

REDD+ for the Guiana Shield

Technical and Regional Platform for the Development of REDD+ in the Guiana Shield

MACAPA DATA FUSION - STEP2

Objective

This tutorial is designed to explain how to combine different data in same study site.

In this second step we will a different way to combine Landsat 8/Sentinel-1/Alos2 information: simply do a layer stack of all available bands.

We need to do the following things:

The goal

The goal is to used Landsat 8 and Sentinel-1/ALOS2 in complementarity

The different steps are:

1. Define the classes to map
2. Layer stack Landsat 8 and Sentinel-1/ALOS2
3. Classify the new layer

For step 1 we will focus on the following classes:

Class	DN value
Forest	10
Swampy vegetation	21
Low Vegetation	22
Bare soil	31
Water	32
Urban area	40

Practical Work: Data pre-processing

Before doing the classification we need to create a new file containing all the bands of Landsat 8 and Sentinel-1/ALOS2.



First we will split all band of each dataset (created in previous tutorial) and second layer stack these bands.

1) Optional – Convert the datasets to same type (if not)

If all the dataset have not same data type (for example unsigned integer for one and float for the other) you need to create new dataset with same type, float for example works well.

Click here to see the video

[OTBConvertRasterType.mp4](#)

2) Split the 2 dataset

We use OTB split tools. To do that we need to define a generic name in order that OTB will use this name and add the number of the band to create one new file for each band.

Apply this for the 2 dataset.

Click here to see the video

[OTBSplitRasterBands.mp4](#)

3) Create new layer stack file (vrt)

To create the new layer stack file we need first to load and check only the necessary band (all Landsat 8 and all Sentinel-1) and order them as you want in the output vrt file.

Click here to see the video

[QgisRasterLayerStacking.mp4](#)

Practical Work: Create Stratification of the Layer Stack

1) Optimize the display

Before any data manipulation it's essential to optimize the display of the data. Indeed, whatever the data used, the display can only show 255 levels for 3 bands contrary to a lot of dataset that can contain for example for Landsat 8 11 bands coded with 12 bits equivalent to 4096 levels.

Consequently, every display of the same dataset should probably be different for every screen and every people.

However, the most important is to optimize the display for your study area and your landscapes of interest.

Click here to see the video

[ImproveRasterDisplay.mp4](#)

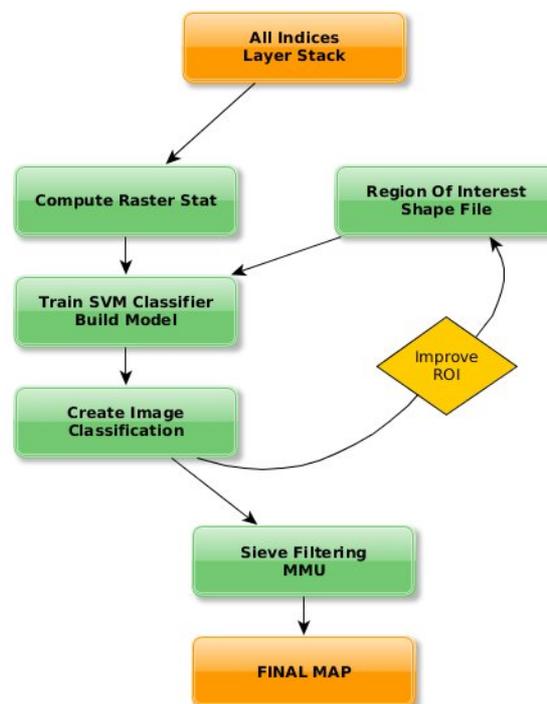
2) Define the classes



Before any classification process it's important to take time to define the classes of your final map by given the following elements:

- Name of the class
Example: Flooded forest
- Description of the class
Example: Minimum area of 1 ha covered by trees with closed canopy and with water on the ground
- Code value
Example: 10

3) Main Processing steps



4) Import the Layer Stacked data

In Qgis, Import the raster using this icon: 

5) Create No data mask

This step is important if you have background with different value in the band. The goal is to create a mask in order to erase (in the next step) this background with unique value.

[Click here to see the video](#)



[QgisBuildNoDataMask.mp4](#) or [YouTube](#)

6) Erase the background value with the No data mask (Optional)

If in your raster you have the same background value for all bands it's not necessary to do this step.

The goal is to create a mask in order to erase (in the next step) this background with unique value. The goal is to vectorize the mask and use it to clip the original data raster using a new No data value, -999 for example.

[Click here to see the video](#)

[QgisMaskRasterWithRasterMask.mp4](#) or [YouTube](#)

7) Compute raster statistics

Based on the new clipped data raster, we will use in Qgis the OTB tools that will create a file containing for each band the mean and stdev. To that it's important to give the Background no data value. This step will create an XML file.

[Click here to see the video](#)

[QgisClassificationStep1-RasterStat.mp4](#) or [YouTube](#)

8) Create ROI (Region Of Interest) shapel file

In order to use Supervised classification tools we need to create a shape file that will contain polygon with one field name (class for example) that will contain the code of the study class. For example it could be:

1 for Forest, 2 for Savannah and 3 for water area.

[Click here to see the video](#)

[QgisClassificationStep2-CreateShapeROI.mp4](#) or [YouTube](#)

9) Train the SVM classifier

Using the input raster, its statistics file previously created and the shape file containing the ROI, we will train the SVM (Support Vector Machine) classifier which will create what is called a model file. This file contain all the "memory" of the training step.

[Click here to see the video](#)

[QgisClassificationStep3-TrainSVMClassifier.mp4](#) or [YouTube](#)

10) Create image classification

Using the input raster, its statistics file previously created and the model file previously created, we will create the classification file.

[Click here to see the video](#)



[QgisClassificationStep4-CreateClassificationFile.mp4](#) or [YouTube](#)

Remove small pixel aggregate and apply MMU (Minimal Mapping Unit)

In order to remove small pixel aggregate which are not significant and also to apply a specific MMU, it's important to apply a sieve filtering in classification post-processing. Usually and whatever the data we estimate that we need to remove pixel aggregate lower than 10 pixels.

Click here to see the video

[QgisClassificationStep5-SieveClassification.mp4](#) or [YouTube](#)

Practical Work: Happy of the results

Did you find that results are good ?

