

# Seismic data analysis exercitations

In the lecture we will see two ways to access and analyse the seismic data:

1. Accessing stored *seed* files with MatLab functions;
2. Using the ObsPy environment under Python to access data directly from seismic stations in the network.

## *Requirements:*

- (1) Having MatLab installed on your laptop
- (2) Having ObsPy installed on your laptop (see next pages)

A complete guide about obspy is available here: <https://docs.obspy.org/>

A tutorial is available here: obspy: <https://docs.obspy.org/tutorial>

A general installation guide of obspy under Anaconda is available here: <https://www.geophysik.uni-muenchen.de/~megies/installation2.pdf>

The installation guide under linux systems is available here: <https://github.com/obspy/obspy/wiki/Installation-on-Linux-via-Apt-Repository>

Below you can find a guide to install everything is needed for the proposed exercitations with Anaconda:

1) install anaconda from <https://www.anaconda.com/products/individual>

2) now add conda forge channel:

```
$ conda config --add channels conda-forge
```

3) setup a separate environment for obspy:

```
$ conda create -n obspy python=3.8
```

```
$ conda activate obspy
```

4) Install pre-compiled ObsPy conda package from Anaconda cloud with:

```
$ conda install obspy
```

and check for updates:

```
$ conda update obspy
```

5) install Jupyter Notebook from Anaconda Navigator interface under Obspy environment

```
$ jupyter notebook
```

here click on new, python 3

6) from anaconda navigator, select obspy, open terminal, and then type Jupyter notebook. The notebook will run in your browser, you will find the local directories and existing notebooks (ipynb) in <http://localhost:8888/tree>.

if kernel error appears in Jupyter Notebook edit the kernel.json file in

```
\anaconda\envs\obsipy\share\jupyter\kernels\python3\
```

and modify the path to python executable (e.g. \anaconda\envs\obsipy\bin\python in \anaconda\envs\obsipy\python

using ObsPy with local stored data requires to have the data placed respecting the SDS scheme:

year/network/station\_name/channel\_name, with channel names like HHZ.D, EHZ.D... e.g.: 2020/ET/SOE0/HHZ.D . root is the variable indicating the "year" (local) path.

a working directory for the data can be created through the notebook interface. Under Windows OS, you can find it (or create it) under your user directory (C:\\Users\\user\_name\\)

7) install the following packages:

- install matplotlib

  - \$ python -m pip install -U pip

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- install numpy:

  - \$ conda install numpy

- install basemap:

  - \$ conda install basemap

- install pandas

  - \$ conda install pandas

- install xarray:

  - \$ conda install -c conda-forge xarray dask netCDF4 bottleneck