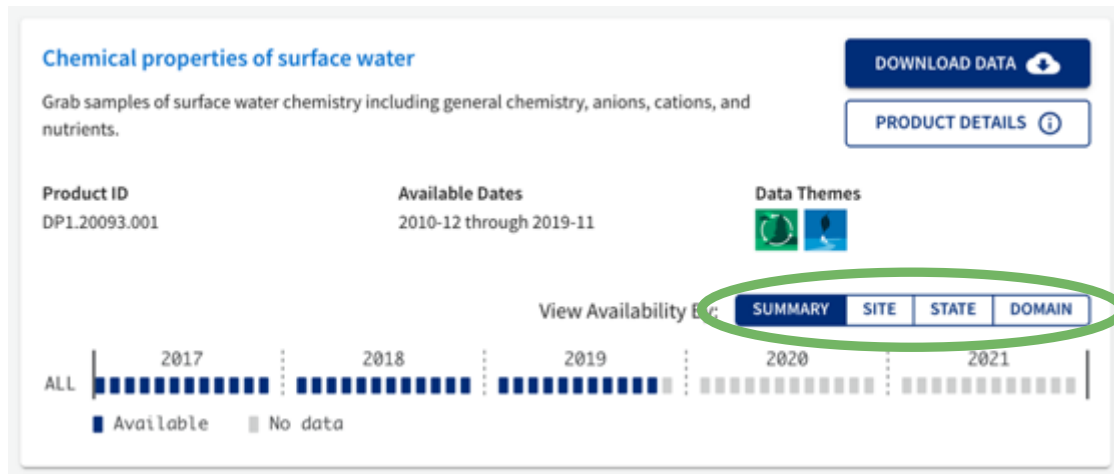
- Summary information**: Points to the product title and description.
- Data product name**: Points to the product title.
- Data product number**: Points to the Product ID.
- Available Dates**: Points to the date range '2010-12 through 2019-11'.
- Data availability by month**: Points to the bar chart showing availability by month. The legend indicates: Blue: currently available for download; Grey: not available for download.
- Associated data themes**: Points to the 'Data Themes' section.
- Move to next step to download data**: Points to the 'DOWNLOAD DATA' button.
- Go to data product page to get details & associated documents**: Points to the 'PRODUCT DETAILS' button.

Data availability by month

- Blue: currently available for download
- Grey: not available for download

Year	2017	2018	2019	2020	2021
Available	12 months	12 months	12 months	12 months	12 months
No data	0 months	0 months	0 months	0 months	0 months

Explore data: View data availability



Configure data download - Part 1

Select Download Data when you are ready to configure a data download

Chemical properties of surface water

Grab samples of surface water chemistry including general chemistry, anions, cations, and nutrients.

Product ID
DP1.20093.001

Available Dates
2010-12 through 2019-11

Data Themes

Download Data

Product Details

View Availability By: **SUMMARY** **SITE** **STATE** **DOMAIN**

	2016	2017	2018	2019	2020
ARIK	Available	Available	Available	Available	No data
BARC	Available	Available	Available	Available	No data
BIGC	Available	Available	Available	Available	No data
BLDE	Available	Available	Available	Available	No data
BLUE	Available	Available	Available	Available	No data
BLWA	Available	Available	Available	Available	No data
CARI	Available	Available	Available	Available	No data
COMO	Available	Available	Available	Available	No data
CRAM	Available	Available	Available	Available	No data
CUPE	Available	Available	Available	Available	No data
FLNT	Available	Available	Available	Available	No data
GUIL	Available	Available	Available	Available	No data
HOPB	Available	Available	Available	Available	No data
KING	Available	Available	Available	Available	No data
LECO	Available	Available	Available	Available	No data
LEWI	Available	Available	Available	Available	No data
LIRO	Available	Available	Available	Available	No data
MART	Available	Available	Available	Available	No data
MAYF	Available	Available	Available	Available	No data
MCDI	Available	Available	Available	Available	No data
MCRA	Available	Available	Available	Available	No data
OKSR	Available	Available	Available	Available	No data
POSE	Available	Available	Available	Available	No data
PRIN	Available	Available	Available	Available	No data
PRLA	Available	Available	Available	Available	No data
PRPO	Available	Available	Available	Available	No data
REDB	Available	Available	Available	Available	No data
SUGG	Available	Available	Available	Available	No data
SYCA	Available	Available	Available	Available	No data
TECR	Available	Available	Available	Available	No data
TOMB	Available	Available	Available	Available	No data
TOOK	Available	Available	Available	Available	No data
WALK	Available	Available	Available	Available	No data
WLOU	Available	Available	Available	Available	No data

■ Available ■ No data

Configure data download - Part 2

1.1 Select date range of interest

1.2 Select area(s) of interest by clicking on appropriate line(s)

1.3 Click the 'Next' button.

The screenshot shows the 'Configure Data for Download' page for 'Chemical properties of surface water' (DP1.20993.001). The page has a progress bar with five steps: 'Sites and Date Range' (checked), 'Documentation' (checked), 'Package Type' (1), 'Policies' (4), and 'Summary' (star). A green circle highlights the 'NEXT >' button in the top right corner. Below the progress bar, the 'What sites and dates do you want?' section is visible. It includes a 'Date Range' selector with 'Start' set to 'December 2018' and 'End' set to 'November 2019'. Below this is a 'View Availability By' section with tabs for 'SUMMARY', 'SITE', 'STATE', and 'DOMAIN'. The 'SITE' tab is selected, showing a grid of data availability for various sites (ARIK, BARK, BIGC, BLUE, BLWA, CARL, COMO, CRAW, CUPE, FLNT, GUTL, HOPR, KING, LECO, LEWI, LIRO, MART, MAYI, MC01, MCRA, OKSR, POSE, PRIN, PRLA, PRPO, REDB, SUGG, SYCA, TECR, TOMB, TOOK, WALK, WLOU) across years from 2013 to 2021. A blue box highlights the 'All sites selected' option in the legend at the bottom. A legend at the bottom indicates: 'Available' (blue square), 'No data' (grey square), 'All sites selected' (blue square), and 'Some sites selected' (blue square).

Configure data download - Part 3

2. Select inclusion of documents

3. Select document package type

4. Agree to NEON policies

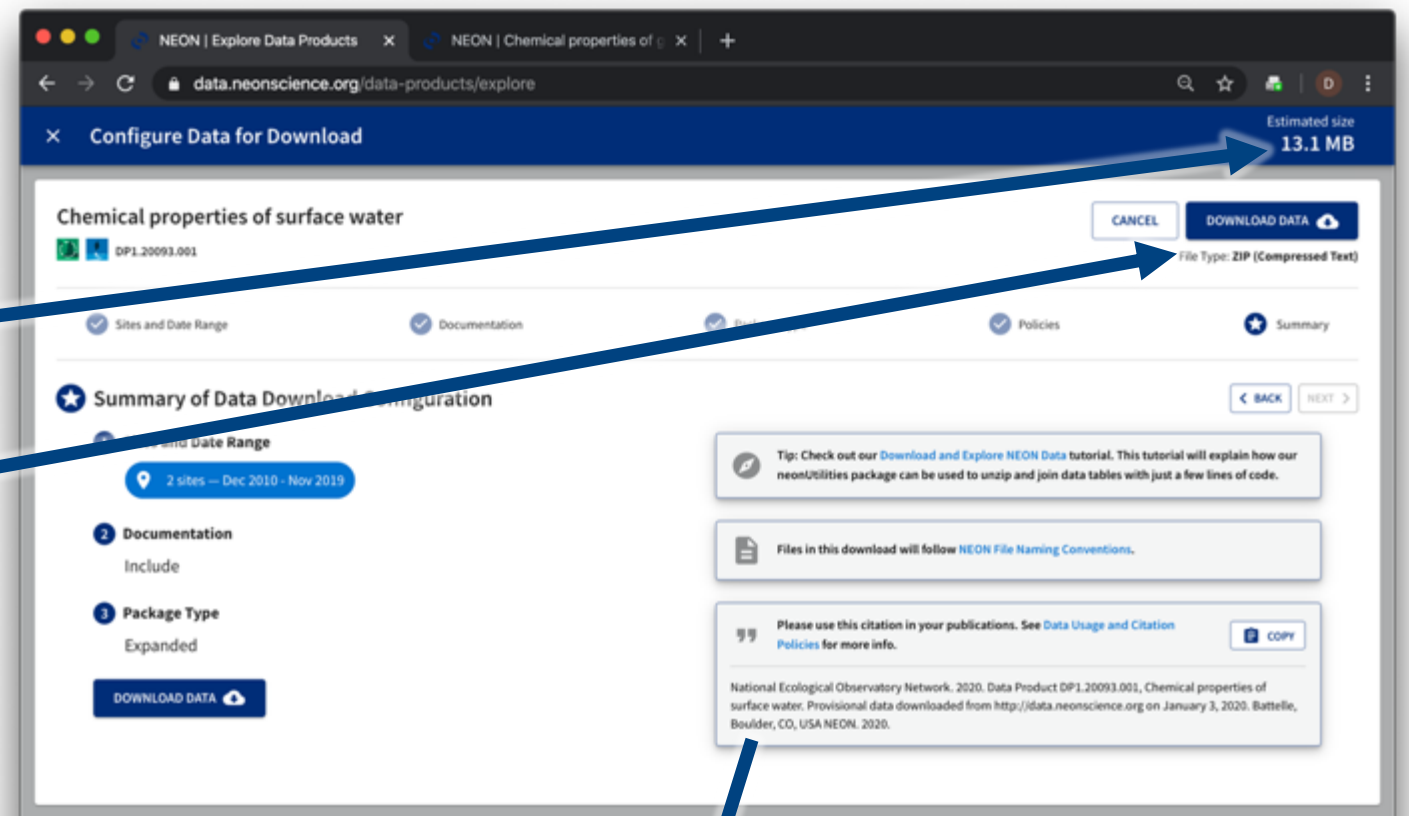
The image displays three sequential screenshots of the NEON data download configuration interface for the dataset "Chemical properties of surface water" (DP1.20093.001). Each screenshot shows a progress bar at the top with five steps: "Sites and Date Range", "Documentation", "Package Type", "Policies", and "Summary".

- Step 2: Do you want to include documentation?** The "Include" option is selected, indicating that relevant documents for this Data Product will be included. An information box notes that EML files are included in all downloads and directs users to the NEON FAQ and KNB for more information.
- Step 3: Which package type do you want?** The "Expanded" option is selected, indicating that the download package will include metadata associated with in-house alkalinity and ANC titrations, and method detection limits from the analytical laboratory.
- Step 4: Agree to Policies** The user is prompted to agree to the NEON Data Usage and Citation Policies. The checkbox for agreement is currently unchecked.

Each screenshot includes "CANCEL" and "DOWNLOAD DATA" buttons at the top right, and "BACK" and "NEXT" navigation buttons at the bottom right of the configuration area.

Configure data download - Part 4

5. Check file size
6. Click Download Data
7. Use the recommended citation!



Please use this citation in your publications. See [Data Usage and Citation Policies](#) for more info.



COPY

National Ecological Observatory Network. 2020. Data Product DP1.20093.001, Chemical properties of surface water. Provisional data downloaded from <http://data.neonscience.org> on January 3, 2020. Battelle, Boulder, CO, USA NEON. 2020.

Special Cases for Downloading Data

- Aerial Observation Platform (AOP) Data:
 - LiDAR
 - Hyperspectral
 - Aerial Imagery
- Phenocam & Genomics Data from Partner Organizations

Aerial Observation Platform (AOP) Data

NEON's remotely sensed data, such as lidar, hyperspectral, and aerial imagery data, are very large files. NEON delivers them as 1km² tiles or flightlines.

To download this data, in addition to data product, site, and date range, you have to select which files you want to download.

You can also explore some types of AOP data through a visual browser.

Sites (none selected) [MAP](#)

- ☐ ABBY Abby Road NEON, WA (93)
- ☐ ARIK Arkansas River NEON, CO (73)
- ☐ BARC Lake Barco NEON, FL (47)
- ☐ BARR Utqiagvik NEON, AK (90)
- ☐ BART Bartlett Experimental Forest NEON, NH (98)

[+ VIEW ALL \(81\)](#)

States (none selected) [MAP](#)

- ☐ Alabama (157)
- ☐ Alaska (158)
- ☐ Arizona (139)
- ☐ California (143)
- ☐ Colorado (149)

[+ VIEW ALL \(25\)](#)

Domains (none selected) [MAP](#)

- ☐ D01 Northeast (147)
- ☐ D02 Mid-Atlantic (146)
- ☐ D03 Southeast (145)
- ☐ D04 Atlantic Neotropical (144)
- ☐ D05 Great Lakes (145)

[+ VIEW ALL \(20\)](#)

LIDAR slant range waveform [DP1.30001.001](#) [DOWNLOAD DATA](#) [PRODUCT DETAILS](#)

Outgoing pulse and slant range return waveform signals with geolocation information provided. Data are provided by flightline in the Pulsewaves format.

Available Dates 2013-06 through 2020-09

Data Themes

Key: ☒ Available ☐ No data

View By: [SUMMARY](#) [SITE](#) [STATE](#) [DOMAIN](#)

Slope and Aspect - LIDAR [DP3.30025.001](#) [DOWNLOAD DATA](#) [PRODUCT DETAILS](#)

Slope is a ratio of rise over run (height over distance) of the bare earth elevation product given in degrees; aspect is the direction of the steepest slope of the bare earth elevation product (e.g., north... [More](#) >)

Available Dates 2013-06 through 2020-09

Data Themes

Key: ☒ Available ☐ No data

View By: [SUMMARY](#) [SITE](#) [STATE](#) [DOMAIN](#)

Ecosystem structure [DP3.30015.001](#) [DOWNLOAD DATA](#) [PRODUCT DETAILS](#)

Height of the top of canopy above bare earth (Canopy Height Model (CHM)); data are mosaicked over AOP footprint; mosaicked onto a spatially uniform grid at 1 m spatial resolution in 1 km by 1 km tiles.

Available Dates 2013-06 through 2020-09

Data Themes

Key: ☒ Available ☐ No data

View By: [SUMMARY](#) [SITE](#) [STATE](#) [DOMAIN](#)

Configure data download - Part 1

1.1 Select date range of interest

1.2 Select area(s) of interest by clicking on appropriate line(s)

1.3 Click the 'Next' button.

The screenshot shows the 'Configure Data for Download' interface in the NEON Data Explorer. The progress bar indicates the following steps: 1. Sites and Date Range (active), 2. Files, 3. Documentation, 4. Policies, and 5. Summary. The 'Sites and Date Range' step is active, showing a list of sites and a date range selector. A blue arrow points to the 'NEXT' button, which is circled in green. Another blue arrow points to the '1 site' button.

Configure data download - Part 2

2.1 Select all files in package, or subset by Site, Date, Visit #, Name, or file Type

2.2 Check the estimated file size!

2.3 Click Next when ready

Estimated size (uncompressed) 348 MB

92 files selected (348 MB uncompressed)

	Site	Date	Visit	Name	Type	Size
<input checked="" type="checkbox"/>	ABBY	2019-07		NEON_D16_ABBY_DP3_554000_506000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_556000_5067000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_551000_5064000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_554000_5071000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_556000_5062000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_555000_5068000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_555000_5063000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_552000_5068000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_552000_5070000_CHM	tif	3.82 MB
<input checked="" type="checkbox"/>	ABBY	2019-07	3	NEON_D16_ABBY_DP3_550000_5063000_CHM	tif	3.82 MB

Configure data download - Part 3

3. Select inclusion of documents

4. Agree to NEON policies

5. Ready to download

The image displays three sequential screenshots of the NEON data download configuration interface, specifically focusing on steps 3, 4, and 5 of the process.

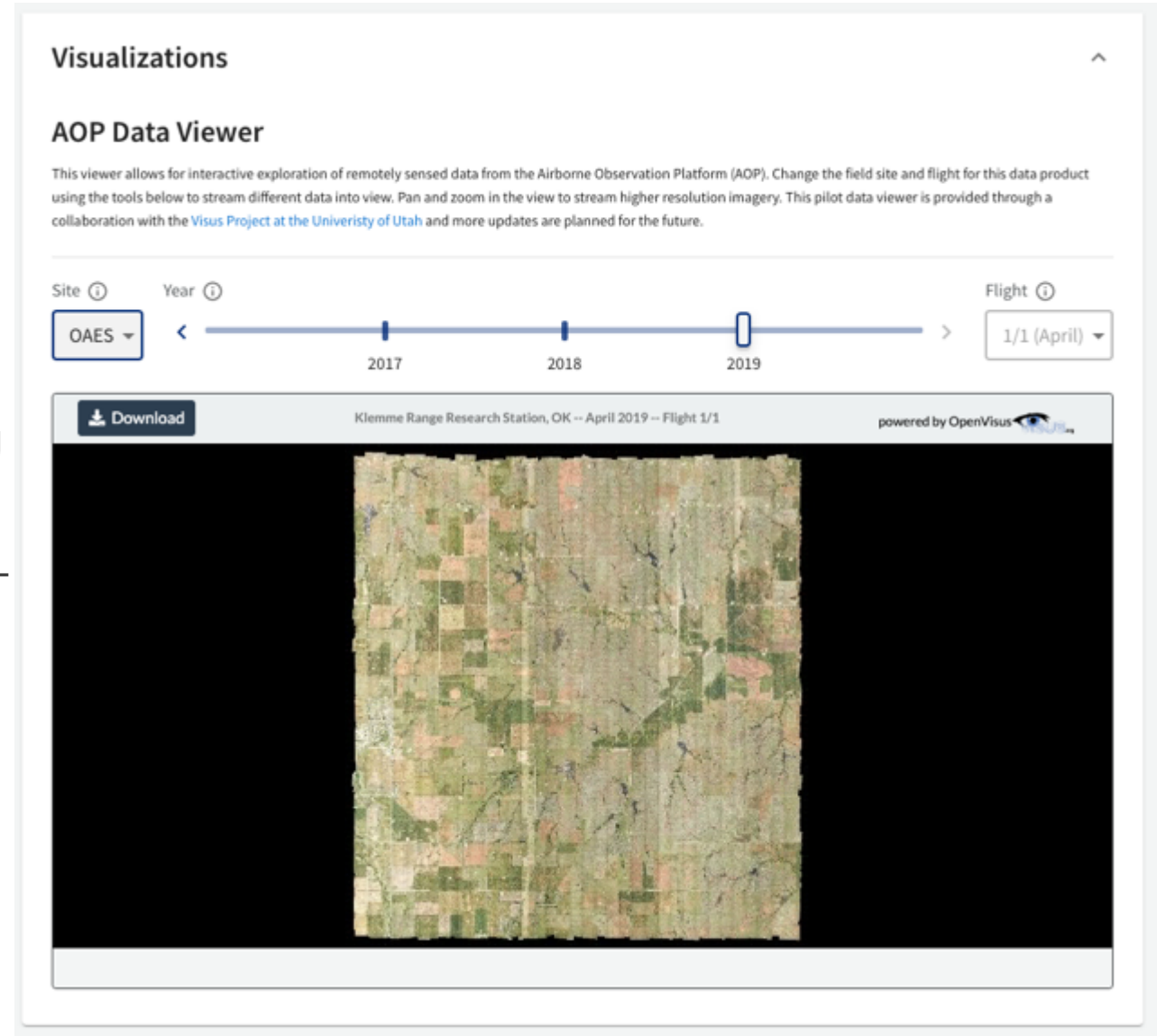
Screenshot 1 (Step 3): The interface is titled "Ecosystem structure" with the identifier "DP3.30015.001". A progress bar at the top shows the following steps: "Sites and Date Range" (checked), "Files" (checked), "Documentation" (checked), "Policies" (current step, indicated by a blue circle), and "Summary" (star icon). The main heading is "3 Do you want to include documentation?". There are two radio button options: "Include" (selected) with the subtext "Include relevant documents for this Data Product", and "Exclude" with the subtext "Data only, no relevant documents for this Data Product". A blue information box on the right states: "EML files for this Data Product are included in all downloads. Learn more about EML files in the [NEON FAQ](#) and at [KNB](#)." Navigation buttons "BACK" and "NEXT" are visible.

Screenshot 2 (Step 4): The interface is titled "Ecosystem structure" with the identifier "DP3.30015.001". The progress bar shows "Policies" as the current step. The main heading is "4 Agree to Policies". Below the heading, it says: "In order to proceed to download NEON data you must agree to the [Data Usage and Citation Policies](#)." There is a checkbox labeled "I agree to the NEON Data Usage and Citation Policies." which is currently unchecked. Navigation buttons "BACK" and "NEXT" are visible.

Screenshot 3 (Step 5): The interface is titled "Summary of Data Download Configuration". The progress bar shows "Summary" as the current step. On the left, a list of configurations is shown: "1 Sites and Date Range" with a blue pill containing "1 site — May 2019 - Sep 2019"; "2 Files" with "92 files (348 MB uncompressed)"; and "3 Documentation" with "Include". A large blue "DOWNLOAD DATA" button with a cloud icon is at the bottom left. On the right, there are three informational boxes: a tip about the "Download and Explore NEON Data" tutorial, a note that files follow "NEON File Naming Conventions", and a citation requirement box with a "COPY" button. The citation text reads: "National Ecological Observatory Network. 2020. Data Product DP3.30015.001, Ecosystem structure. Provisional data downloaded from <http://data.neonscience.org> on January 3, 2020. Battelle, Boulder, CO, USA NEON. 2020." Navigation buttons "BACK" and "NEXT" are visible.

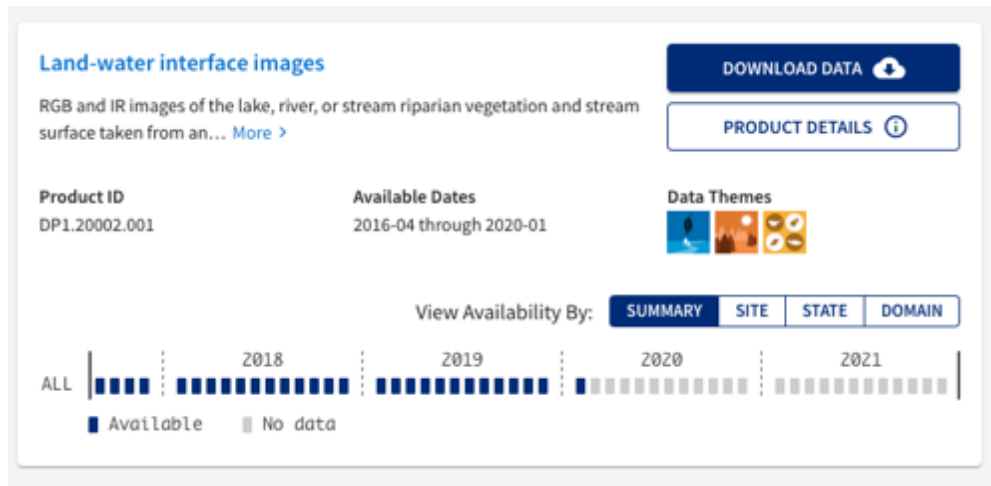
Explore through visual browser

- Explore mosaicked camera and hyperspectral imagery
- Available on the Data Product Detail Page
- Current download options: only can download .png or binary files
- Partnership with University of Utah's ViSUS team – availability of data product that this is for will be expanding
- Two products available to browse:
- High-resolution Imagery:
 - <https://data.neonscience.org/data-products/DP3.30010.001>
- Vegetation indices:
 - <https://data.neonscience.org/data-products/DP3.30026.001>



Download Phenocam Data

1. Select your dataset of interest
2. Follow the links provided



Download Data from External Host

Land-water interface images

DP1.20002.001

DONE

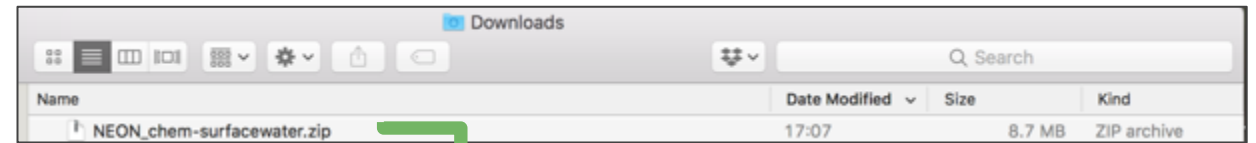
Data for this product is not currently available for download through the NEON Data Portal. Please use the links below to access data for this product for a particular site from the [PhenoCam Project](#).

State	Sites
Alabama	• BUWA - Black Warrior River • DELA - Dead Lake • LENO - Lenoir Landing • MAYF - Mayfield Creek • TALL - Talladega National Forest • TOMB - Tombigbee River
Alaska	• BARR - Barrow Environmental Observatory • BOHA - Caribou-Poker Creeks Research Watershed • CARI - Caribou Creek at Caribou-Poker Creeks Research Watershed • DEJU - Delta Junction • HEAL - Healy • OKSR - Oksrukuyik Creek • TOOK - Toolik Lake • TOOL - Toolik
Arizona	• SRER - Santa Rita Experimental Range • SYCA - Sycamore Creek
California	• BIGC - Upper Big Creek • SJER - San Joaquin • SOAP - Soaproot Saddle • TEAK - Lower Teakettle • TECR - Teakettle 2 Creek
Colorado	• ARIK - Arikaree River • COMO - Como Creek • CPER - Central Plains Experimental Range • NIWO - Niwot Ridge Mountain Research Station • RMNP - Rocky Mountain National Park • STER - Sterling • WLOU - West St Louis Creek
Florida	• BARC - Barco Lake • DSNY - Disney Wilderness Preserve • OSBS - Ordway-Swisher Biological Station • SUGG - Suggs Lake
Georgia	• FLNT - Flint River • JERC - Jones Ecological Research Center
Hawaii	• PUUM - Pu-u Maka-ala Natural Area Reserve
Kansas	• KING - Kings Creek • KONZ - Konza Prairie Biological Station - Relocatable • KONZ - Konza Prairie Biological Station • MCDI - McDuffett Creek • UKFS - The University of Kansas Field Station
Maryland	• SERC - Smithsonian Environmental Research Center
Massachusetts	• HARV - Harvard Forest • HOPB - Hop Brook
Michigan	• UNDE - UNDERC
New Hampshire	• BART - Bartlett Experimental Forest
New Mexico	• JORN - Jornada LTER
North Dakota	• DCFS - Dakota Coteau Field School • NOGP - Northern Great Plains Research Laboratory • PRLA - Prairie Lake at Dakota Coteau Field School
Oklahoma	• BLUE - Blue River • OAES - Klemme Range Research Station

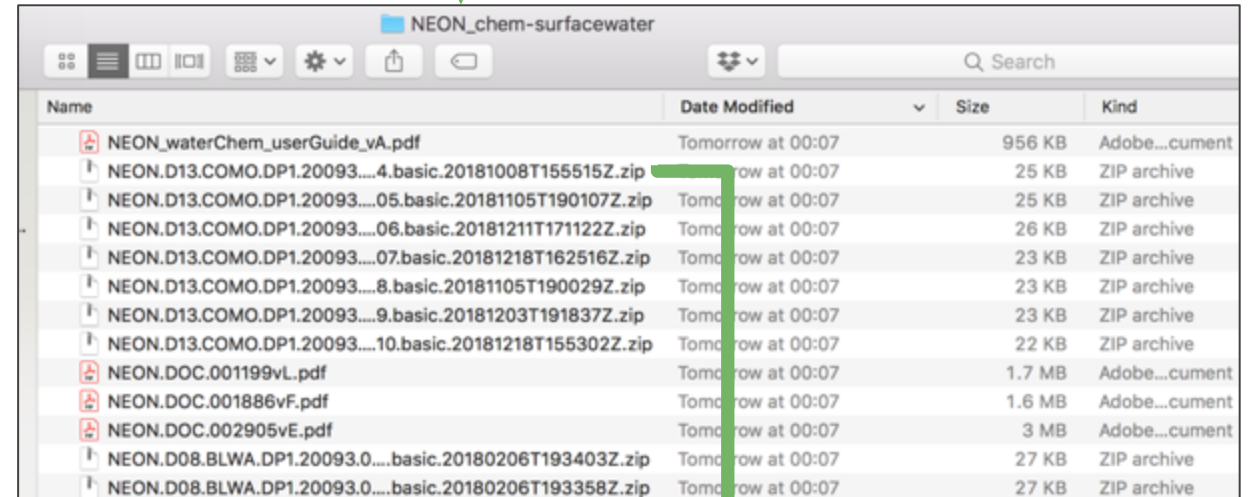
Understand Downloaded Data Structure

Use downloaded data: Structure

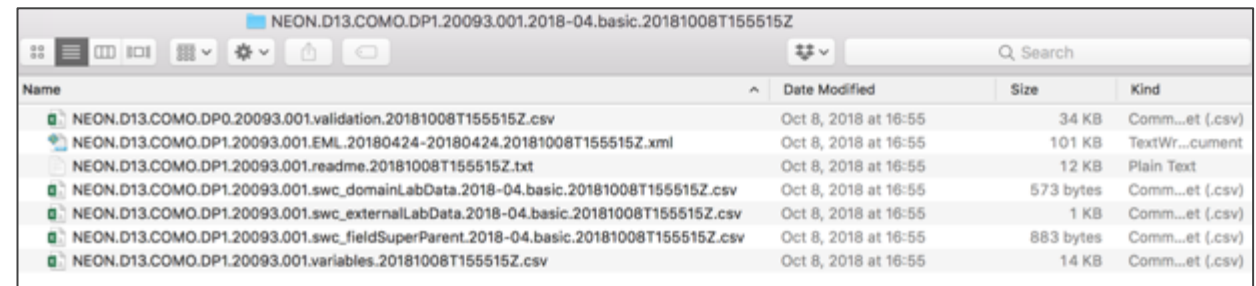
- Most NEON data products are delivered as compressed (zipped) .csv files.
 - Other formats include .hdf5 and .tif
- Uncompress to view the contents
- Data in compressed site by month files
- For each site by month, there may be multiple related data tables per data product.



Uncompressed

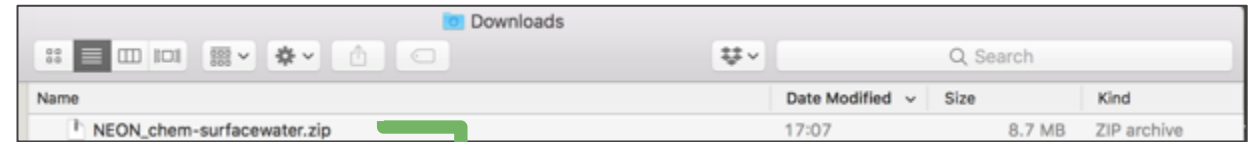


Uncompressed

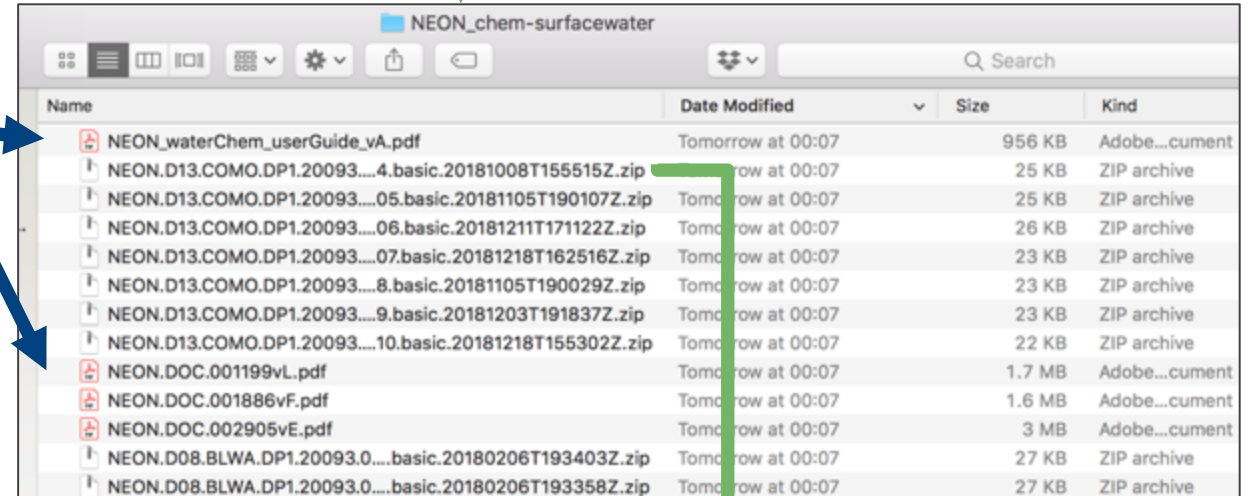


Use downloaded data: Key files

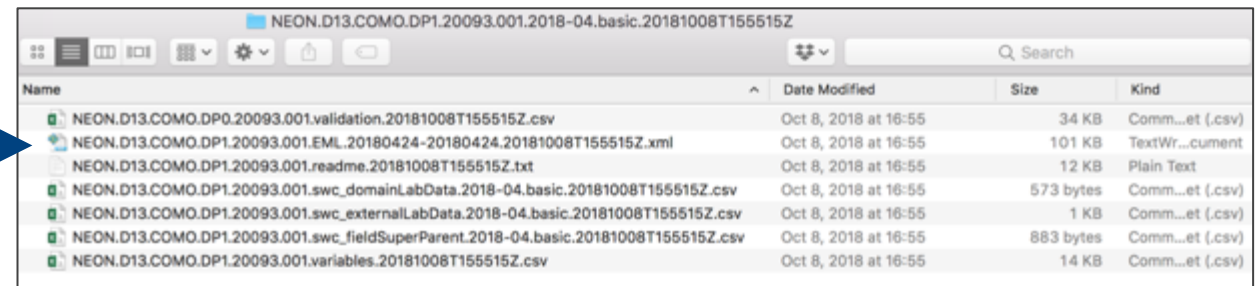
- Included documentation (if selected)
 - User Guide, Protocol, etc.
- Validation file
 - Contains the data processing rules
- EML (.xml) file
 - Machine readable metadata file
- Readme file
 - Important information on the download
- Data table(s)
 - One or more related .csv files
- Variables file
 - Lists which variables are found in which data table



Uncompressed

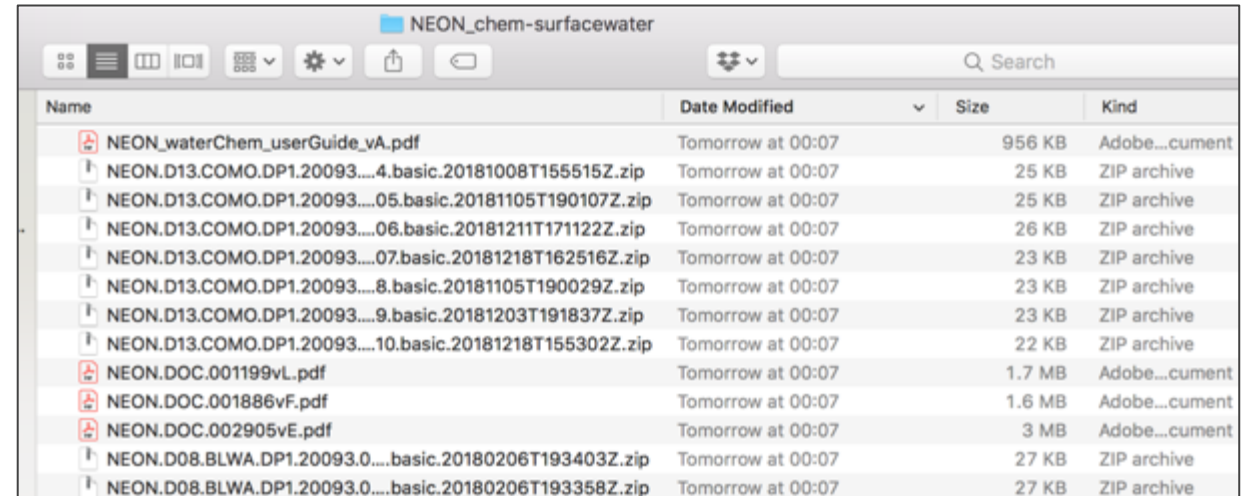


Uncompressed



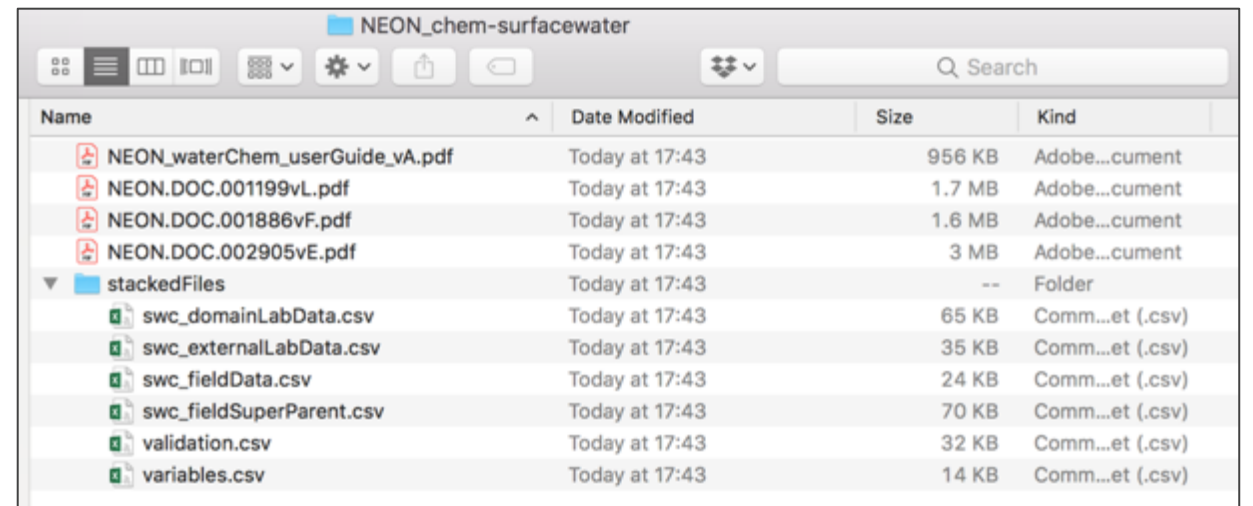
Use downloaded data: Stack data

- Use neonUtilities R package to combine all site by month files.
- Tools to help (see notes)
 - Super simple script for beginners
 - Using neonUtilities with Python
 - Data tutorial on neonUtilities



Name	Date Modified	Size	Kind
NEON_waterChem_userGuide_vA.pdf	Tomorrow at 00:07	956 KB	Adobe...cument
NEON.D13.COMO.DP1.20093....4.basic.20181008T155515Z.zip	Tomorrow at 00:07	25 KB	ZIP archive
NEON.D13.COMO.DP1.20093....05.basic.20181105T190107Z.zip	Tomorrow at 00:07	25 KB	ZIP archive
NEON.D13.COMO.DP1.20093....06.basic.20181211T171122Z.zip	Tomorrow at 00:07	26 KB	ZIP archive
NEON.D13.COMO.DP1.20093....07.basic.20181218T162516Z.zip	Tomorrow at 00:07	23 KB	ZIP archive
NEON.D13.COMO.DP1.20093....8.basic.20181105T190029Z.zip	Tomorrow at 00:07	23 KB	ZIP archive
NEON.D13.COMO.DP1.20093....9.basic.20181203T191837Z.zip	Tomorrow at 00:07	23 KB	ZIP archive
NEON.D13.COMO.DP1.20093....10.basic.20181218T155302Z.zip	Tomorrow at 00:07	22 KB	ZIP archive
NEON.DOC.001199vL.pdf	Tomorrow at 00:07	1.7 MB	Adobe...cument
NEON.DOC.001886vF.pdf	Tomorrow at 00:07	1.6 MB	Adobe...cument
NEON.DOC.002905vE.pdf	Tomorrow at 00:07	3 MB	Adobe...cument
NEON.D08.BLWA.DP1.20093.0....basic.20180206T193403Z.zip	Tomorrow at 00:07	27 KB	ZIP archive
NEON.D08.BLWA.DP1.20093.0....basic.20180206T193358Z.zip	Tomorrow at 00:07	27 KB	ZIP archive

neonUtilities::stackByTable()



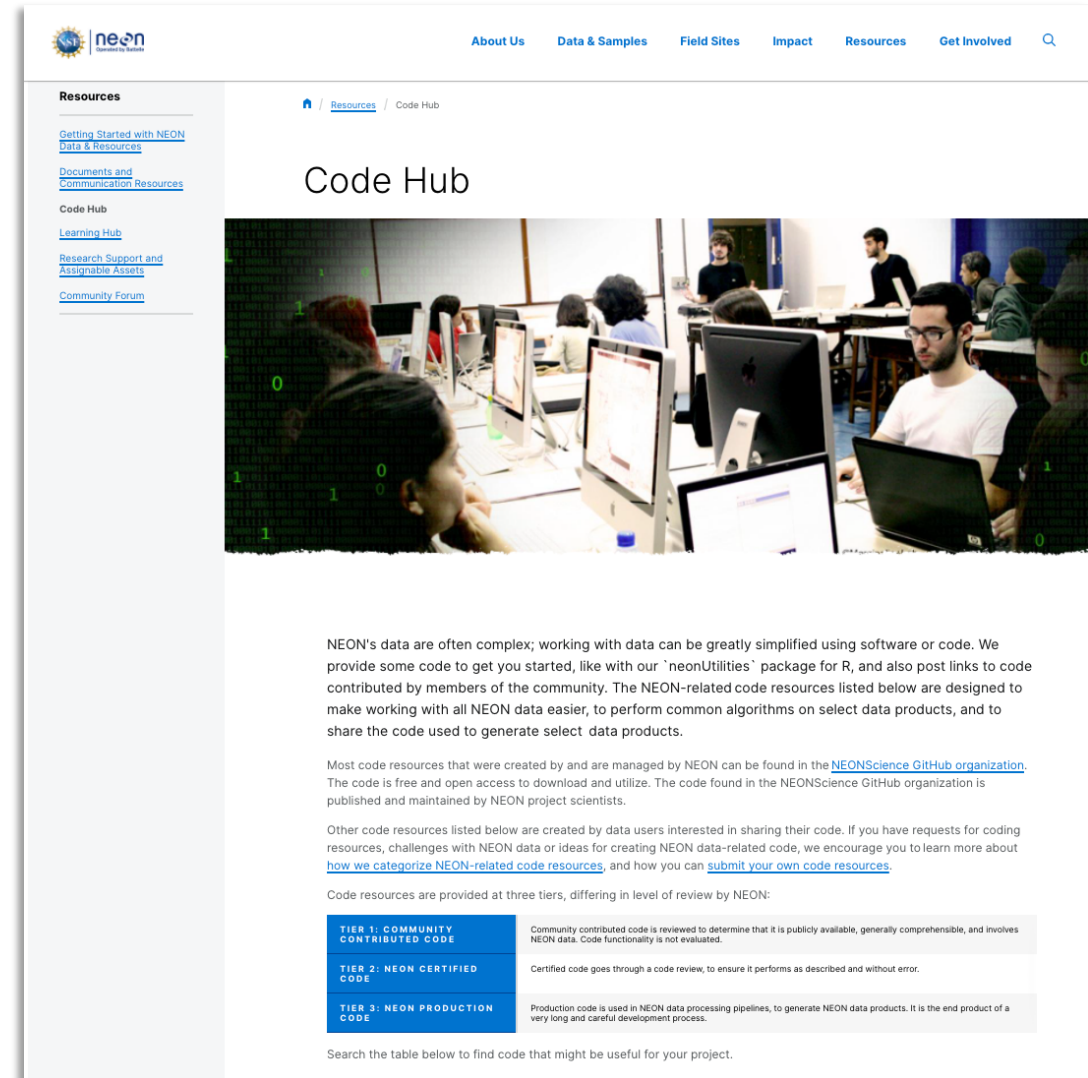
Name	Date Modified	Size	Kind
NEON_waterChem_userGuide_vA.pdf	Today at 17:43	956 KB	Adobe...cument
NEON.DOC.001199vL.pdf	Today at 17:43	1.7 MB	Adobe...cument
NEON.DOC.001886vF.pdf	Today at 17:43	1.6 MB	Adobe...cument
NEON.DOC.002905vE.pdf	Today at 17:43	3 MB	Adobe...cument
stackedFiles	Today at 17:43	--	Folder
swc_domainLabData.csv	Today at 17:43	65 KB	Comm...et (.csv)
swc_externalLabData.csv	Today at 17:43	35 KB	Comm...et (.csv)
swc_fieldData.csv	Today at 17:43	24 KB	Comm...et (.csv)
swc_fieldSuperParent.csv	Today at 17:43	70 KB	Comm...et (.csv)
validation.csv	Today at 17:43	32 KB	Comm...et (.csv)
variables.csv	Today at 17:43	14 KB	Comm...et (.csv)

Additional Important Pages

- Accessing NEON Data Programmatically
- Making the Most of your NEON Account
- NEON Data Policies – How to Cite
- Data Product Detail Pages
- File Name Conventions Page
- Data Quality Pages

Programmatic access to NEON data

- Use the NEON API
 - Learn More: <https://data.neonscience.org/data-api/>
- Use the neonUtilities R package
 - Functions to directly access NEON data (not just stack downloaded files)
 - Available on CRAN
 - Data tutorial: www.neonscience.org/neonDataStackR
- Additional tools
 - github.com/NEONScience
 - [Code Hub](#)



The screenshot shows the NEON Code Hub page. The header includes the NEON logo and navigation links: About Us, Data & Samples, Field Sites, Impact, Resources, and Get Involved. A search icon is also present. The left sidebar lists resources: Getting Started with NEON Data & Resources, Documents and Communication Resources, Code Hub, Learning Hub, Research Support and Assignable Assets, and Community Forum. The main content area is titled 'Code Hub' and features a large image of people working at computers. Below the image, there is a paragraph explaining that NEON's data is often complex and that the organization provides code to simplify working with it. It mentions the 'neonUtilities' package for R and links to community-contributed code resources. A table below describes three tiers of code resources: Tier 1 (Community Contributed Code), Tier 2 (NEON Certified Code), and Tier 3 (NEON Production Code). The table details the review process for each tier.

NEON's data are often complex; working with data can be greatly simplified using software or code. We provide some code to get you started, like with our 'neonUtilities' package for R, and also post links to code contributed by members of the community. The NEON-related code resources listed below are designed to make working with all NEON data easier, to perform common algorithms on select data products, and to share the code used to generate select data products.

Most code resources that were created by and are managed by NEON can be found in the [NEONScience GitHub organization](#). The code is free and open access to download and utilize. The code found in the NEONScience GitHub organization is published and maintained by NEON project scientists.

Other code resources listed below are created by data users interested in sharing their code. If you have requests for coding resources, challenges with NEON data or ideas for creating NEON data-related code, we encourage you to learn more about [how we categorize NEON-related code resources](#), and how you can [submit your own code resources](#).

Code resources are provided at three tiers, differing in level of review by NEON:

TIER 1: COMMUNITY CONTRIBUTED CODE	TIER 2: NEON CERTIFIED CODE	TIER 3: NEON PRODUCTION CODE
Community contributed code is reviewed to determine that it is publicly available, generally comprehensible, and involves NEON data. Code functionality is not evaluated.	Certified code goes through a code review, to ensure it performs as described and without error.	Production code is used in NEON data processing pipelines, to generate NEON data products. It is the end product of a very long and careful development process.

Search the table below to find code that might be useful for your project.

NEON Data Account

Take advantage of optional account features while helping NEON achieve our mission.

- Review your download history to easily update your research with the latest data, and forward your queries to collaborators around the world
- Help NEON track data usage for **anonymized** reporting to our funding agency, the National Science Foundation
- Your data are yours! Retrieve your data or delete your account any time
- To read more about how we secure and respect your information, please visit: <https://www.neonscience.org/about/user-accounts>

The screenshot displays the NEON Data Account interface. At the top, there is a navigation bar with links for NEON SCIENCE, DATA PORTAL, and BIOREPOSITORY. Below this, the user's account information is shown, including a profile picture (DA), name (Data Staff), and identity provider (auth0). The last login time is August 30th, 2019, 3:23:52 PM. The account information section includes fields for First Name, Middle Name, Last Name, Staff, Organization (NEON / Battelle), Title, Country (United States of America), ORCID, and Twitter Handle. Below this, there are two sections: Products of Interest and Sites of Interest. Both sections have a search bar and a list of items with checkboxes and information icons. The Products of Interest list includes 2D wind speed and direction, 3D wind attitude and motion reference, 3D wind speed, direction and sonic temperature, Air temperature above water on-buoy, Albedo - spectrometer - flightline, and Albedo - spectrometer - mosaic. The Sites of Interest list includes Abby Road, Arikaree River, Barco Lake, Barrow Environmental Observatory, Bartlett Experimental Forest, and Black Warrior River. At the bottom, there are three buttons: SAVE, DOWNLOAD ACCOUNT DATA, and DELETE ACCOUNT.

NEON Data Policies

By using NEON data, you agree to appropriately cite these products.

Please see our detailed citation, acknowledgement, copyright, and table styles at:

<https://www.neonscience.org/data-samples/data-policies-citation>

The screenshot shows the NEON Data Policies & Citation Guidelines webpage. The header includes the NEON logo and navigation links: About Us, Data & Samples, Field Sites, Impact, Resources, Get Involved, and a search icon. The left sidebar contains a 'Data & Samples' section with links to Data Portal, Samples & Specimens, Collection Methods, Data Policies & Citation Guidelines (highlighted), Data Notifications, and Data Management. Below these is a 'JUMP TO:' section with a list of links: Data Usage Policy, Sample Usage Policy, Acknowledging NEON, Citing NEON, Citing Data, Citing Samples & Specimens, Citing Documents, Citing Code Packages, Citing Educational Resources, and Citing Media. The main content area is titled 'Data Policies & Citation Guidelines' and contains the following text: 'NEON is committed to providing data of high value to the ecological research community by meeting the [FAIR data principles](#). These principles recommend that data be:'. A bulleted list follows: 'Findable, through globally unique persistent identifiers and rich metadata which is indexed in a searchable resource.', 'Accessible, through standardized communication protocols. Metadata should be preserved even when data are no longer available.', 'Interoperable, through the use of broadly accessible language with shared vocabularies and qualified references to other metadata.', and 'Reusable, through prescribed data usage criteria, documentation of provenance, and defined domain-relevant community standards.' Below this, it states: 'To show our commitment to FAIR, we are a [COPDESS signatory for the Enabling FAIR Data project](#), as a data repository and research infrastructure.' It then encourages practices that continue the enablement of FAIR, including acknowledging and citing sources of data, samples, and documentation as well as preserving and openly publishing research inputs, workflows, and outputs so that they may be discovered and used by others. The next section is 'Data Usage Policy', which states: 'All data collected by NEON and provided as data products, with the exception of data related to rare, threatened, or endangered (RTE) species, are released to the "public domain" under Creative Commons CC0 1.0 "No Rights Reserved" (<https://creativecommons.org/publicdomain/zero/1.0/>). No copyright has been applied to NEON data; any person may copy, modify, or distribute the data, for commercial or non-commercial purposes, without asking for permission. NEON data may still be subject to other laws or rights such as for privacy, and NEON makes no warranties about the data and disclaims all liability. When using or citing NEON data, no implication should be made about endorsement by NEON.' It then states: 'In most countries, data and facts are not copyrightable. By putting NEON data into the public domain, we encourage broad use, particularly in scientific analyses and data aggregations. However, **please be mindful of the following scholarly norms**:' followed by a bulleted list: 'NEON data should be used in a way that is mindful of the limitations of the data, using the documentation associated with the data packages as a guide.' and 'Unlike most scientific data, NEON data is not associated with individual authors; rather, the "author" of data produced by the Observatory is NEON itself. Attributions and citations should be made to NEON for any use of the data.' The next section is 'Sample Usage Policy', which states: 'The majority of NEON samples are archived in the Biorepository at Arizona State University. To learn more about ASU-specific guidelines, please visit the [Biorepository Portal](#).' It then states: 'Across all repositories that NEON partners with, [NEON's Sample Use Policy](#) balances the need to provide researchers with access to NEON samples for a wide-variety of purposes while preserving the future research potential of those samples. This is a living document that is subject to change over time.' The next section is 'Acknowledging NEON', which states: 'In publications, the following statements may be used in the Acknowledgement section, or a combined statement if more than one type of support was obtained from NEON.' The next section is 'General Support and Data Product Use', which states: 'The National Ecological Observatory Network is a program sponsored by the National Science Foundation and operated under cooperative agreement by Battelle Memorial Institute. This material is based in part upon work supported by the National Science Foundation through the NEON Program.' The final section is 'Assignable Asset Program', which states: 'The National Ecological Observatory Network is a program sponsored by the National Science Foundation and operated under cooperative agreement by Battelle Memorial Institute. Data collected/used in this research were obtained through the NEON Assignable Assets program.'

Data product details

These pages provide you with information regarding any NEON data product.

Contents:

- About: Overview information including product ID, data themes, keywords, a brief description, Abstract, additional remarks, and the data citation
- Collection and Processing: details about the observatory-wide collection, including relevant documentation and instrumentation types
- Availability and Download: similar to the interface shown in the previous slides

HOME > DATA PRODUCTS > DP1.20093.001

Chemical properties of surface water

About

Product ID ⓘ
DP1.20093.001

Data Themes

Responsible Science Team
Aquatic Observation System (AOS)

Date Range ⓘ
December 2010 - ongoing

Scientific Keywords
acid neutralizing capacity (ANC) anions
chemical properties grab samples
nutrients surface water analytes
cations chemistry nitrogen (N)
carbon (C) phosphorous (P)
total carbon (TC) water quality
alkalinity

Description

Grab samples of surface water chemistry including general chemistry, anions, cations, and nutrients.

Abstract

This data product contains the quality-controlled, native sampling resolution data from NEON's surface water chemistry sampling protocol. Subsamples are analyzed at NEON domain headquarters for alkalinity and acid neutralizing capacity (ANC); other subsamples are sent to external facilities for a broad suite of analytes, including dissolved and total nutrients and carbon, cations and anions, and general chemistry. For additional details on NEON field and laboratory protocols, see the AOS Protocol and Procedure: Water Chemistry Sampling in Surface Waters and Groundwater (NEON.DOC.002905).

Latency: The expected time from data and/or sample collection in the field to data publication is as follows, for each of the data tables (in days) in the downloaded data package. See the Data Product User Guide for more information.

swc_domainLabData: 60
swc_externalLabData: 150
swc_fieldData: 30
swc_fieldSuperParent: 30
swc_externalLabSummaryData: 14

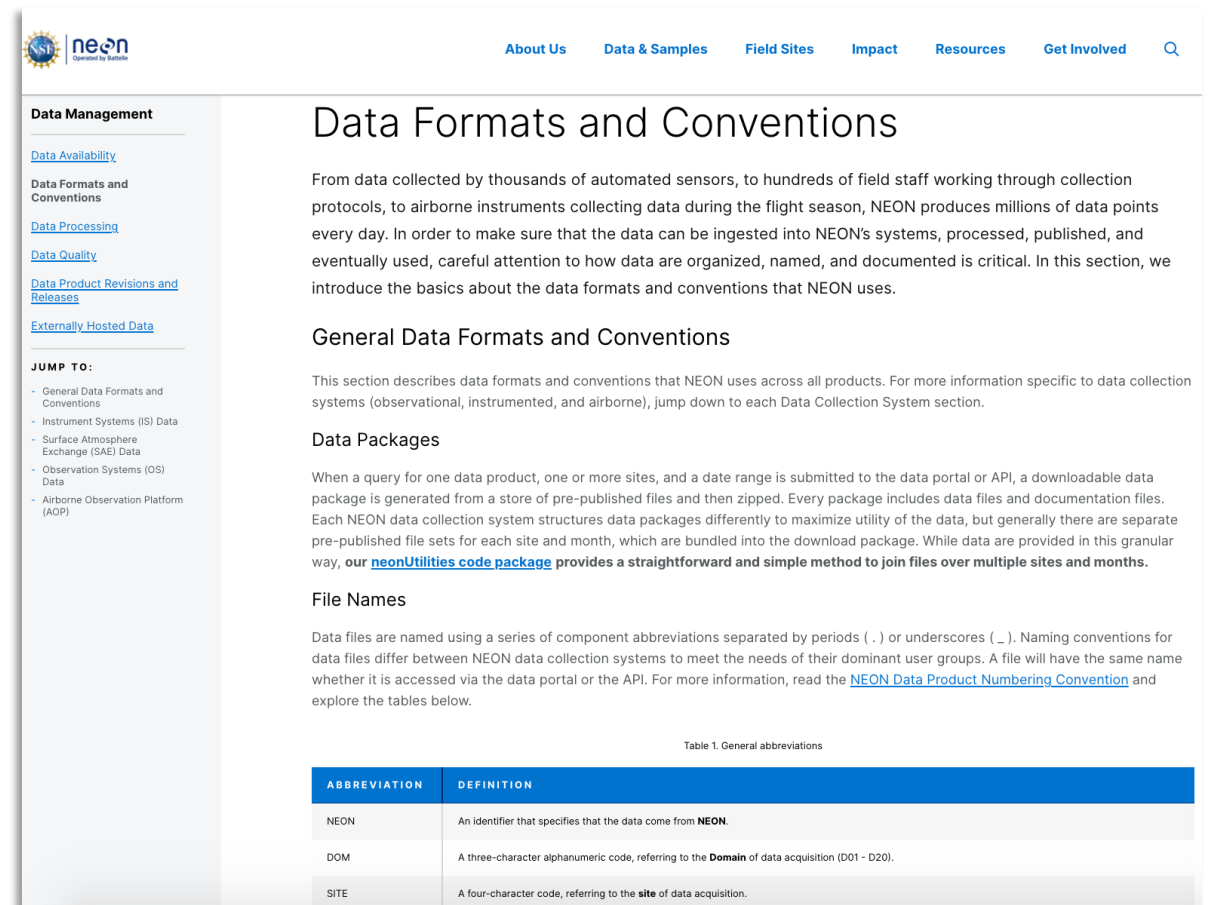
Remarks

Contents

- ABOUT
- COLLECTION AND PROCESSING
- AVAILABILITY AND DOWNLOAD

File name conventions

- Provides details on standardized names of the data files.
- <https://www.neonscience.org/data-samples/data-management/data-formats-conventions>



The screenshot shows the NEON Data Management page. The left sidebar contains a 'Data Management' section with links for 'Data Availability', 'Data Formats and Conventions', 'Data Processing', 'Data Quality', 'Data Product Revisions and Releases', and 'Externally Hosted Data'. Below these links is a 'JUMP TO:' section with a list of data collection systems: General Data Formats and Conventions, Instrument Systems (IS) Data, Surface Atmosphere Exchange (SAE) Data, Observation Systems (OS) Data, and Airborne Observation Platform (AOP). The main content area is titled 'Data Formats and Conventions' and contains an introductory paragraph, a 'General Data Formats and Conventions' section, a 'Data Packages' section, and a 'File Names' section. The 'File Names' section includes a table of general abbreviations.

Data Formats and Conventions

From data collected by thousands of automated sensors, to hundreds of field staff working through collection protocols, to airborne instruments collecting data during the flight season, NEON produces millions of data points every day. In order to make sure that the data can be ingested into NEON's systems, processed, published, and eventually used, careful attention to how data are organized, named, and documented is critical. In this section, we introduce the basics about the data formats and conventions that NEON uses.

General Data Formats and Conventions

This section describes data formats and conventions that NEON uses across all products. For more information specific to data collection systems (observational, instrumented, and airborne), jump down to each Data Collection System section.

Data Packages

When a query for one data product, one or more sites, and a date range is submitted to the data portal or API, a downloadable data package is generated from a store of pre-published files and then zipped. Every package includes data files and documentation files. Each NEON data collection system structures data packages differently to maximize utility of the data, but generally there are separate pre-published file sets for each site and month, which are bundled into the download package. While data are provided in this granular way, our [neonUtilities code package](#) provides a straightforward and simple method to join files over multiple sites and months.

File Names

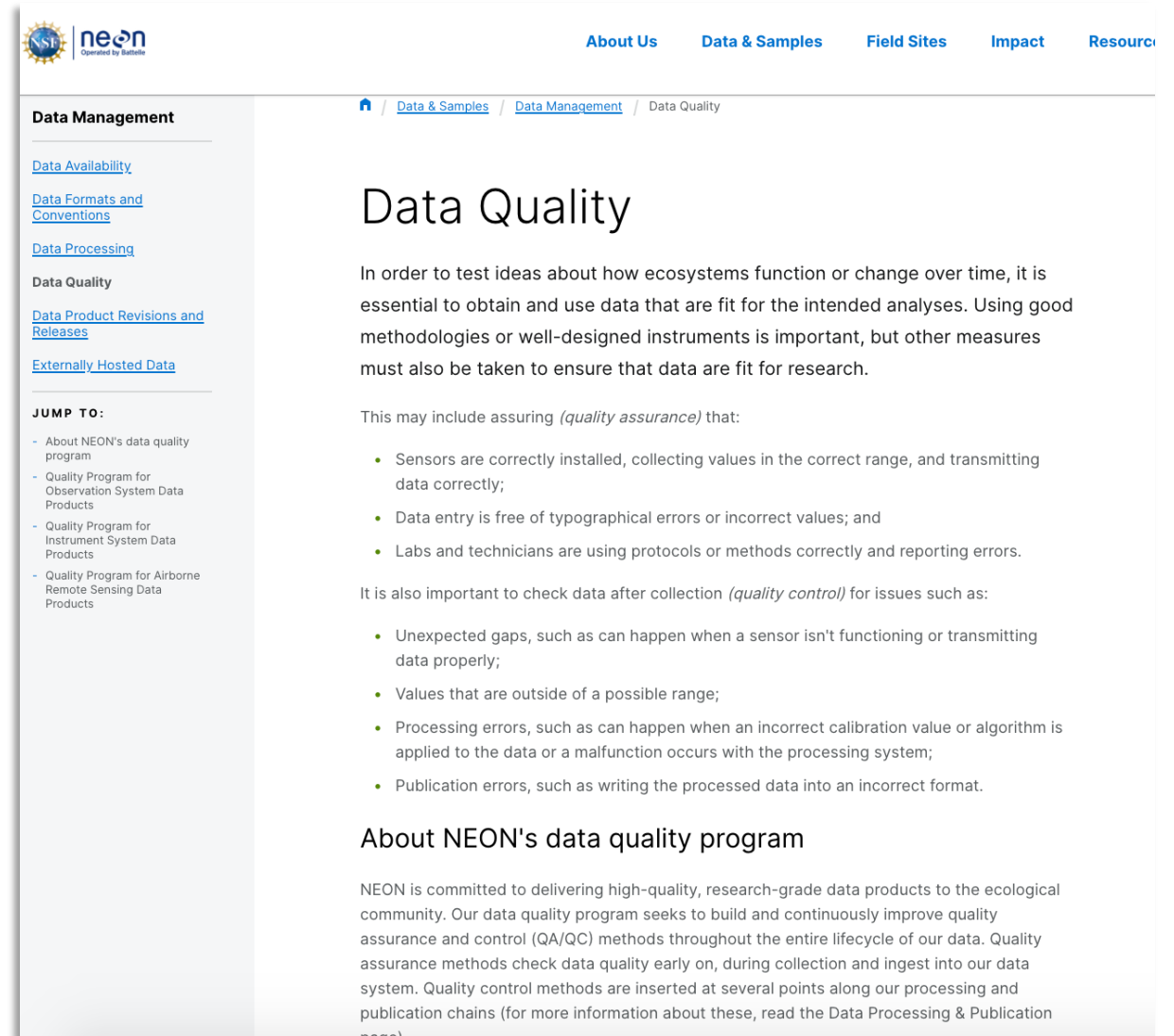
Data files are named using a series of component abbreviations separated by periods (.) or underscores (_). Naming conventions for data files differ between NEON data collection systems to meet the needs of their dominant user groups. A file will have the same name whether it is accessed via the data portal or the API. For more information, read the [NEON Data Product Numbering Convention](#) and explore the tables below.

Table 1. General abbreviations

ABBREVIATION	DEFINITION
NEON	An identifier that specifies that the data come from NEON .
DOM	A three-character alphanumeric code, referring to the Domain of data acquisition (D01 - D20).
SITE	A four-character code, referring to the site of data acquisition.

Data quality

- Learn how NEON ensures quality, reliable data.
- <https://www.neonscience.org/data-samples/data-management/data-quality-program>



The screenshot shows the NEON Data Quality page. The header includes the NSF and NEON logos, and navigation links for About Us, Data & Samples, Field Sites, Impact, and Resources. The breadcrumb trail is: Data & Samples / Data Management / Data Quality. The left sidebar lists links for Data Availability, Data Formats and Conventions, Data Processing, Data Quality (selected), Data Product Revisions and Releases, and Externally Hosted Data. Below these is a 'JUMP TO:' section with links to About NEON's data quality program, Quality Program for Observation System Data Products, Quality Program for Instrument System Data Products, and Quality Program for Airborne Remote Sensing Data Products. The main content area has the title 'Data Quality' and a paragraph explaining its importance. It lists three quality assurance measures: correct sensor installation, error-free data entry, and proper use of protocols. It also lists three quality control checks: unexpected gaps, values outside the range, and processing or publication errors. The page concludes with a section titled 'About NEON's data quality program'.

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About Us Data & Samples Field Sites Impact Resources

Data Management

[Data Availability](#)
[Data Formats and Conventions](#)
[Data Processing](#)
Data Quality
[Data Product Revisions and Releases](#)
[Externally Hosted Data](#)

JUMP TO:

- [About NEON's data quality program](#)
- [Quality Program for Observation System Data Products](#)
- [Quality Program for Instrument System Data Products](#)
- [Quality Program for Airborne Remote Sensing Data Products](#)

Data Quality

In order to test ideas about how ecosystems function or change over time, it is essential to obtain and use data that are fit for the intended analyses. Using good methodologies or well-designed instruments is important, but other measures must also be taken to ensure that data are fit for research.

This may include assuring (*quality assurance*) that:

- Sensors are correctly installed, collecting values in the correct range, and transmitting data correctly;
- Data entry is free of typographical errors or incorrect values; and
- Labs and technicians are using protocols or methods correctly and reporting errors.

It is also important to check data after collection (*quality control*) for issues such as:

- Unexpected gaps, such as can happen when a sensor isn't functioning or transmitting data properly;
- Values that are outside of a possible range;
- Processing errors, such as can happen when an incorrect calibration value or algorithm is applied to the data or a malfunction occurs with the processing system;
- Publication errors, such as writing the processed data into an incorrect format.

About NEON's data quality program

NEON is committed to delivering high-quality, research-grade data products to the ecological community. Our data quality program seeks to build and continuously improve quality assurance and control (QA/QC) methods throughout the entire lifecycle of our data. Quality assurance methods check data quality early on, during collection and ingest into our data system. Quality control methods are inserted at several points along our processing and publication chains (for more information about these, read the Data Processing & Publication page).



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