Software Installation

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

1. **Matlab**. You will need to acquire a student license of Matlab, at least version R2016a or newer.

2. Viewing point clouds. You can use the simple (but powerful) point-cloud viewer lasview from the LASTools package (see 3, works best on Windows OS). However, there are other point-cloud viewer with more functionality that run on all OS. There exist a small, but very powerful and useful point-cloud viewer called **Displaz** (http://c42f.github.io/displaz/). I highly recommend installing it – there exist packages for Windows and Ubuntu systems (Mac OS X will work, too but may require some editing).

   There exists a very powerful point-cloud analysis tool that does much more than just viewing point clouds. Install **CloudCompare** (http://www.danielgm.net/cc/) from http://www.danielgm.net/cc/release/index.html. We will use CloudCompare for some tasks during the workshop.

3. **LASTools**. http://rapidlasso.com/lastools/ or download directly from: http://lastools.org/download/LAStools.zip Martin Isenburg will bring a licensed version of this software to the workshop. This software is licensed on the desktop computers and the unlicensed software will add uncertainties to the pointclouds. The software will only run on Windows Operating System. But you can call the lastools commands with wine and thus this software also can be used on Macs and Ubuntu computers (in fact, I mostly run lastools via Ubuntu). All manual and help documentation for LASTools are available online, please visit http://rapidlasso.com/lastools/ and select the appropriate tool from the menu to get a help documentation.

4. **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). We have installed QGIS for Windows within the OSGeo4W package (see next item).

5. 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

For Windows, download the setup for 64-bit: http://download.osgeo.org/osgeo4w/osgeo4w-setup-x86_64.exe . A short tutorial to install OsGeo4W is available here: http://www.aubrett.com/InformationTechnology/Geospatial/InstallOsgeo4wGDAL.aspx

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

6. 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. *WE will not be using SNAP during this Lidar Workshop, but if you intend to fuse lidar data with Sentinel (optical/radar) or other satellite date, we strongly suggest to install SNAP.*