# EDDY COVARIANCE LEVEL 0 PRIME DATA: DOWNLOAD INSTRUCTIONS

NEON eddy covariance L0 prime (L0’) data files contain eddy covariance turbulent exchange (ECTE) and eddy covariance storage exchange (ECSE) data, in HDF5 format, at the original sensor sampling frequency (e.g., 20 Hz for 3D winds, 40Hz for accelerometer measurements, 1 Hz for CO2/H2O concentration profile measurements). These are the input data which are processed by the eddy4R code to obtain standard L1-4 data products. Additional metadata about the sensor and data, a description of terms, as well as readme info about the HDF5 file are also included. L0p data are typically available within 3-7 days of data collection, if a file is not returned by the following methods, it is not available or has not yet been processed. ECTE L0p files are approximately 400 MB per day of data and ECSE files are approximately 20 MB per day of data.

1. Data file and URL naming convention: Each data file is named by the Domain name, site name, and data product ID along with other variables. Download URLs are constructed from the file name. File names are as follows:
* dom = Domain number (i.e D01 – D20)
* site = Site Name (i.e. KONZ, SERC)
* IP# = IP0.00200.001
* system = For example, turbulent exchange (ECTE), and storage exchange (ECSE)
* date: The date format is YYYY-MM-DD
* The generalized format for file name is:

**NEON.dom.site.IP#.system.date.l0p.h5**

* To construct a download URL for each file, replace the file name in the following path with the above file name for the site and date of interest. Files are gzipped, so make sure to add the .gz extension. So, the general form of the URL is:

**<https://storage.googleapis.com/ods/dataproducts/IP0/date/filename.h5.gz>**

An example URL [to download](http://data.neonscience.org/documents?p_p_id=110_INSTANCE_JEygRkSpUBoq&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&_110_INSTANCE_JEygRkSpUBoq_struts_action=%2Fdocument_library_display%2Fview_file_entry&_110_INSTANCE_JEygRkSpUBoq_redirect=http%3A%2F%2Fdata.neonscience.org%2Fdocuments%2F-%2Fdocument_library_display%2FJEygRkSpUBoq%2Fview%2F11206%3F_110_INSTANCE_JEygRkSpUBoq_redirect%3Dhttp%253A%252F%252Fdata.neonscience.org%252Fdocuments%253Fp_p_id%253D110_INSTANCE_JEygRkSpUBoq%2526p_p_lifecycle%253D0%2526p_p_state%253Dnormal%2526p_p_mode%253Dview%2526p_p_col_id%253Dcolumn-1%2526p_p_col_count%253D1&_110_INSTANCE_JEygRkSpUBoq_fileEntryId=2401425) a ECTE L0’ data from CPER site on 12/01/2021:

<https://storage.googleapis.com/neon-sae-files/ods/dataproducts/IP0/2021-12-01/CPER/NEON.D10.CPER.IP0.00200.001.ecte.2021-12-01.l0p.h5.gz>

For more information about NEON HDF5 files, download the readme text from The NEON DATA Document library. Direct Link: [Download](http://data.neonscience.org/documents?p_p_id=110_INSTANCE_JEygRkSpUBoq&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&_110_INSTANCE_JEygRkSpUBoq_struts_action=%2Fdocument_library_display%2Fview_file_entry&_110_INSTANCE_JEygRkSpUBoq_redirect=http%3A%2F%2Fdata.neonscience.org%2Fdocuments%2F-%2Fdocument_library_display%2FJEygRkSpUBoq%2Fview%2F11206%3F_110_INSTANCE_JEygRkSpUBoq_redirect%3Dhttp%253A%252F%252Fdata.neonscience.org%252Fdocuments%253Fp_p_id%253D110_INSTANCE_JEygRkSpUBoq%2526p_p_lifecycle%253D0%2526p_p_state%253Dnormal%2526p_p_mode%253Dview%2526p_p_col_id%253Dcolumn-1%2526p_p_col_count%253D1&_110_INSTANCE_JEygRkSpUBoq_fileEntryId=2401425)

1. Suggested tools:
	1. **Web browser** (required)
	2. **cURL** (optional) is installed on most Linux systems by default.  It is installed on Windows 10 (build 1803+). For earlier versions of Windows, use one of the following to download and install cURL:
* Curl for Windows: [https://curl.haxx.se/windows/](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcurl.haxx.se%2Fwindows%2F&data=02%7C01%7Cnwelsh%40battelleecology.org%7C151fe75e0113468f9f6908d6400ad019%7Cf44d2ab390994d85998610165a8619f5%7C0%7C0%7C636766812515600348&sdata=4%2FWeNrgCTrOkPrqVn%2BbJv1nRzvVU2shLW5fePnOuGDM%3D&reserved=0)
* Cygwin: [https://www.cygwin.com/](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.cygwin.com%2F&data=02%7C01%7Cnwelsh%40battelleecology.org%7C151fe75e0113468f9f6908d6400ad019%7Cf44d2ab390994d85998610165a8619f5%7C0%7C0%7C636766812515600348&sdata=WKlU8fVP7ME%2B%2F%2FdWzKd5U2qoaGPlNi7u2f5YMfXjL7o%3D&reserved=0)
	1. **R programming language** required to run our L0p file download workflow [flow.dnld.dp0p.hdf5.R](https://github.com/NEONScience/eddy4R/blob/deve/flow/tool/flow.dnld.dp0p.hdf5.R)
	2. **Google Cloud SDK** **libraries and command line interface** (optional; <https://cloud.google.com/sdk>).
	3. **HDFView** (optional) is a free application to view the transferred .h5 data file. Visit: <https://www.hdfgroup.org/downloads/hdfview/> to download the application. For an overview of the HDF5 file format and the tool HDFView, visit the **NEON SCIENCE YouTube** page: <https://youtu.be/q14F3WRwSck>.

Only one tool in a) to d) above will be needed to download files.

1. We recommend one of the following methods to download the EC L0’ data:
	1. **Web browser**: type the file URL into your web browser to download one file at a time
		1. For example, to download a L0’ data file for ECTE systems from domain 10 CPER site on 12/01/2021, you can construct the URL as following:

<https://storage.googleapis.com/neon-sae-files/ods/dataproducts/IP0/2021-12-01/CPER/NEON.D10.CPER.IP0.00200.001.ecte.2021-12-01.l0p.h5.gz>

* 1. **cURL** (Client URL): Is a command line tool, the instructions below use cURL for the download.
		1. For the requested data, enter the curl commands below at the command prompt, modifying the url for each day that is requested following the naming convention:
* curl -O https://storage.googleapis.com/neon-sae-files/ods/dataproducts/IP0/2021-12-01/CPER/NEON.D10.CPER.IP0.00200.001.ecse.2021-12-01.l0p.h5.gz
* curl -O https://storage.googleapis.com/neon-sae-files/ods/dataproducts/IP0/2021-12-01/CPER/NEON.D10.CPER.IP0.00200.001.ecte.2021-12-01.l0p.h5.gz
	1. **flow.dnld.dp0p.hdf5.R**: Is an R script designed to allow users to quickly enter in the required variables, such as site name and start/end dates, to download multiple files over the specified time range. The script is hosted on the eddy4R Github repository: <https://github.com/NEONScience/eddy4R/blob/deve/flow/tool/flow.dnld.dp0p.hdf5.R>
	2. **Google Cloud SDK** **libraries and command line interface** (<https://cloud.google.com/sdk>). This option is best for more advanced users, see the tutorial <https://cloud.google.com/sdk/docs/install-sdk> to get started. Please [contact us](https://www.neonscience.org/about/contact-us) for additional instructions if needed.

For any questions, [please contact us](https://www.neonscience.org/about/contact-us).