Software Installation

We will rely on various software packages. These are installed on the department's computers. If you bring your own laptop, please install the following software packages:

1. **QGIS**. German webpage: https://www.qgis.org/de/site/forusers/alldownloads.html or English webpage: https://www.qgis.org/en/site/forusers/alldownloads.html Please follow these instructions for your operating system (Windows, Linux, Mac OS X). Feel free to install either version 3.8 or 3.4. Both will work for our purposes, the interfaces are just a bit different.

2. **QGIS Semi-Automatic Classification Plugin.** Information and installation instructions can be found here: https://plugins.qgis.org/plugins/SemiAutomaticClassificationPlugin/. It can also be installed from within QGIS under 'Plugins -> Manage and install Plugins'.

3. Sentinel Application Platform (**SNAP**, http://step.esa.int/main/toolboxes/snap/) to work with Sentinel and other radar and optical data. Many commands are included in QGIS, but some steps for processing radar data require the SNAP toolbox. Install from here: http://step.esa.int/main/download/ and use the appropriate OS version. Use Windows 64-bit, when installing for Windows.
   In this class, we will make use of both the Sentinel-1 and Sentinel-2 toolboxes, as well as the Sen2Cor plugin (available as a standalone module or within SNAP).

4. **Python programming language.** We recommend to install Python through a package manager, such as Anaconda: https://www.anaconda.com/download/. In this class, you should use python 3.7.

5. In addition to Python, we will use some extra libraries. The libraries we will need to install are called '**matplotlib**, **gdal**, **gdalnumeric**, **ogr**, **osr**, **numpy**, **pandas**, **statsmodels**, and **h5py**'. This is straightforward with Anaconda. Please see the more detailed instructions on the next page.

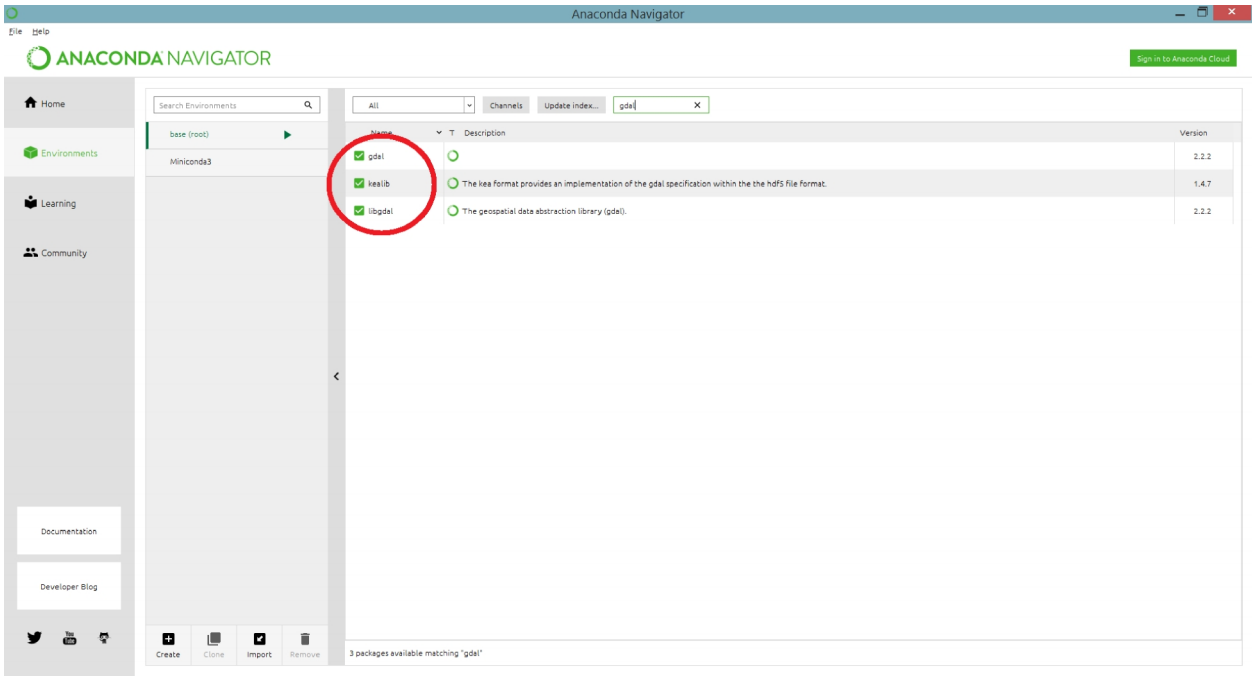
6. GDAL command-line access through **OSGeo4W**. This is a very useful addition to QGIS as it directly allows to work with vector and raster data on the command line. This software is well programmed, uses multiple cores (if available) and is generally much faster than ArcMap. Install the OsGeo4W Shell to access the GDAL Utilities: http://trac.osgeo.org/osgeo4w/ . There is a German webpage, too: http://trac.osgeo.org/osgeo4w/wiki/OSGeo4W_de

   More about the GDAL Utilities: http://gdal.org/gdal_utilities.html with manuals.

   Note: GDAL can also be accessed via Anaconda, if the gdal libraries are installed (see (4.) and next page for detailed instructions).

Detailed Python Instructions – Anaconda

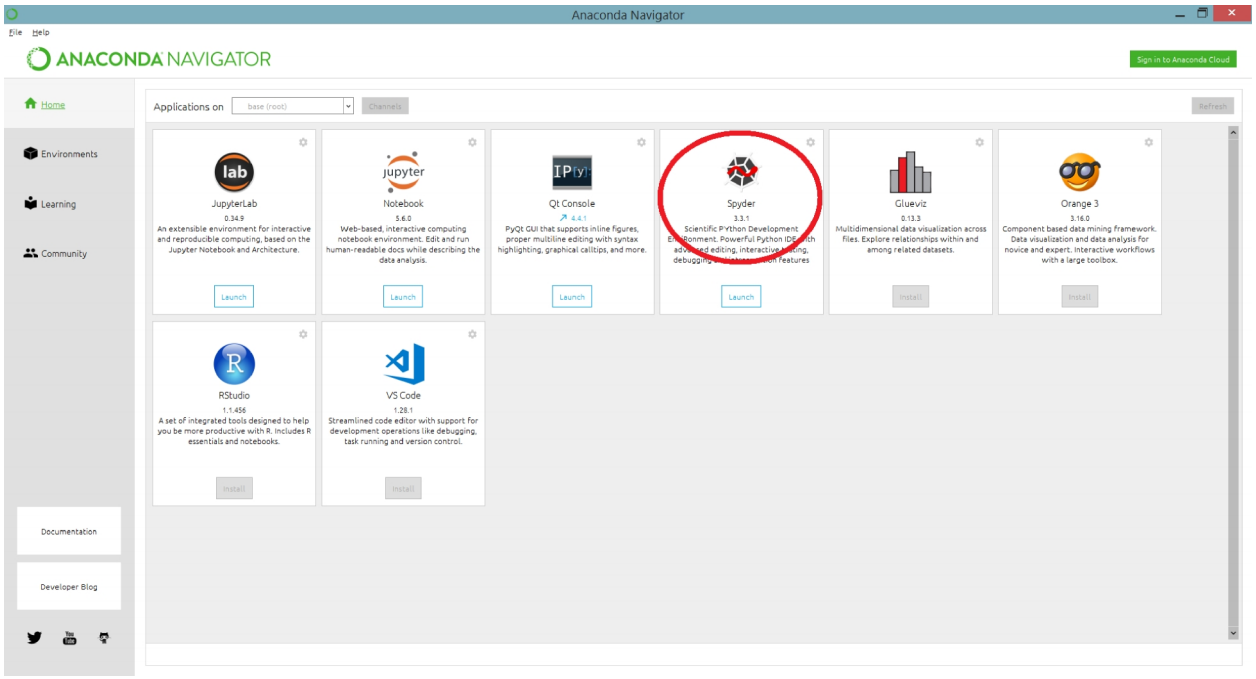
To install new packages on Anaconda, simply open the “Anaconda Navigator” and go to the ‘Environments’ tab.



The center panel shows your python environments – this is an easy way to manage your python installation when you have multiple versions or packages which require different installations. The right panel is a list of all of the python modules you can install via Anaconda. Use the search bar to check for the required packages listed above. All of them except for gdal, osr, ogr, and gdalnumeric should be installed by default. Thankfully, osr, ogr, and gdalnumeric are included with ‘gdal’, so we only have to install one new library: **gdal**.

Search for the ‘gdal’ package, and select both ‘gdal’ and ‘libgdal’. Then click the button on the bottom right with says ‘Apply’. This will find all of the other packages that you need to have installed to make gdal and libgdal work, and automatically install them. When the pop-up dialog appears asking if you are ready to install the modules, click ‘OK’. This will then take some minutes to install all of the packages on your computer.

Once this is done, navigate back to the ‘Home’ panel (on the far left), and there should be an option to open Spyder.



You can test to make sure everything is installed correctly by running Spyder and trying to import all of the libraries:

import matplotlib.pyplot as plt
import numpy as np
import h5py
import statsmodels.api as sm
import pandas as pd
import gdal
import gdalnumeric
import ogr
import osr

If these all work, you're all set!