Training session run by Plymouth Marine Laboratory for JNCC as part of a workshop on Using Earth Observation for Water Quality Monitoring 13-14 October 2020. The training was delivered by Lauren Biermann and Oliver Clements at PML.

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Pre-course information on software and and example code

SNAP for Visualising Data

The European Space Agency (ESA) have developed a series of toolboxes for working with data from the Sentinel satellites. These can be downloaded from the Sentinel Toolbox Exploitation Platform (STEP).

The toolboxes share a common architecture called the Sentinel Application Platform (SNAP), which also supports numerous sensors beyond the Sentinels (Including MERIS, MODIS, Landsat8). Though SeaDAS (developed by NASA) has a similar graphical user interface, SNAP builds on the legacy of the VISAT BEAM software developed for use with data from the ENVISAT satellite.

Functionalities of SNAP that we will explore together will primarily involve image display and navigation, mask definition and display, band arithmetic, and spectral view. However, there are many more functionalities, including:

- Layer management to view and manipulate multiple product layers as well as images from WMS servers/ESRI shape files.
- Subsetting and exporting to different file formats.
- Plots and statistics for defined regions of interest.
- Graph Processing Framework (GPF): for creating user-defined processing chains.
- Reprojection and ortho-rectification to a variety of map projections.
- Geo-coding and rectification using ground control point.
- Multithreading and Multi-core processor support.

SNAP is available for Windows, Mac and UNIX systems. To download and install:

- o Visit this page and select the download of the Sentinel Toolboxes suitable for your operating system.
- o Open the downloaded file and follow the installation instructions. You can opt to only install the toolboxes you want. For this course you will only need the Sentinel 3 toolbox, but you may wish to install all. If you wish to install other toolboxes after the initial installation you can follow the guidelines here to install from within SNAP.
- o Once installed, open the software by clicking on the icon in your relevant install location (e.g. in 'All Programs' in Windows, 'Applications' in Mac, or the equivalent dependent on your UNIX system). You can also open from the command line, information on the SNAP command line interfaces is here.
- o We recommend you update all the plugins once installed. You can do this from the top menu under Help>Check for updates.

Python & libraries Installation

How you install Python can be very much dependant on what operating system you run - but we would highly recommend installing the Anaconda distribution (discussed below) as a default - this is what we have used to develop course material.

First off, Python is very common, and, to avoid ambiguity, you should check that you don't have it installed already; you can do this by following the instruction below:

https://wiki.python.org/moin/BeginnersGuide/Download

If Python is not installed, you can download the appropriate official version by following the links on the aforementioned page. However, this version only supplies the basic Python installation, with a more limited set of libraries. In order to install further libraries, you will need to configure the python package manager, pip. Instructions on how to install and configure pip can be found here:

https://packaging.python.org/tutorials/installing-packages/

Please be aware of the warning box toward the top of this page if you are attempting to install new libraries on a system which has a pre-existing Python version, but to which you do not have root access.

Alternatively, SNAP supports Anaconda Python distributions, which are packaged with more libraries that are suitable for data analysis. These are available here:

https://www.anaconda.com/products/individual

Note that, if you install the Anaconda version, you have two options for managing the installation of additional libraries, the GUI based Navigator or the command line based conda. Information on configuring these options can be found via this link:

http://docs.anaconda.com/anaconda/user-guide/getting-started/

Alternatively, if you are a Mac user and run versions of the Homebrew or Macports package manager, then most Python versions, and Python package managers (e.g. pip) can be installed through this route.

Important notes: If you intend to use Python to interface to the SNAP Java API (more information on this below) or BRAT then please take note of the following:

The officially supported versions are Python 2.7, 3.3, and 3.4 64-bit (Linux + Darwin) and both 32-bit and 64-bit (Windows) as well as Anaconda distributions. Please note that Python 3.5 is not yet supported. Windows users: Please note that you must use a 32-bit Python if your SNAP installation is 32-bit and accordingly use a 64-bit Python if your SNAP installation is 64-bit.

While currently not supported, later versions of the BRAT for altimetry package will also allow Python interfacing, however, only Python 3 compatible scripts will be supported (Python 2 scripts are not guaranteed to be executed).

How to use Python?

If this is your first time using Python, good step by step resources on using it can be found here:

https://www.programiz.com/python-programming

To help show how we will use Python in this course, some examples are provided. These examples are written in Jupyter Notebook, which is an interactive way of showing how code is written, and explaining what it does. More information on Jupyter Notebook, including its installation, can be found here:

https://www.datacamp.com/community/tutorials/tutorial-jupyter-notebook#gs.McRwgxQ

Installation requirements for the upcoming course

If you do not have Python currently installed, or would like to ensure you have a version that will be compatible with the scripts we will provide, please install the latest version of Anaconda for Python 3.8 here: https://www.anaconda.com/products/individual

We recommended that you install the following packages at minimum, in the form relevant for your Python version (if you have used the Anaconda installation, please follow the installation guidelines below, from your command line interface for the highlighted packages - cartopy and netcdf4):

numpy   (Included with Anaconda)

scipy   (Included with Anaconda)

cartopy   (**NOT** included with Anaconda **and required**).

> To install cartopy for Anaconda type:

> **conda install -c conda-forge cartopy** into your terminal/anaconda prompt

matplotlib   (Included with Anaconda)

xarray (Included with Anaconda)

netCDF4   (**NOT** included with Anaconda **and required**).

> To install netCDF4 for Anaconda type:

> **'conda install -c anaconda netcdf4'** into your terminal/anaconda prompt

ipython   (Included with Anaconda)

jupyter   (Included with Anaconda). To install outside of Anaconda, please consult: http://jupyter.org/install.htm

rasterio **(NOT included with Anaconda and required):**

> To install rasterio for Anaconda type:

> **'conda install -c conda-forge rasterio**' in to your terminal/anaconda prompt

plotly (**NOT** included with Anaconda **and required**):

> To install plotly for Anaconda type:

> **'conda install -c plotly plotly'** in to your terminal/anaconda prompt

earthpy (**NOT** included with Anaconda **and required**):

> To install earthpy for Anaconda type:

> **'conda install -c conda-forge earthpy'** in to your terminal/anaconda prompt

Getting example code

For the short course we will be using a set of Jupyter notebooks. The python installation instructions above highlight the required packages to run the example code. Through the course we will not use/demo all of the code in this repo but it may prove useful for you to have anyway. To get the code navigate to https://github.com/doclements/JNCC_shortcourse in a browser. Then click the green "code" button and select "Download Zip" (screenshot below). Once the zip file has been downloaded simply extract it to a location you will remember. If you have used git before feel free to use git commands to get a copy of the repo.

doclements / JNCC_shortcourse

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<> Code   ⊙ Issues   ⁈ Pull requests   ⊙ Actions   ⊞ Projects   ⊞ Wiki   ⊙ Security   ⊯ Insights   ⚙ Settings

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No description, website, or topics provided.

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📁 Sentinel3_General_Tools	first commit	12 days ago
📁 Third_party	first commit	12 days ago
📁 img	first commit	12 days ago
📄 .gitignore	first commit	12 days ago
📄 00_index.ipynb	first commit	12 days ago
📄 LICENSE	first commit	12 days ago
📄 Quick_instructions_for_use.txt	first commit	12 days ago
📄 README.md	first commit	12 days ago

Clone   ?

HTTPS   SSH   GitHub CLI

https://github.com/doclements/JNCC_s   📋

Use Git or checkout with SVN using the web URL.

⊡ Open with GitHub Desktop

⊟ Download ZIP

⊞ Readme

⚖ MIT License

Releases

No releases published
Create a new release

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Publish your first package

Languages

● Jupyter Notebook 99.8%   Other 0.2%

README.md   ✎

GIT REPOSITORY FOR EUMETSAT USC TRAINING CODE FOR OCEAN DATA