Open Foris SAR Toolkit

USER MANUAL

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Version 0.1-beta May 2016

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1 Introduction

1.1 About this manual

The user manual provides information on how to pre-process Synthetic Aperture Radar (SAR) datasets in an automatic way by using the Open Foris SAR Toolkit (OFST). The manuscript gives basic explanations of how OFST functions work. It is not attempted to explain the theoretical background on how to use SAR remote sensing or GIS, but rather will guide you through **hands-on examples** for each tool, next to some general topics, such as the installation and technical specifications of the used data.

OFST programs are called via the UNIX command line. However, the user manual is written in a way that it can be understood by people who are experienced Windows or Mac users, but have not used Linux or OFST before. The same applies for specific knowledge on SAR technology. While a basic understanding of product types and SAR missions is recommended, no detailed knowledge about specific aspects regarding the processing of SAR imagery is needed.

1.2 What is Open Foris SAR Toolkit?

OFST - Open Foris SAR Toolkit is a collection of prototype command-line utilities for highly-automated SAR related processing tasks such as data inventory and download as well as data preprocessing and some basic post-processing commands. The toolkit aims to strongly simplify the complex process of transforming raw, or low level SAR imagery into higher level products that are ready for subsequent image processing tasks in order to enable the production of value-added thematic information layers.

The processing chains are realized in simple bash scripts that expect a minimum of given input parameters when executed. The output files are usually in the GeoTiff format and stored for every band separately. A virtual-raster file is created allowing to import the stack into GIS or RS software. The processing commands follow standardized workflows in order to provide ready-to-classify data stacks comparable to optical remote sensing data. The tools have been tested solely on Ubuntu Linux 14.04 environment for now. While it should be compatible with other with other Linux distributions (given the installation of the software dependencies) it is foreseen to provide installers for Mac OS as well as MS Windows in future. For the actual data processing, the scripts call the functionalities of other freely available software packages such as the Sentinel Application Platform (SNAP, `http://step.esa.int/main/toolboxes/snap/`) and geospatial FOSS software like the GDAL libraries.

1.3 The great potential of OFST

In the past, the use of SAR data required a specific expertise for creating useful datasets out of raw or low-level data. In addition, specialized software can be quite costly. The development of the OFST, on the contrary, provide rather ready-to-use, standardized workflows that do not need a fundamental knowledge of SAR data processing. It is based on already available GPL software such as ESA's SNAP toolbox and can therefore be used freely. A minimum of easy-to-understand processing parameters have to be submitted in order to let the computer do the rest of the work.

1.4 First time users

First time users, the terminal is your friend: The Open Foris SAR Toolkit tutorial is aiming to provide straight forward guidelines and examples to help first time users to familiarise themselves with the Open Foris SAR Toolkit. This includes the installation of Ubuntu, various geospatial tools and, in particular, the installation and application of the Open Foris SAR Toolkit which is based on ESA's SNAP software. You do not need to be an expert, we just would like you to be curious to try things out. Do not be afraid of using the command-line! We know that the terminal window is for many users a barrier of being afraid ruining everything and having to start from scratch. These days the terminal is not exclusively for advanced computer enthusiasts. Give it a try and just start playing around following the tutorials and instructions you can find in the wiki.

1.5 Hardware requirements

Hardware requirements will depend both on the data you want to use and the size of your area of interest. While for the processing of ALOS Kyoto & Carbon mosaics (Section 4.1) as well as for the processing of ALOS ASF data over regional spots (Section 4.2) 4 GB of RAM are enough, the processing of Sentinel-1 is resource-intensive and at least 12 GB of RAM are recommended even for single scenes (Section 4.3).

2 License

In addition the SNAP toolbox developed by the European Space Agency ESA will be downloaded and installed during the installation procedure. Note that SNAP is licensed under the same GNU GPL version 3 license as the Open Foris SAR Toolkit.

3 Installation of Open Foris SAR Toolkit

3.1 Automatic Installation in Ubuntu 14.04

The easiest way to install the Open Foris SAR Toolkit is via an install script provided for Ubuntu 14.04 which downloads all of its software dependencies automatically and set-up OFST on the system. It is named **install_ofst_ubuntu1404_01-beta.sh**. To run the installer please follow the steps:

1. Open the terminal (CTRL+ALT+T) and download the script from the github repository by copying the following line into the terminal:

```
wget https://raw.githubusercontent.com/openforis\
OpenSARKit/master/bins/install_scripts/
   install_ofst_ubuntu1404_01-beta.sh
```

   Note: the **wget** *command allows you to download files from the internet directly from the command line just as you can do from your browser. Since you will be in your home folder after opening the terminal, the installation script will be placed there. There are advanced options available as well (e.g. defining an output directory).*

2. Run the script as **Superuser** on the command line of the opened terminal window in order to install everything:

```
sudo bash install_ofst_ubuntu1404_01-beta.sh [optional
   installation directory]
```

   Note I: *The installation directory argument is optionally. If no input is given, OFST will be automatically installed into* **/usr/local/lib/osk**.
   Note II: *This script has to be run as Superuser (i.e. use of the* **sudo** *command) since it will install additional software packages where administrative permission is needed. After launching the script it will ask for your Superuser password, which in most of the cases is the same as your normal user password. If you are a secondary user of the PC where you want to install OFST, contact the administrator of the PC for assistance.*

3. Source the commands (optionally) by typing:

```
source /etc/profile.d/OpenSARKit.sh
```

   Note: Within the File **/etc/profile.d/OpenSARKit.sh** *all the paths to the OFST scripts are defined. By adding them to the global PATH variable they will be available for execution on the command line. Since the file*

itself acts as a script by launching a new terminal it will be only necessary to source the file the first time. Opening a new terminal window will from now on include all OFST commands .

3.2 Manual Installation on other Linux platforms

While it is foreseen to provide also automatic installers for other operating systems in future, at the moment the only way is to do it manually by (1) installing the dependencies, (2) cloning the OFST scripts with github, (3) downloading the database that is necessary for nationwide processing and source the commands so that they come available on the command-line interface.

3.2.1 Dependencies

According to your operating system, install all the following software packages via your package manager. Note that the naming corresponds to the Ubuntu packages, but should be similar for other operating systems.

- gdal-bin
- libgdal-dev
- dans-gdal-scripts
- saga
- geotiff-bin
- spatialite-bin
- aria2
- unrar
- parallel
- xml-twig-tools
- curl
- python
- python-scipy
- python-numpy

- git

In addition you have to install the SNAP toolbox provided by European Space Agency which can be downloaded from here: http://step.esa.int/downloads/3.0/installers/esa-snap_sentinel_unix_3_0.sh

3.2.2 Get OFST from the github repository

As a next step the scripts can be downloaded from the github repository. Create a new folder of your choice (for the example we use /OFST) and get the scripts via github:

```
mkdir ~/OFST && cd ~/OFST &&
git clone https://github.com/openforis/opensarkit
```

3.2.3 Download the OFST database

The OFST database contains country borders and the ALOS K&C grid. It is needed for search queries based on the ISO3 country codec as well as ALOS K&C processing. In order to set it up, create a folder for the OFST database, download it to this one and rename it to its original name:

```
mkdir ~/OFST/Database && cd ~/OFST/Database &&
wget https://www.dropbox.com/s/qvujm3l0ba0frch/OFST_db.sqlite
```


3.2.4 Source the commands

There is a template source file which contains all the paths in order to have access of the commands on the command line. It is called template_source.bash and is located in /OFST/opensarkit/template_source.bash (in case of the folders used in the previous steps). The part between line 4 and 15 should be set accordingly to your installation and placement of OFST, SNAP and the database. Make sure that $SNAP_EXE is linked to the actual gpt executable file of SNAP and not only the bin directory.
As a last step you can source the file within your /.bashrc (or whatever your OS uses to provide the executables):

```
echo "source ~/OFST/opensarkit/template_source.bash" \
>> ~/.bashrc
```

You can test if everything worked fine by opening a new terminal and see if the oft-sar commands are there. For example, type oft-sar-S1-inventory and an explanation of the command should appear.

3.3 Manual Installation on Mac OS

Running OFST on the Mac Operating System X necessitates the installation of Macport. The Macports project provides an easy-to-use system that enables to easily install command-line utilities for the Mac Operating System X. Please follow the instructions for installation on https://www.macports.org/install.php. After the Macports have been successfully installed you can follow the instructions in section 3.2. Note that the names of the packages will slightly differ.

4 OFST - Tools documented

4.1 ALOS Kyoto & Carbon workflow

4.1.1 Dataset Description

Kyoto & Carbon initiative
Global 25m resolution PALSAR-2/PALSAR mosaic and forest/non-forest map are free and open datasets generated by applying JAXAs sophisticated processing and analysis method/technique to a lot of images obtained with Japanese L-band Synthetic Aperture Radars (PALSAR and PALSAR-2) on Advanced Land Observing Satellite (ALOS) and Advanced Land Observing Satellite-2 (ALOS-2).
The global 25m resolution PALSAR/PALSAR-2 mosaic is a seamless global SAR image created by mosaicking SAR images of backscattering coefficient measured by PALSAR/PALSAR-2, where all the path within 10x10 degrees in latitude and longitude are path processed and mosaicked for the sake of processing efficiency. Correction of geometric distortion specific to SAR (ortho-rectification) and topographic effects on image intensity (slope correction) are applied to make forest classification easy. The size of one pixel is approximately 25 meter by 25 meter. The temporal interval of the mosaic is generally 1 year.
The global forest/non-forest map (FNF) is generated by classifying the SAR image (backscattering coefficient) in the global 25m resolution PALSAR-2/PALSAR mosaic so that strong and low backscatter pixels are assigned as forest (colored in green) and non-forest (colored in yellow), respectively. Here, the forest is defined as the natural forest with the area larger than 0.5ha and forest cover over 90%, as same to the FAO definition. Since the radar backscatter from the forest depends on the region (climate zone), the classification of 2 Forest/Non-forest is conducted by using the region dependent threshold of backscatter. The classification accuracy is checked by using in-situ photos and high-resolution optical satellite images. (*taken from the official document at* `http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/DatasetDescription_PALSAR2_Mosaic_FNF_v1.pdf`)

Data Distribution by JAXA
In order to retrieve data, the user has to register at `http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/registration.htm` Note that the datasets are provided free of charge, but are available for research and educational purposes only. It is prohibited to use the datasets for commercial, profit-making purposes without JAXA's consent. If users wish to use the datasets for such purposes, please make contact to JAXA. Anyone wishing to publish any results using the datasets should clearly acknowledge the ownership of the data in the publication. JAXA retains

ownership of the dataset. JAXA cannot guarantee any problem caused by or possibly caused by using the datasets.

4.1.2 Overview of the workflow

The workflow of the ALOS Palsar Kyoto & Carbon mosaics consists of 2 scripts, one for the data download and one for the subsequent processing (Figure 1). The only input which needs to be given is either a polygon shapefile, bounding the area of interest, or one ISO3 country code, in case the data should be processed for a whole country. In addition the year for which the data should be retrieved has to be set.
Within the given project folder the download script (oft-sar-ALOS-KC-download) will create a ZIP folder, where all downloaded archives will be stored. If the download script is run more than once for different years, again, all archives are stored therein, independent of the year.

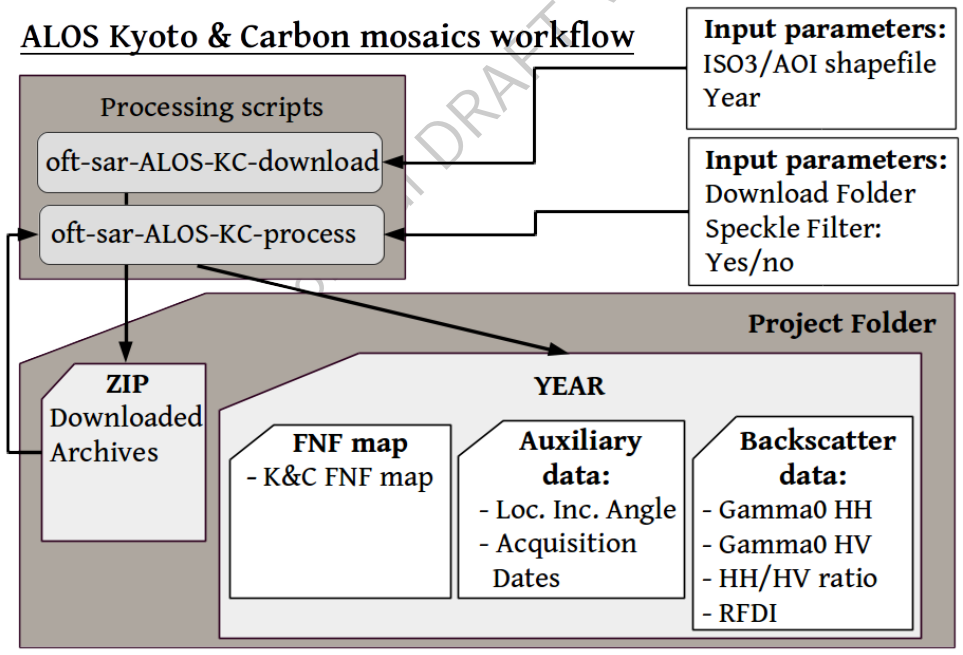

Figure 1: Overview of the ALOS Kyoto & Carbon workflow.

After the download is completed, the process script (oft-sar-ALOS-KC-process) can be executed. The Project folder should be the same as for the download

script, i.e. the one where the Zip folder is stored. Next to the Zip folder, a folder named after the year will be created within the project folder.
Inside this year folder, 4 additional folders will be created. The first one is called FNF and contains the forest/non-forest map created by Jaxa for the area of interest. The second one is called AUX and contains a GeoTiff file with the local incidence angle of the acquisitions and another one containing the acquisition dates. The backscatter data is stored in the MOS folder. Within this folder 4 files are placed. 2 files correspond to the Gamma0 HH- and HV polarized bands. The script creates also the ratio band out of the HH and HV polarized data. In order to visualize the data, a virtual raster file (vrt) is added as well. Band 1,2 and 3 correspond to Gamma0 HH, HV and HH/HV ratio, respectively. In addition the Radar Forest Degradation Index is calculated by:

$$RFDI = \frac{Gamma0_{HH} - Gamma0_{HV}}{Gamma0_{HH} + Gamma0_{HV}} \quad (1)$$

4.1.3 Script manuals

oft-sar-ALOS-KC-download - download script for ALOS K&C data

OFST VERSION
0.1

SYNOPSIS
`oft-sar-ALOS-KC-download <project folder> <ISO3/area of interest> <year>`

- project folder: (output) folder where the downloaded data will be saved
- ISO3/area of interest: (input) ISO3 country code or shapefile of your area of interest (AOI)
- year: Acquisition Year (2007, 2008, 2009, 2010 or 2015)

DESCRIPTION
ALOS K&C data is provided in tar-zipped 5x5 degree tiles on the JAXA server. After registration it is possible to download the backscatter tiles as well as the JAXA forest/non-forest classification globally. The script will make sure that only those 5x5 tiles will be downloaded that overlap with the area of interest. Within the project folder a ZIP folder is created which contains all downloaded content.

oft-sar-ALOS-KC-process - prepare ALOS Kyoto & Carbon mosaics

OFST VERSION
0.1

SYNOPSIS
`oft-sar-ALOS-KC-process <project folder> <ISO3/area of interest> <year> <filtering>`

- project folder: (output) folder where the downloaded data will be saved
- ISO3/area of interest: (input) ISO3 country code or shapefile of your area of interest (AOI)
- year: Acquisition Year (2007, 2008, 2009, 2010 or 2015)
- filtering: Apply Refined Lee Filter

  available choices:

  0: no filter applied

  1: filter applied

DESCRIPTION
As a first step the script unpacks the archives and stores the K&C forest/non-forest map by JAXA as well as the auxiliary data in dedicated folders (see Figure 1).
Since inside the downloaded 5 by 5 degree tiles of the backscatter data the tiles are further subdivided into 1 by 1 degree files, the script checks first if such a file is overlapping the actual area of interest. In case it will apply the layover/shadow mask, calculate the HH/HV ratio and the Radar Forest Degradation Index (RFDI). Finally the all tiles are merged and clipped to the extent of the area of interest. In case of a given ISO3 code, a buffer of 0.1 degree is applied in order to avoid missing data due to inaccuracies of the country borders.

4.2 ALOS ASF data processing

4.2.1 Dataset Description

Mission
From 2006 to 2011, PALSAR's L-band SAR yielded detailed, all-weather, day-and-night observation, as well as repeat-pass interferometry. PALSAR data are from multiple observation modes with variable polarization, resolution, swath width, and off-nadir angle.

PALSAR was one of three instruments on the Advanced Land Observing Satellite-1 (ALOS-1), also known as DAICHI, developed to contribute to the fields of mapping, precise regional land-coverage observation, disaster monitoring, and resource surveying. ALOS-1 was a mission of the Japan Aerospace Exploration Agency (JAXA). (https://www.asf.alaska.edu/sar-data/palsar/about-palsar/)

Technical specifications
For a brief overview of observation modes check out http://www.eorc.jaxa.jp/ALOS/en/about/palsar.htm
A more detailed description of the mission can be found under http://www.eorc.jaxa.jp/ALOS/en/kyoto/ref/ALOS_BioGeo-04.pdf

4.2.2 Data Distribution by Alaska Satellite Facility

ASF provides data free-of-charge after signing the EULA terms & conditions (https://www.asf.alaska.edu/data-tools/submit-a-proposal/alos-end-user-license-ag), which fundamentally allows for the use of the available ALOS data for non-commercial use. Even though ASF holds a considerable amount of imagery, it does not contain the full archive. Most of data is limited to the regions of the Americas, Africa and South-East Asia.

4.2.3 Overview of the workflow

In order to preprocess ALOS data from the Alaska Space Facility site, 3 scripts are needed. At the moment OFST only supports the already radiometrically, terrain corrected products that are provided by (i.e. RTC_HI_RES, RTC_LOW_RES), which should be respected during data inventory by chossing the corresponding processing level.
The inventory script will create a shapefile within a newly created Inventory folder containing the footprints and additional metadata information like acquisition date etc. This shapefile can be edited in order to refine the data selection.
Based on the inventory shapefile, the download script will retrieve all scenes.

In order to allow an immediate bulk prcessing, the data is already sorted in a predefined structure under the newly created folder named after acquisition mode (e.g. FBD).
From within the acquisition mode folder, the oft-sar-ALOS-ASF-bulk-preprocess script can be run. This script will apply a Refined Speckle Filter to all scenes and merge the scenes of the same track acquired at the same date into one swath product. All swath products are stored inside a newly created folder called PATH.

4.2.4 Script manuals

oft-sar-ALOS-ASF-inventory - data inventory script for ALOS PALSAR data from the Alaska Space Facility

OFST VERSION
0.1

SYNOPSIS
`oft-sar-ALOS-ASF-inventory <output folder> <area of interest> <start date> <end date> <mode> <processing level> <script Mode>`

- output folder: (output) folder where the downloaded data will be saved
- area of interest: (input) shapefile of your area of interest (AOI)
- start date: start date of search in format YYYY-MM-DD
- end date: end date of search in format YYYY-MM-DD
- mode: acquisition mode of the PALSAR instrument
  available choices:
  FBS (Fine-Beam Single Polarization)
  FBD (Fine-Beam Dual Polarization)
  PLR (Polarimetric Mode)
  WB1 (Wide-swath Mode)
- processing level: choose the product level
  available choices
  L1.0 (RAW - Level 1.0)
  L1.1 (SLC - Level 1.1)

L1.5 (GRD - Level 1.5)

RTC_HI_RES (12.5m High-resolution Terrain Corrected)

RTC_LOW_RES (30m Low-resolution Terrain Corrected)

- script mode

  available choices

  0 (only do the data inventory)

  1 (data inventory + direct data download)

DESCRIPTION

This command will create a folder called `Inventory` inside the given Project folder. This new directory contains a shape-file with the footprints of the scenes and additional information in its attribute table based on the search criteria given. The direct download option (script mode has to be 1) will download all resulting scenes. In case of script mode 0, a refined manual selection of the desired scenes is possible based on the created shape-file. You can then download the selected scenes using the oft-sar-ALOS-ASF-download script.

Note I:The Alaska Space Facility provides unrestricted access to ALOS PALSAR data for major regions in the world (i.e. Americas, Africa, Asia). Apart from the standard SAR products (RAW,SLC,GRD), already preprocessed imagery (RTC) is available at 2 resolutions (12.5m, 30m) and it is highly recommended to use those. For more information you can visit:
`https://www.asf.alaska.edu/sar-data/palsar/terrain-corrected-rtc/`

NOTE II: Even though the scripts supports different acquisition modes, it is recommended to use the Fine-Beam-Dual (FBD) mode, especially if you work on large regions or nations. The predefined observation strategy implemented by JAXA assured a consistent coverage for the whole world and the cross-polarized channel (i.e. HV) is well-suited for forestry applications.

oft-sar-ALOS-ASF-download - download script for ALOS PALSAR data from the Alaska Space Facility based on a OFST inventory shapefile

OFST VERSION
0.1

SYNOPSIS
`oft-sar-ALOS-ASF-download <output folder> <inventory shapefile>`

- output folder: (output) folder where the downloaded data will be saved
- inventory shapefile: Shapefile created by the osk_ALOS_ASF_inventory script

DESCRIPTION
This command will download ALOS data that is listed in an inventory shapefile created by the oft-sar-ALOS-ASF-inventory. The shapefile can be edited beforehand (i.e. selection of a subset of scenes instead of all scenes available on the server).

oft-sar-ALOS-ASF-RTC-bulk-process - data inventory script for ALOS PALSAR data from the Alaska Space

OFST VERSION

0.1

SYNOPSIS

`oft-sar-ALOS-ASF-RTC-bulk-process <project path> <resolution>`

- project path: pathname, where the ASF downloaded zips are located
- resolution: output resolution in degree (- for original resolution)

DESCRIPTION

This command will process all scenes contained in the project path which corresponds to the folder of the acquisition mode created by the download script (e.g. /path/to/FBD). Resolution hsould be set in degrees, since the data is in Lat/Long projection.

4.3 Sentinel-1 data processing

4.3.1 Dataset Description

Mission

Sentinel-1 is one of the satellite constellation of European Union's Copernicus programme providing imagery acquired by its C-Band SAR instrument. As one of the first operational earth observation satellites it will provide data for decades. The constellation consists of two satellites (Sentinel-1A and B, launched in spring 2014 and 2016) orbiting earth in a sun-synchronous orbit 180 degree apart. The nominal revisit frequency is 6 days. Due to the independence of cloud conditions its large potential lies in capturing the temporal dynamics of the land surface that can help to distinguish between different land cover and land use classes.
OFST provides an optimized workflow for capturing those dynamics by calculating statistics in the temporal domain out of a set of multi-temporal imagery acquired by the Interferometric Wide-swath Mode (IW).

Technical specifications

For first time users it is recommended to familiarize themselves with the C-band SAR instrument and its imaging modes. A short introduction into the acquisition modes can be found here: http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-1/Instrument
For a more detailed description users can find further information here: https://directory.eoportal.org/web/eoportal/satellite-missions/c-missions/copernicus-sentinel-1#sensors

4.3.2 Data Distribution by Copernicus program

In line with its data and information policy, the Copernicus programme provides users with free, full and open access to environmental data.
Depending on their needs, users can obtain these data either from the Copernicus services or directly from the Copernicus satellites. No registration is required for discovery and view services while it is a prerequisite to download Sentinel data. Registration is free of charge and can be done at https://scihub.copernicus.eu/dhus/#/self-registration

4.3.3 Overview of the multi-temporal workflow

In order to preprocess Sentinel-1 GRD data 3 scripts are needed. The first one does the data inventory and creates a shapefile containing the footprints and metadata on the single acquisitions. This file can be edited and then used by the download script, which will retrieve the data and put it in a predefined folder structure. This allows for the immediate processing using the multi-temporal bulk processing script. As a result, radiometrically, terrain corrected datasets are available for every swath. Optionally multi-temporal metrics can be derived by image swath.

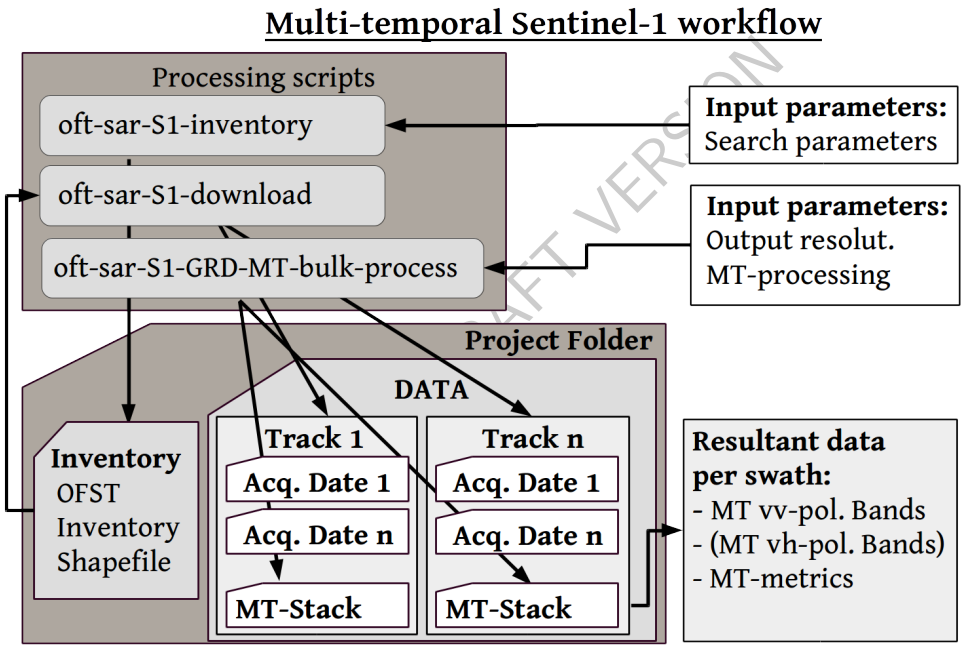

Figure 2: Overview of the multi-temporal Sentinel-1 GRD workflow.

4.3.4 Script manuals

oft-sar-S1-inventory - data inventory script for Sentinel-1 data on the Copernicus scihub server

OFST VERSION
0.1

SYNOPSIS

```
oft-sar-S1-inventory <output folder> <area of interest> <start date>
<end date> <product type> <polarization mode> <script mode>
```

- output folder: (output) folder where the downloaded data will be saved
- area of interest: (input) shapefile of your area of interest (AOI)
- start date: start date of search in format YYYY-MM-DD
- end date: end date of search in format YYYY-MM-DD
- product type: acquisition mode of the PALSAR instrument

  available choices:

  SLC (L1.1 - Single-look complex)

  GRD (L1.5 - Ground Range Detected)
- polarization mode: acquisition Mode of Sentinel-1 instrument

  available choices

  VV (for IWS Mode VV & VV/VH)

  VH (for IWS Mode VV/VH)

  HH (for IWS Mode HH & HH/HV)

  HV (for IWS Mode HH/HV)
- script mode

  available choices

  0 (only do the data inventory)

  1 (data inventory + direct data download)

DESCRIPTION

This command will create a folder called `Inventory` inside the given Project folder. This new directory contains a shape-file with the footprints of the scenes and additional information in its attribute table based on the search criteria given. The direct download option (script mode has to be 1) will download all resulting scenes. In case of script mode 0, a refined manual selection of the desired scenes is possible based on the created shape-file. You can then download the selected scenes using the oft-sar-S1-download script.

Note I: At the moment OFST is only able to handle GRD data. The corresponding product type should therefore be set appropriately.

oft-sar-S1-download - download script for ALOS PALSAR data from the Alaska Space Facility based on a OFST inventory shapefile

OFST VERSION
0.1

SYNOPSIS
`oft-sar-S1-download <output folder> <inventory shapefile>`

- output folder: (output) folder where the downloaded data will be saved
- inventory shapefile: Shapefile created by the oft-sar-S1-inventory script

DESCRIPTION
This command will download ALOS data that is listed in an inventory shapefile created by the oft-sar-ALOS-ASF-inventory. The shapefile can be edited beforehand (i.e. selection of a subset of scenes instead of all scenes available on the server).

oft-sar-ALOS-ASF-RTC-bulk-process - data inventory script for ALOS PALSAR data from the Alaska Space

OFST VERSION

0.1

SYNOPSIS

`oft-sar-S1-GRD-MT-bulk-preprocess <input directory> <resolution> <MT metrics>`

- input directory: (input) higher-level directory of the downloaded zip file (i.e. DATA folder created by oft-sar-S1-download)
- output resolution:

  available choices:

  HI_RES (10m output)

  MED_RES (30m output)
- MT-metrics: calculate muti-temporal metrics

  available choices:

  0: does not calculate the MT-metrics

  1: calculates the MT-metrics

DESCRIPTION

This command will process all scenes contained in the input which corresponds to the DATA folder by the download script (e.g. /path/to/Project/DATA).
If the MT metrics are not calculated, all scenes will be assembled to the whole swath (i.e. if more then 1 scene per swath), will be radiometrically terrain corrected and an additonal vv/vh ratio channel will be created for the dual-polarized products.
the multi-temporal mode, instead, will create a MT-metrics folder for every swath. Within this folder a coregistered stack of each polarization and of the multi-mteporal metrics calculated for every polarization will be stored.