

Client Tutorials

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authenticated. This means you have to a user account with the institution and any software client application working on your behalf (browser, cURL, etc) must be provided with user credentials or tokens either through dynamic user interaction or configuration.

- [You can learn about DAP Client Software Authentication here.](#)
- [You can learn about how to use NASA's EDL tokens for Client Software Authentication here.](#)

Command line clients

These clients are invoked from a shell and are typically used in an automated data access activity, possibly written as a shell script.

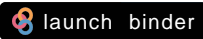
- [nccopy tutorial](#)

Python client tutorials


Among the most stable and widely used within the Python ecosystem are NetCDF and [PyDAP](#). Xarray, a widely popular package within the Pangeo ecosystem uses both as a backend [engine](#), and both NetCDF and [PyDAP](#) are required dependencies for Xarray, which means installing Xarray installs NetCDF and [PyDAP](#) by default. Between the two packages, we recommend getting started with [PyDAP](#) to best exploit OPeNDAP resources, because PyDAP has the following characteristics:

- Pure python implementation of the DAP protocol.
- Open-source, developed and maintained by the OPeNDAP team and the broad PyDAP/OPeNDAP community.
- Has its own lightweight server implementation.
- Server-side and data-proximate subsetting. OPeNDAP servers are highly specialized to subset the original dataset. With [PyDAP](#), a user can add constraint expressions to the URL, a powerful tool once you get familiarize with.

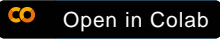

Below are a combination of static and interactive resources. You can click the associated image



Binder badge to run the notebooks in your browser.

- PyDAP's [documentation](#) - Inside you will find static tutorials, mostly with DAP4 protocol. Some of the example include working with Constraint Expressions.
 - [Token-based Authentication](#) (necessary for example to access NASAEarth data).
 - Tutorial workflows for accesing and plotting various NASA and Non-NASA data product ([CMIP6](#), [ECCOV4](#), [PACE](#) and [SWOT](#)).
- [Interactive jupyter notebooks](#) , showing similar workflows with PyDAP as that of its official documentation. The DAP2 example is that when working with [CMIP6](#) data.
 - **Requirements:** [EDL](#) account, and create a token for authentication.
 - **NOTE:** [GetStarted.ipynb](#) notebook should be executed first as it creates local file with [EDL](#) credentials needed to access data in the all other notebooks.

Older python resource:

- [NetCDF-python w/DAP4](#)  - An iPython notebook tutorial for remote data access using NetCDF Python. When NetCDF is used to access a remote dataset it does so by making DAP4 queries to the remote service.
- [Xarray and netCDF4 w/DAP4](#)  - An iPython notebook tutorial for remote data access using Xarray.

Matlab

- [Matlab Tutorial for remote data access](#) (beta).

Tutorial Datasets

Several datasets are used in these tutorials and some general information about each may be found on our [Tutorial Dataset Information](#) page.

Coming Soon

- DAP4 PyDAP Python sub-setting large datasets (notebook)
- Using the cURL command line to access data (shell)
- Panoply Tutorial for remote data access.