

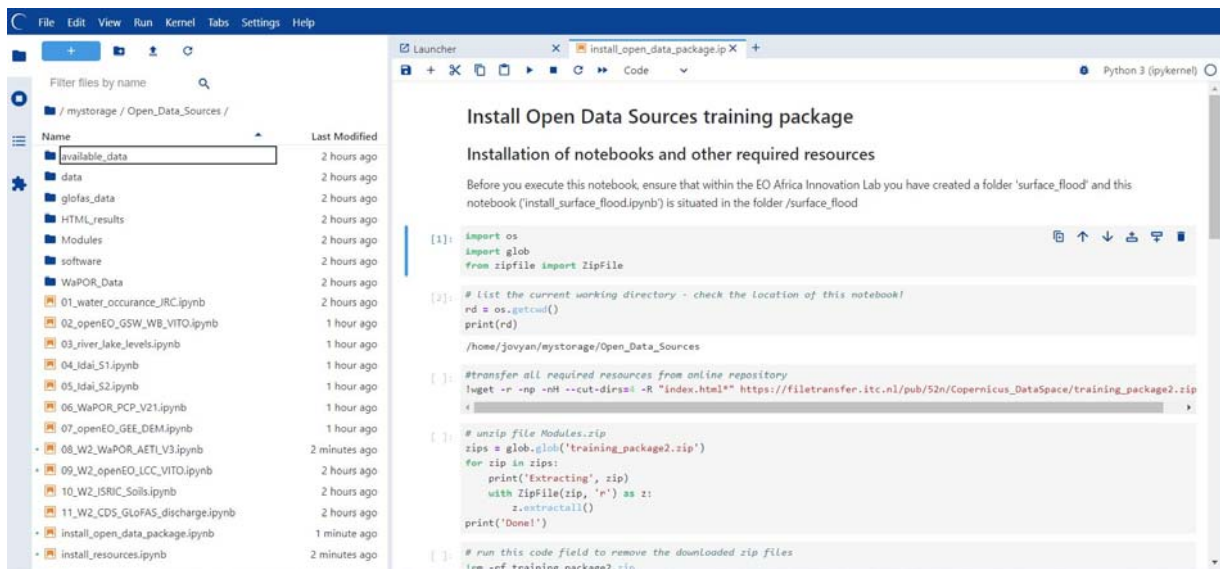
# Assessing open data sources and cloud-based RS and GIS processing

## Installing the resources

The participants are expected to have a basic knowledge on the use of cloud environments, EO image processing and some basics on Python. They have already installed the previous provided resources, as described in the document: 'Copernicus Data Space Ecosystem for access to open and free Copernicus data' (available at: [https://filetransfer.itc.nl/pub/52n/Copernicus\\_DataSpace/](https://filetransfer.itc.nl/pub/52n/Copernicus_DataSpace/)).

The notebooks prepared are assumed to be operated within the Copernicus DataSpace Ecosystem. You will need to login (at: <https://dataspace.copernicus.eu/>), select the folder /mystorage. Create a new folder 'Open\_Data\_Sources'. In order to install the required resources (software, notebooks and sample data) a notebook has been prepared (install\_open\_data\_package.ipynb), available from: [https://filetransfer.itc.nl/pub/52n/Copernicus\\_DataSpace/](https://filetransfer.itc.nl/pub/52n/Copernicus_DataSpace/). Download this notebook on your local system and upload the file into the Copernicus DataSpace Ecosystem, in the new folder created (/Open\_Data\_Sources' and open / execute the notebook, e.g. using the notebook Menu options: 'Kernel' > 'Restart Kernel' and run the cells. Once the notebook is completed the training package is at your disposal. Upon completion the Jupyter environment in the Copernicus DataSpace Ecosystem should resemble the figure below.

Figure 1: installing resources using the notebook 'install\_open\_data\_package.ipynb'



```
File Edit View Run Kernel Tabs Settings Help
+
Filter files by name
/mystorage / Open_Data_Sources /
Name Last Modified
available_data 2 hours ago
data 2 hours ago
glofax_data 2 hours ago
HTML_results 2 hours ago
Modules 2 hours ago
software 2 hours ago
WaPOR_Data 2 hours ago
01_water_occurrence_IRC.ipynb 2 hours ago
02_openEO_GSW_WB_VITO.ipynb 1 hour ago
03_river_lake_levels.ipynb 1 hour ago
04_idai_S1.ipynb 1 hour ago
05_idai_S2.ipynb 1 hour ago
06_WaPOR_PCP_V21.ipynb 1 hour ago
07_openEO_GEE_DEM.ipynb 1 hour ago
08_W2_WaPOR_AETL_V3.ipynb 2 minutes ago
09_W2_openEO_LCC_VITO.ipynb 2 hours ago
10_W2_ISRIC_Soils.ipynb 2 hours ago
11_W2_CDS_GloFAS_discharge.ipynb 2 hours ago
install_open_data_package.ipynb 1 minute ago
install_resources.ipynb 2 minutes ago

Launcher
install_open_data_package.ip X
Python 3 (pykernel)

Install Open Data Sources training package
Installation of notebooks and other required resources
Before you execute this notebook, ensure that within the EO Africa Innovation Lab you have created a folder 'surface_flood' and this notebook ('install_surface_flood.ipynb') is situated in the folder /surface_flood

[1]: import os
import glob
from zipfile import ZipFile

[2]: # list the current working directory - check the location of this notebook!
rd = os.getcwd()
print(rd)

/home/jovyan/mystorage/Open_Data_Sources

[3]: #transfer all required resources from online repository
!wget -r -np -nH --cut-dirs=1 -R "index.html" https://filetransfer.itc.nl/pub/52n/Copernicus_DataSpace/training_package2.zip

[4]: # unzip file Modules.zip
zips = glob.glob('training_package2.zip')
for zip in zips:
    print('Extracting', zip)
    with ZipFile(zip, 'r') as z:
        z.extractall()
    print('Done!')

[5]: # run this code field to remove the downloaded zip files
rm -rf training_package2.zip
```

## Prerequisites

These additional notebooks are supplementary to those provided as described in the document: 'Copernicus Data Space Ecosystem for access to open and free Copernicus data' (see link above). It is assumed here that this package has been installed according to the instructions provided.

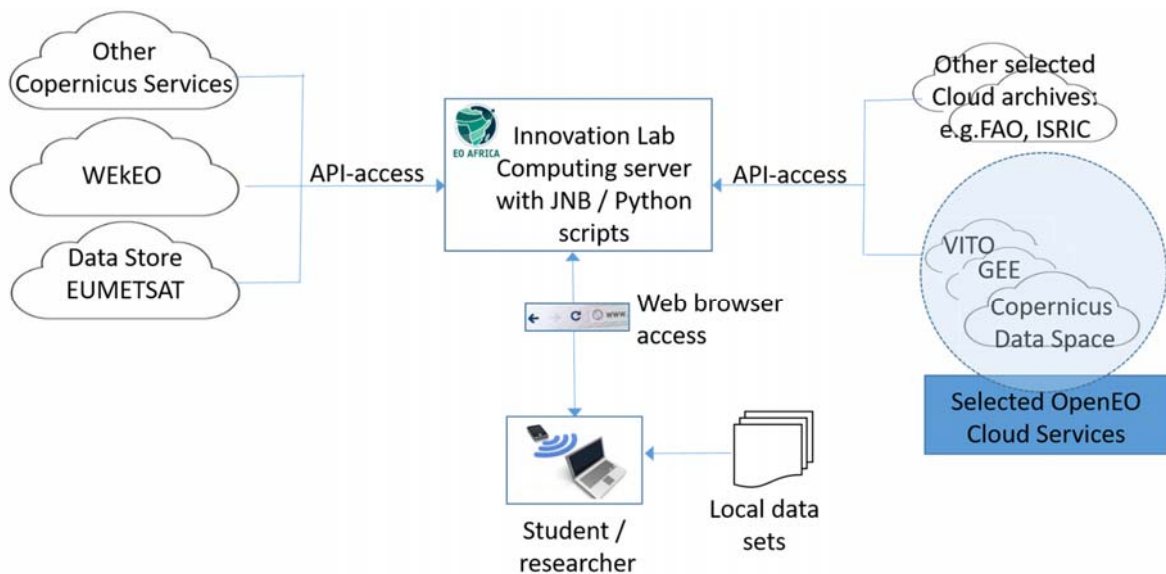
Within the various additional notebooks provided here, use is made of different repositories. You have to (freely) register yourself at:

- Google Earth Engine (<https://code.earthengine.google.com>)
- FAO – WaPOR (<https://wapor.apps.fao.org/sign-in>)
- Copernicus Climate Data Store (<https://cds.climate.copernicus.eu/user/login>)
- OpenEO access to multiple repositories (<https://aai.egi.eu/registry/>)

## Scope and Area of interest

A number of notebooks are prepared showing the various elements that are relevant when conducting environmental studies, using analysis ready data and satellite images. The data from various source repositories will be retrieved and processed. Eventual results obtained can then be downloaded to your local system.

Figure 2: Graphical representation of the cloud infrastructure accessed through the Innovation Lab



For these notebooks the area of interest used is the Buzi river catchment, south-west of the town of Beira in Mozambique. This area was heavily affected by the cyclone Idai in March 2019, see also the information provided on Wikipedia ([https://en.wikipedia.org/wiki/Cyclone\\_Idai](https://en.wikipedia.org/wiki/Cyclone_Idai)).

## Proposed sequence of activities

Notebooks are numbered, and the execution is expecting the order, e.g. starting at notebook 1\_\*, followed by 2\_\*, etc. Mostly at the end of the notebook an exercise is presented, which you should be able to execute given the sample code provided in these respective notebooks. You can also change the area of interest / date and execute the notebooks once more for the newly selected area / date.

A number of repositories are visited containing relevant data for flood modelling. Some of the repositories used are accessed using OpenEO:

1. Joint Research centre's global water occurrence database. See also: <https://global-surface-water.appspot.com/download>
2. Global surface water, see also: <https://collections.eurodatacube.com/global-surface-water/>
3. Water bodies, see also: <https://collections.eurodatacube.com/water-bodies/>
4. Water levels (Altimetry), see also: <http://land.copernicus.eu/global/products/wl>
5. Sentinel1 and Sentinel2, see also: <https://sentinels.copernicus.eu/web/sentinel/home>
6. WaPOR CHIRPS Precipitation data, see also: <https://data.apps.fao.org/catalog/iso/cad25a02-1cbc-422c-a8eb-6b4516f5486b> and <https://www.chc.ucsb.edu/data/chirps>
7. Elevation information (DEM), see also: <https://spacedata.copernicus.eu/collections/copernicus-digital-elevation-model>
8. WaPOR Evapotranspiration (ETIa, see: <https://data.apps.fao.org/catalog/iso/d2fc17f6-db91-4733-acac-fbf5164182ee>
9. Land cover (LCC), see: <https://collections.eurodatacube.com/global-land-cover/>
10. Soil grids (from ISRIC), see [https://www.isric.org/explore/soilgrids/faq-soilgrids#What\\_is\\_SoilGrids](https://www.isric.org/explore/soilgrids/faq-soilgrids#What_is_SoilGrids)
11. Discharge data from GoFAS, see: <https://www.globalfloods.eu/> and <https://www.globalfloods.eu/general-information/data-and-services/>

Before you execute the notebooks, consult the links presented above, to get an idea of the data that is going to be retrieved and processed.

## Start-up instructions (after install)

After installation of the training package, or when starting a new session in the Copernicus DataSpace Ecosystem, always start with the notebook 'install\_resources.ipyn'. Subsequently navigate (back) to the folder '/mystorage' and run the notebook 'Setup\_OpenEO\_ILWISPY.ipynb'.

Navigate to the folder '/Open\_Data\_Sources' and execute the provided notebooks in their given sequence.

Success.

## Central Asia Data

Additional data for central Asia has been prepared and is available from:

[https://filetransfer.itc.nl/pub/52n/Central\\_Asia\\_data/](https://filetransfer.itc.nl/pub/52n/Central_Asia_data/)

In the Copernicus DataSpace Ecosystem (at: <https://dataspace.copernicus.eu/>), select the folder /mystorage. Create a new folder 'Central\_Asia'. In order to install the data and meta data description a notebook has been prepared (asia\_sampledata.ipynb), available from:

[https://filetransfer.itc.nl/pub/52n/Central\\_Asia\\_data/](https://filetransfer.itc.nl/pub/52n/Central_Asia_data/). Download this notebook on your local system and upload the file into the Copernicus DataSpace Ecosystem, in the new folder created (/Central\_Asia' and open / execute the notebook.

Review the document provided 'data\_sources\_CA\_data.pdf' and review the table on the first page.

This dataset can be used to prepare additional exercises, using data from your own region using the sample notebooks which are now at your disposal.