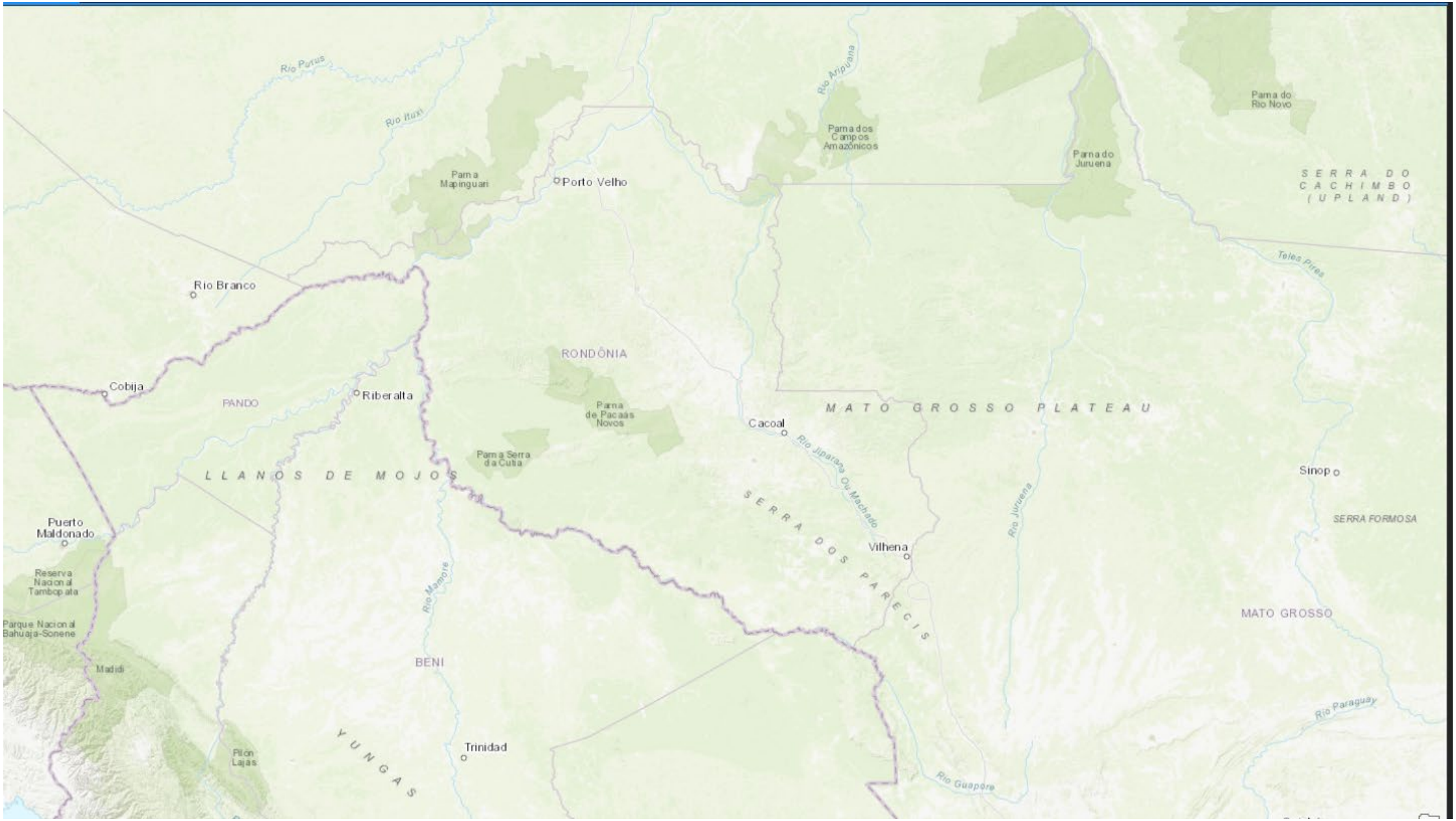
Image Classification of Agriculture, Rainforest and Urbanization of Rondolandia, Brazil

Geography 342

Wynshum Luke

w0919266@apps.losrios.edu

Study Site: Rondolandia, Brazil

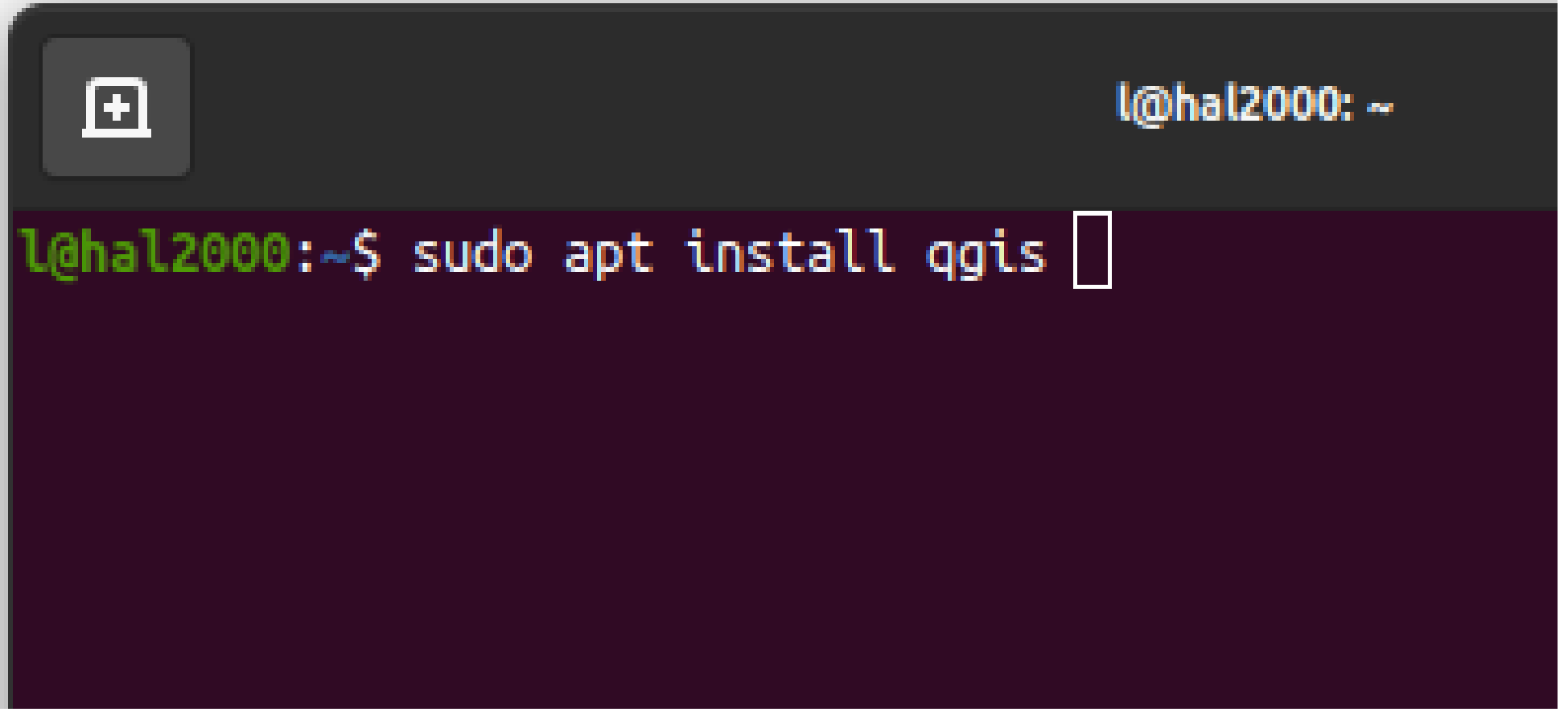


Goals

- Create a classification output identifying urban, agriculture and forest using a supervised classification method.
- Data Source: Landsat 8 / USGS Earth Explorer Portal.

Creating Training Sites and Emerging Issues

- Training Site Guideline Followed:
  - TS > 100 Pixels
  - Homogeneous Spectral Signature
- Potential issues
  - Spectral similarities between areas of agriculture and forests.
  - Forest or Orchard?
  - Features like water/roads/canals are only one pixel wide.
  - User unfamiliar with the Brazilian landscape.


l@hal2000: ~
l@hal2000:~$ sudo apt install qgis

Exploring Image Classification of Agriculture, Rainforest and Urbanization of Rondolandia, Brazil using QGIS and SACP

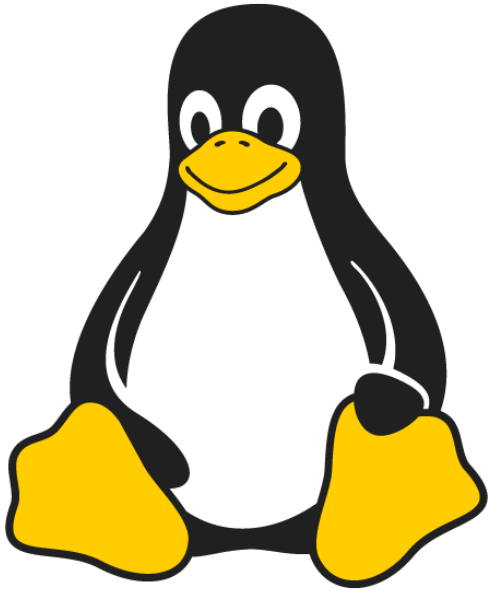
Geography 342

Wynshum Luke

w0919266@apps.losrios.edu

Tools Used

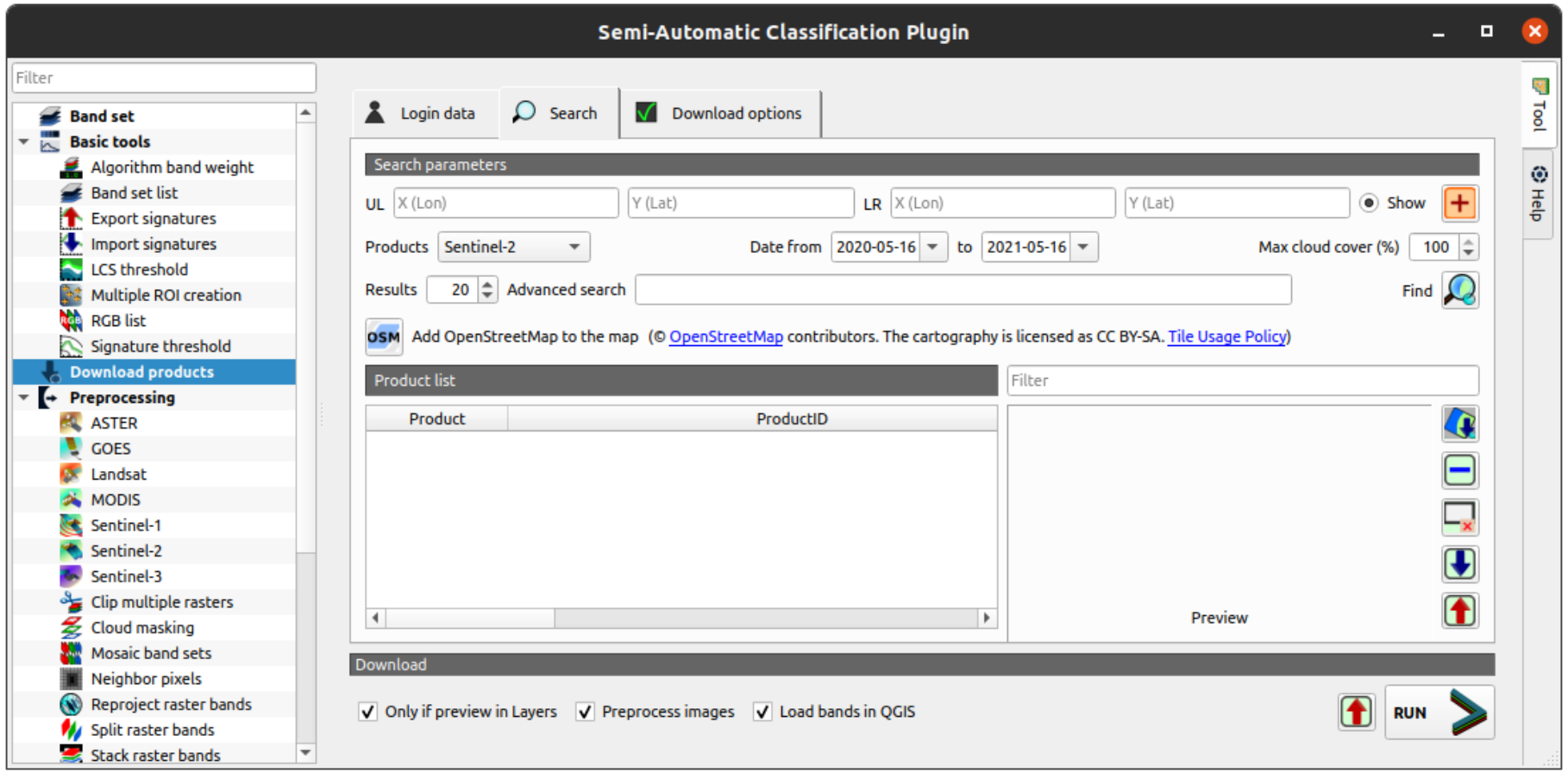
- Operating System
  - Ubuntu Linux 20.04
- QGIS
  - Semi-Automatic Classification Plugin
- Dependencies
  - Python
  - NumPy
  - SciPy
  - GDAL



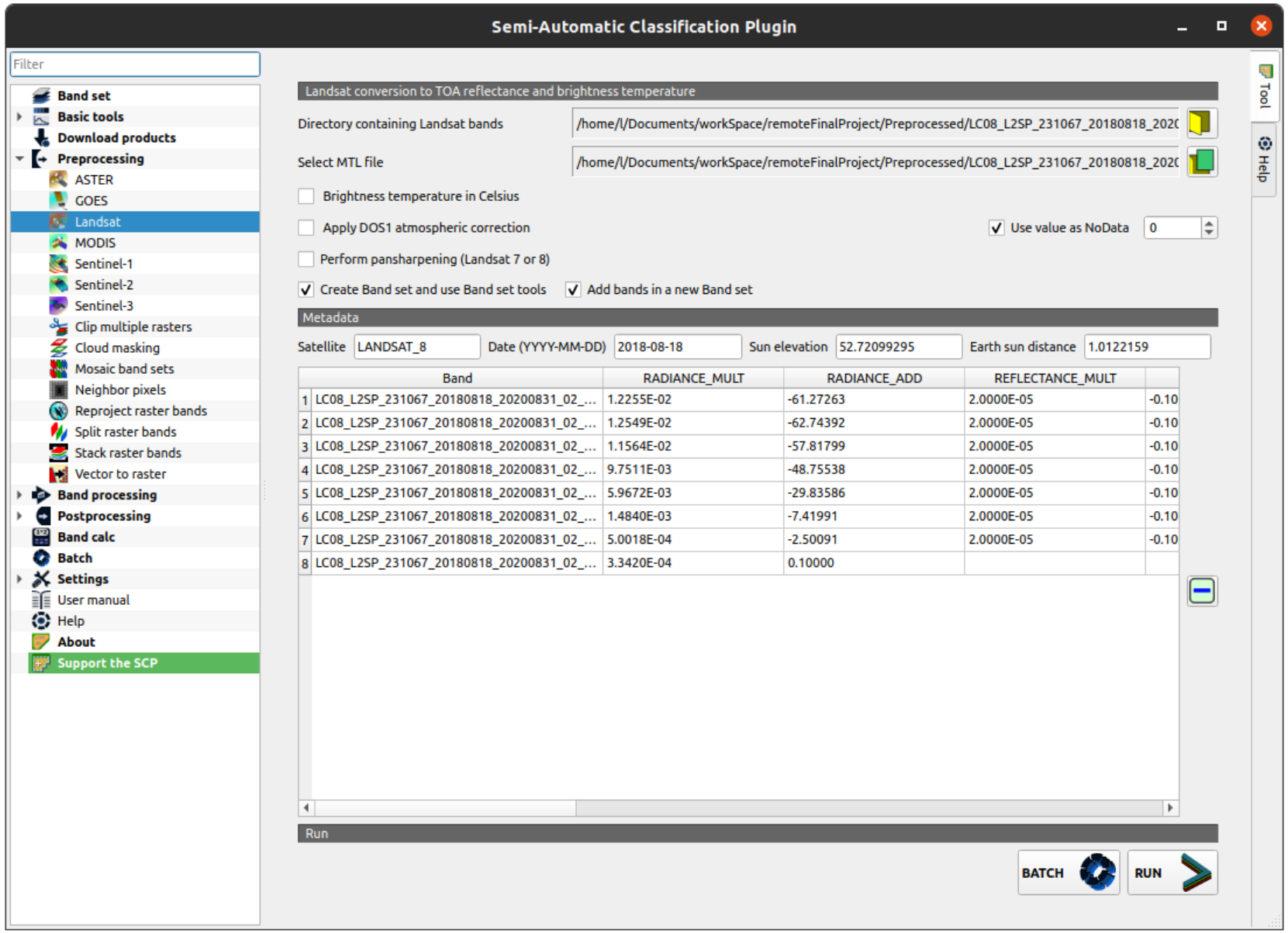
Using Semi-Automatic Classification Plugin

It’s pretty user friendly and intuitive……

SACP has a data downloader interface

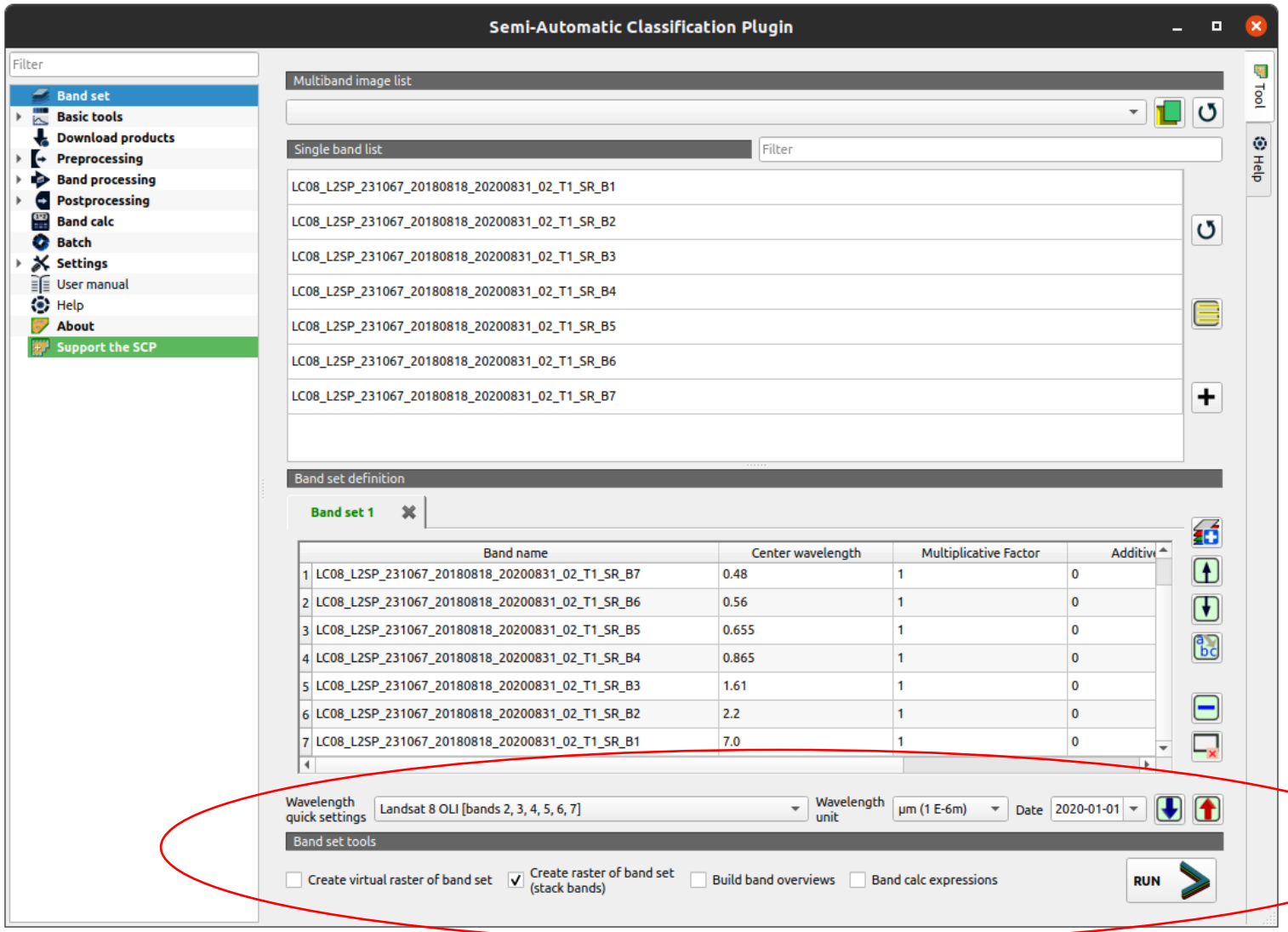


Preprocessing



- Converts to surface reflectance
- Has various settings specific to types of satellite imagery
- Has a clipping option for clipping without the creation of a vector /polygon feature
  - Visual selection
  - Coordinates

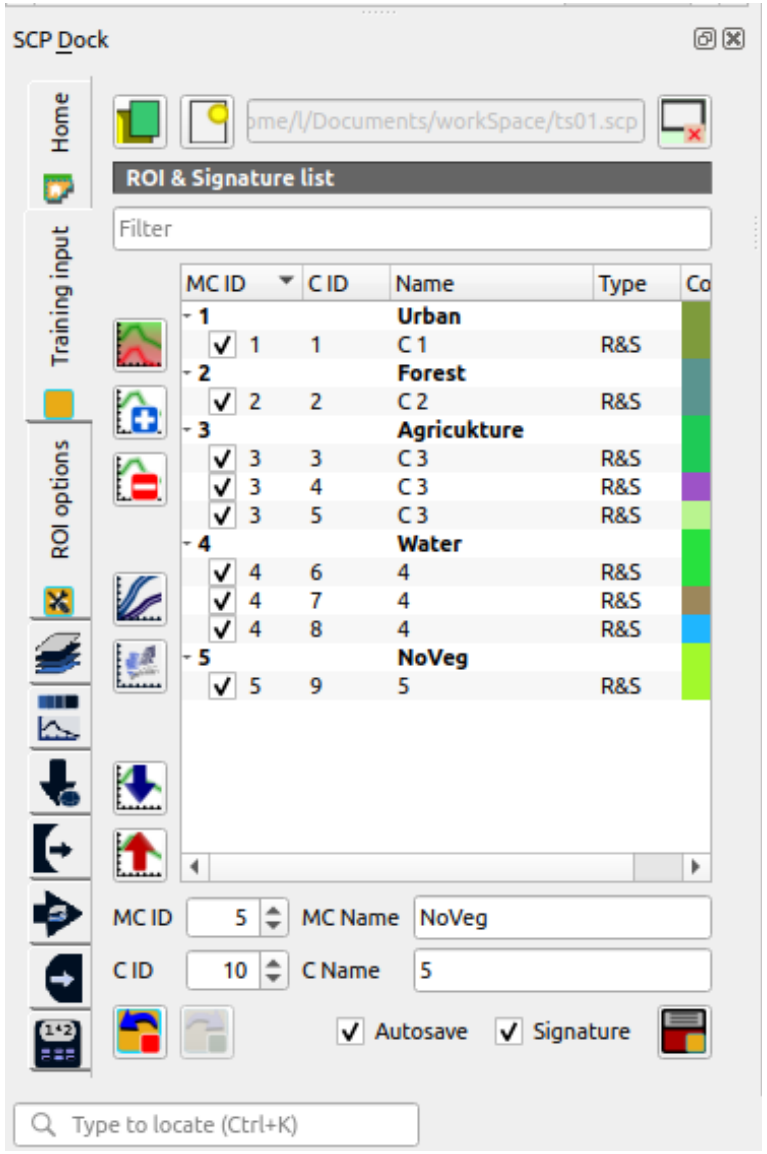
Compositing Bandset

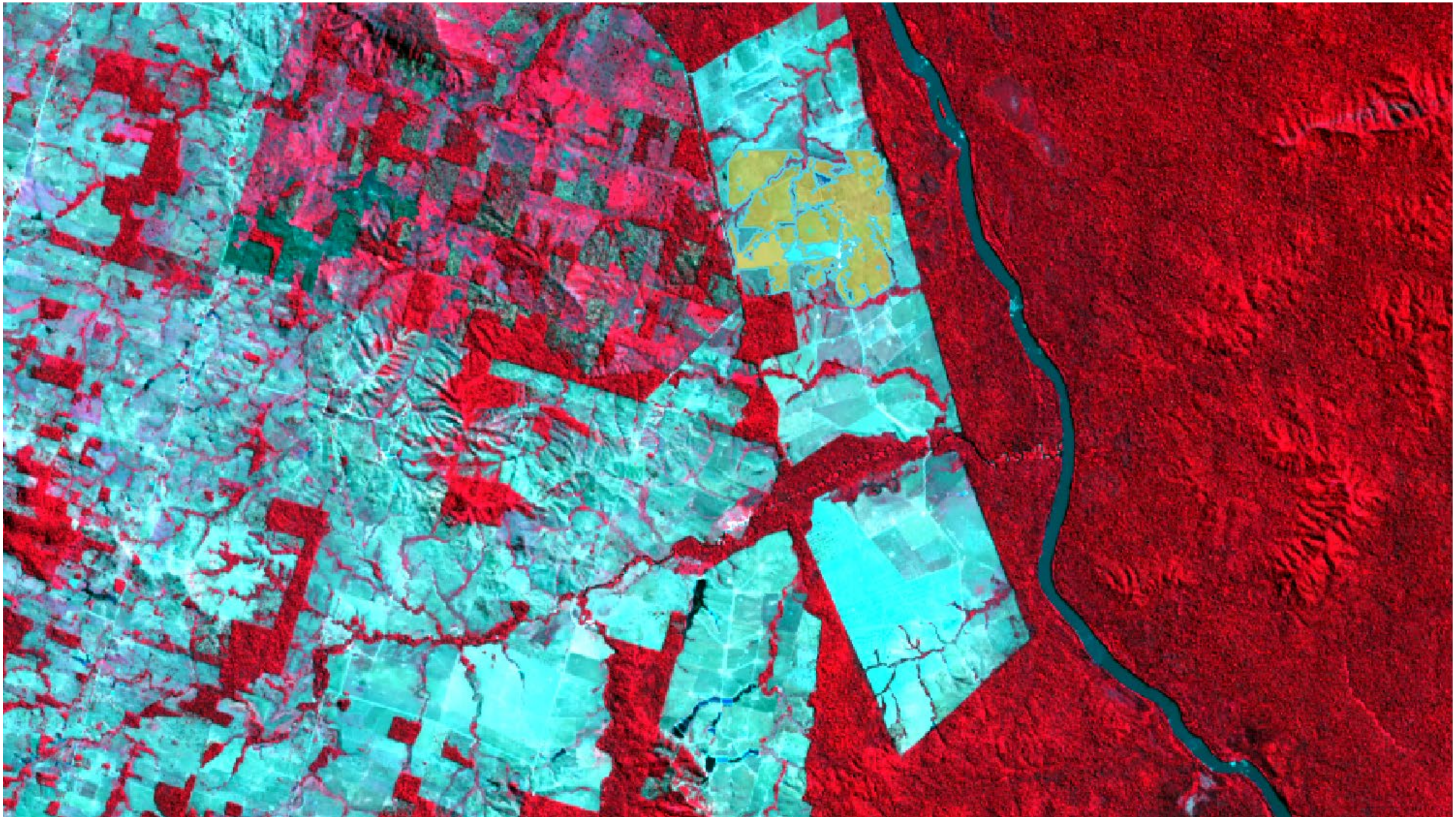


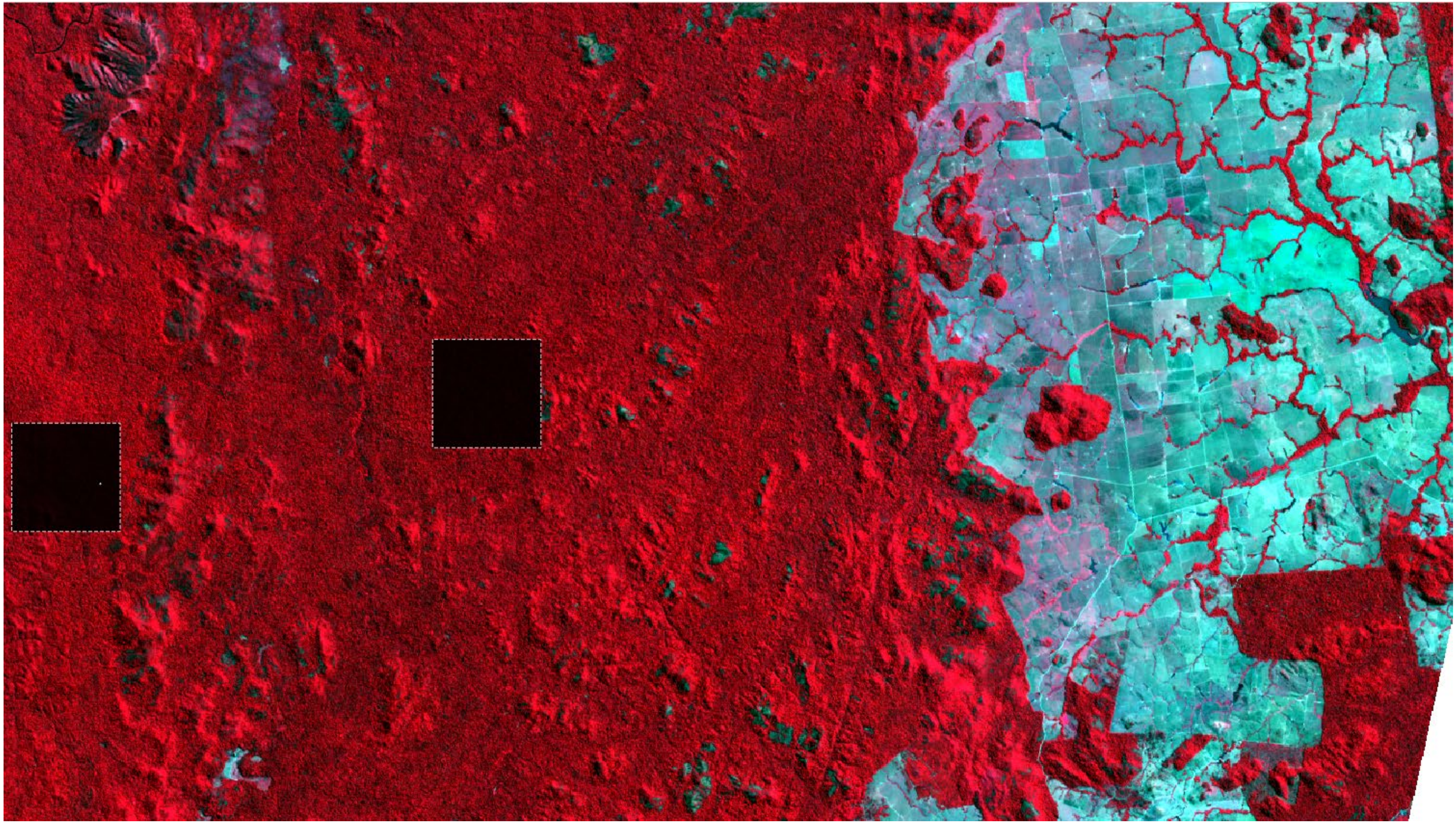
- Using the “bandset” section to combine bands into a composit geotiff.
- Various outputs available
  - Raster export
  - Temp/dynamic raster
  - Band overview
  - Band expression

Training Site (ROI) Creation and Selection

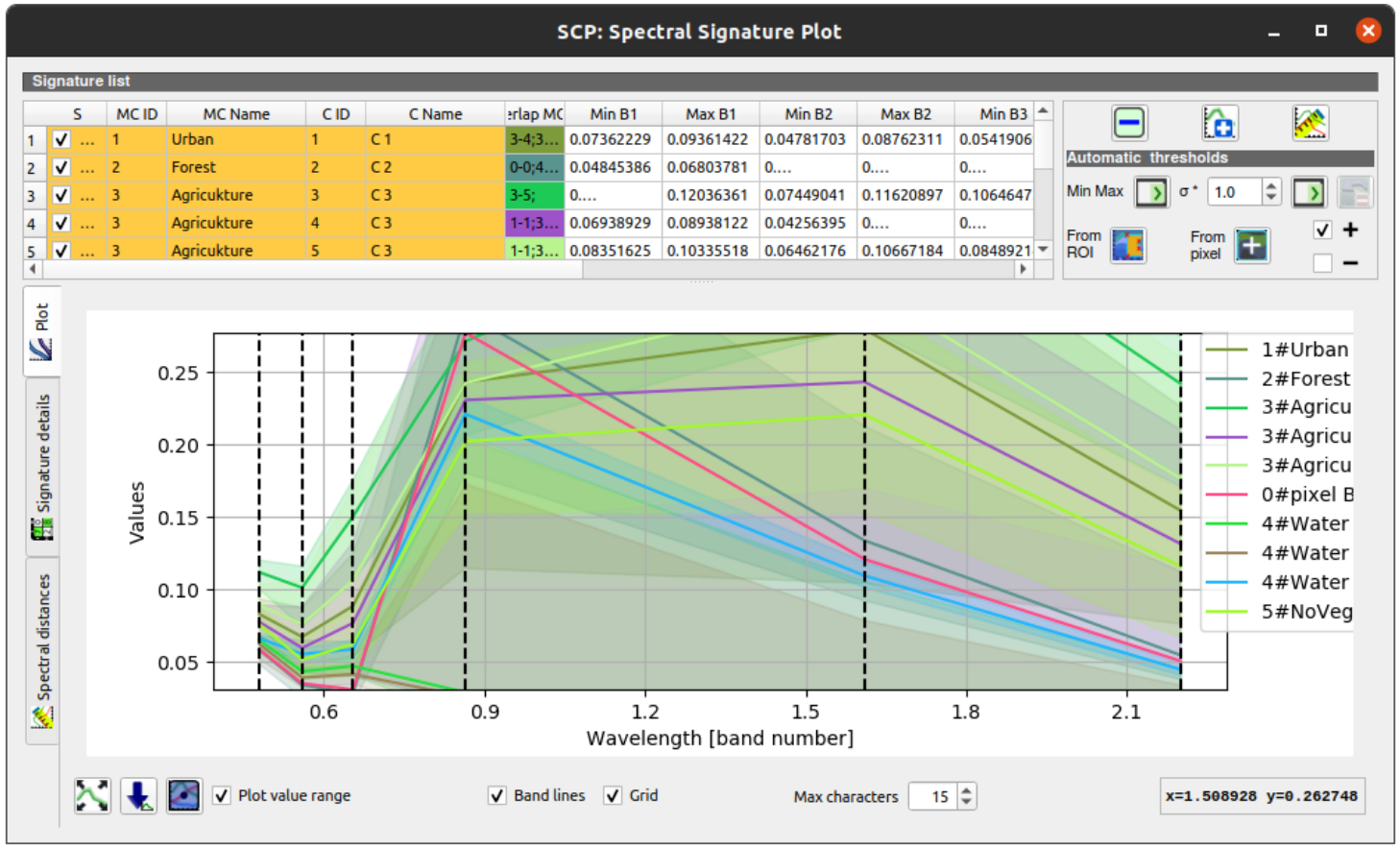
- SCP calls training sites “region of interests”
- Similar to ArcPro
  - Can select by shape
  - Does not create a segmented image
  - Can select by object or spectrally similar nearby pixels
- Different keys can be assigned to unique training sites and can be referenced in the classification process.
  - Macro Class and Class, ID





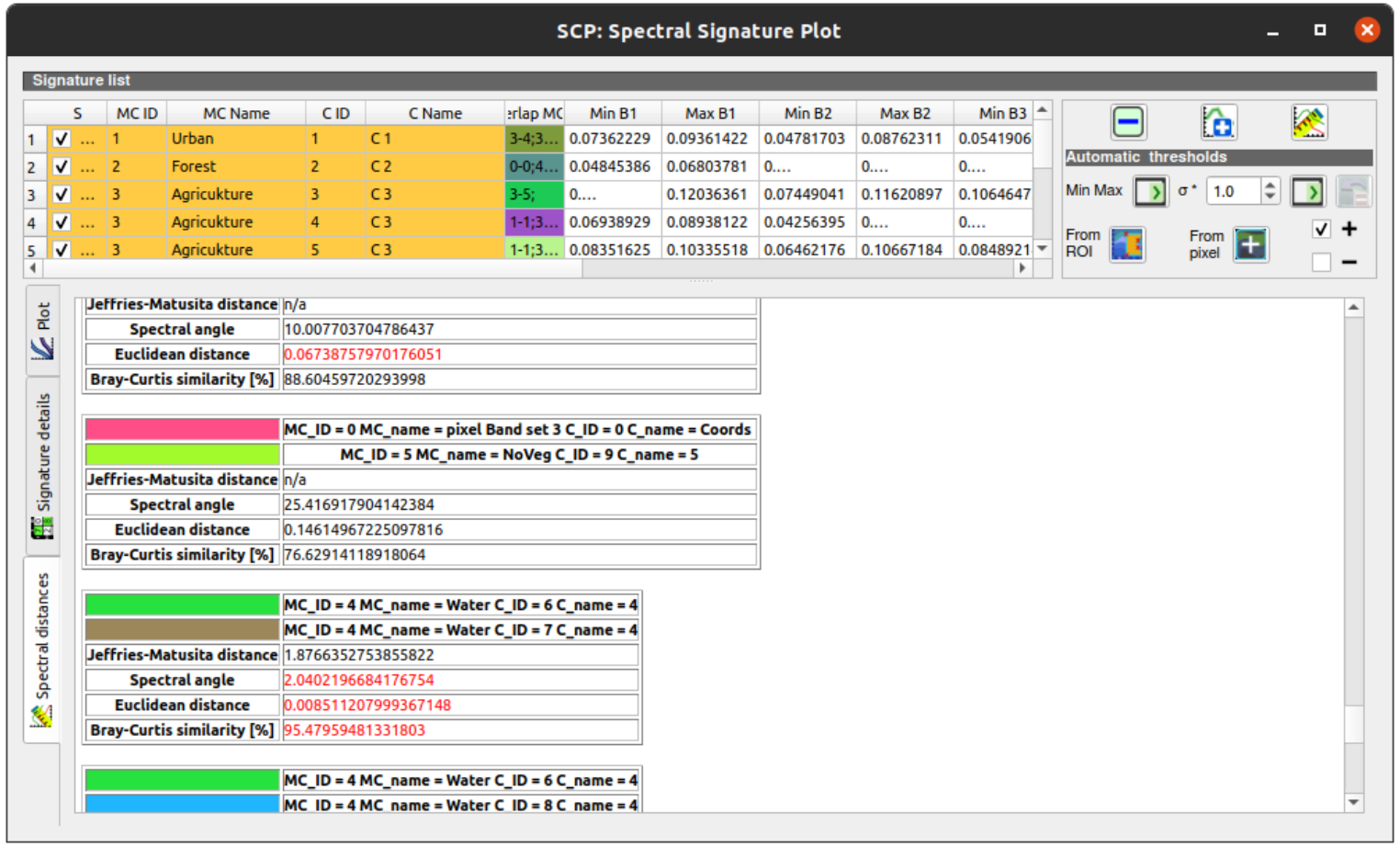


Examining ROI Spectral Data



- The Spectral Signature Plot allows users view spectra signature of collected ROI data.
- Allows users to find classes with similar signatures before classification.

Spectral Distance Data



- Allows users a quantitative view to compare spectral data or collected ROI.
- Similar or near values are highlighted in red.

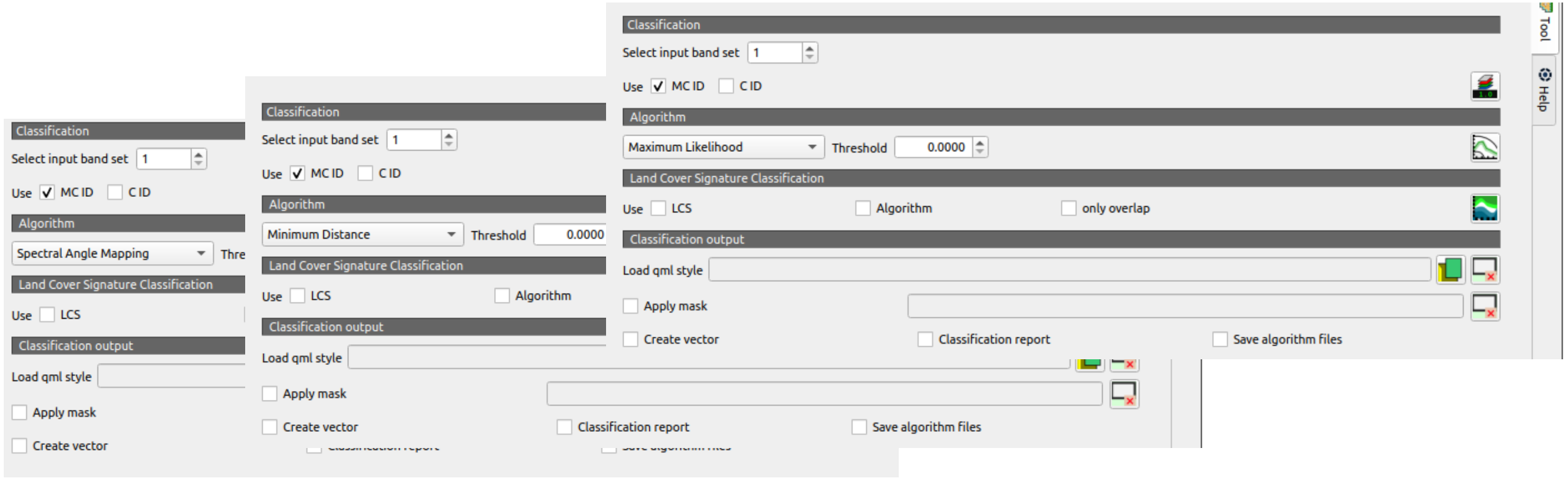
Running the classification algorithm.

Save now!

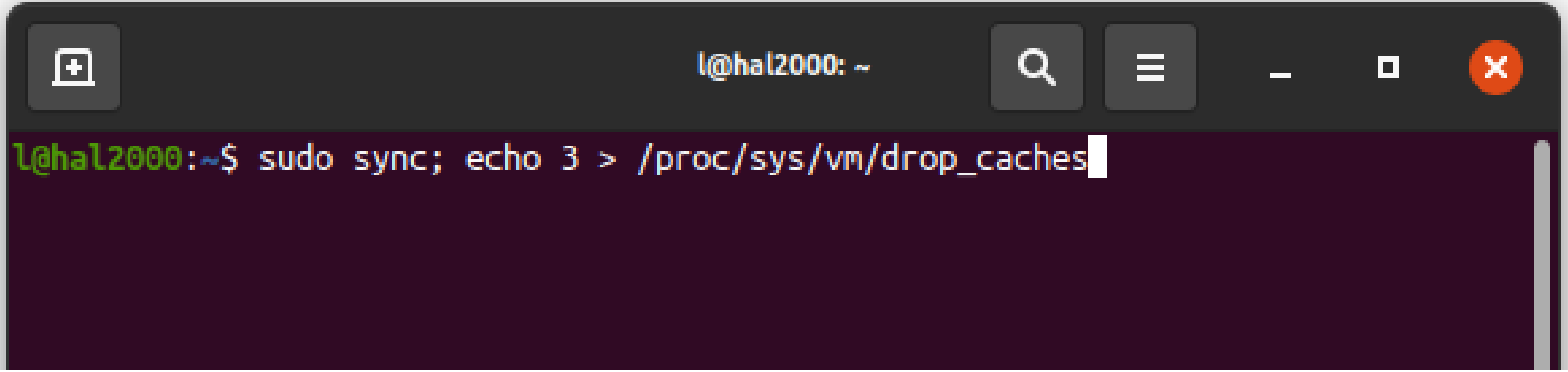
SACP Classification

- Spectral Angle Mapping
- Minimum Distance
- Maximum Likelihood

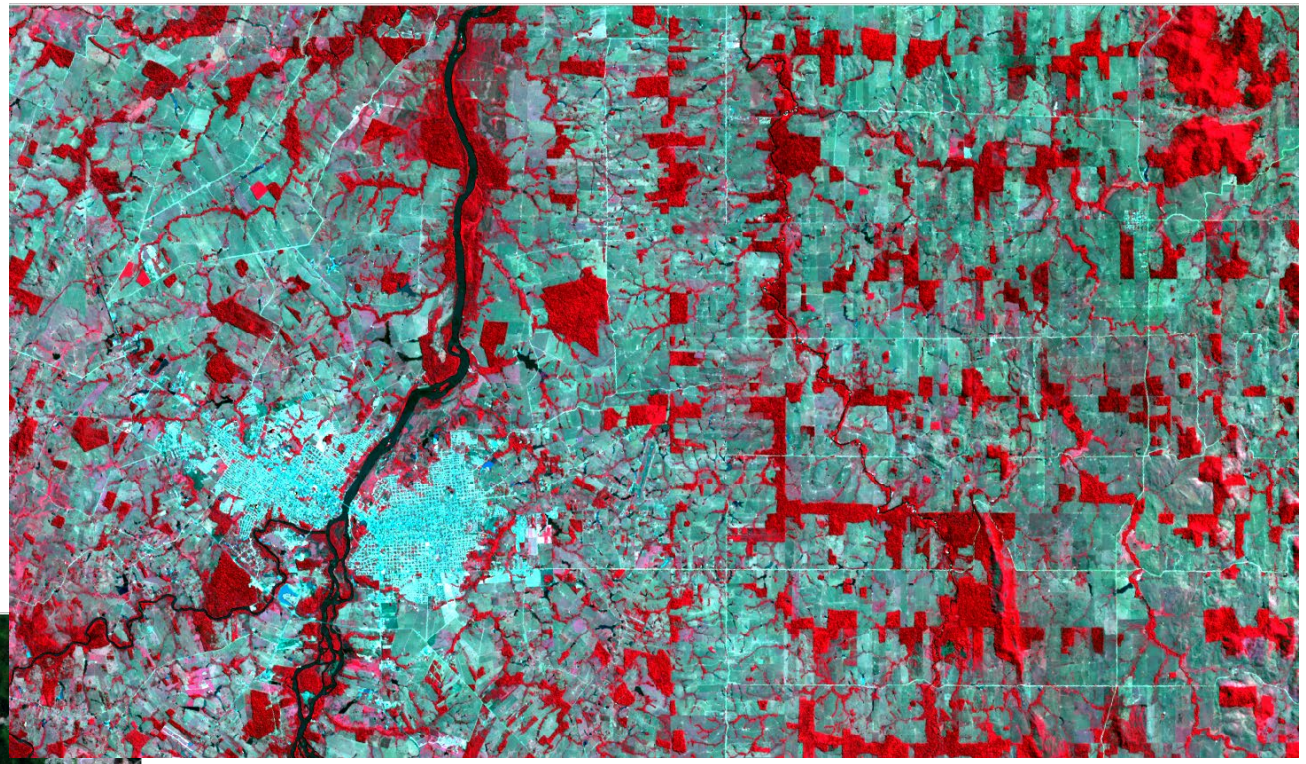
- DO NOT CREATE VECTOR!!!!!



RAM Cache Dump Helps

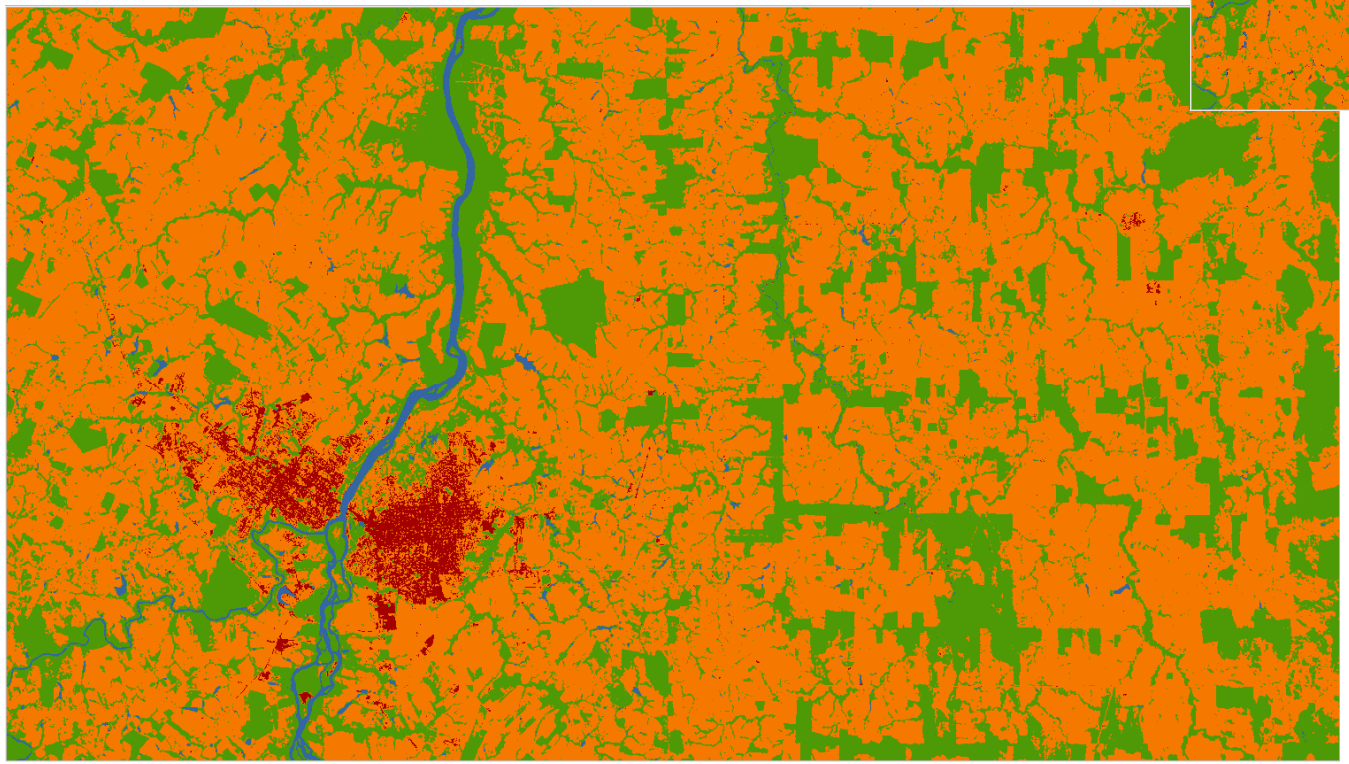


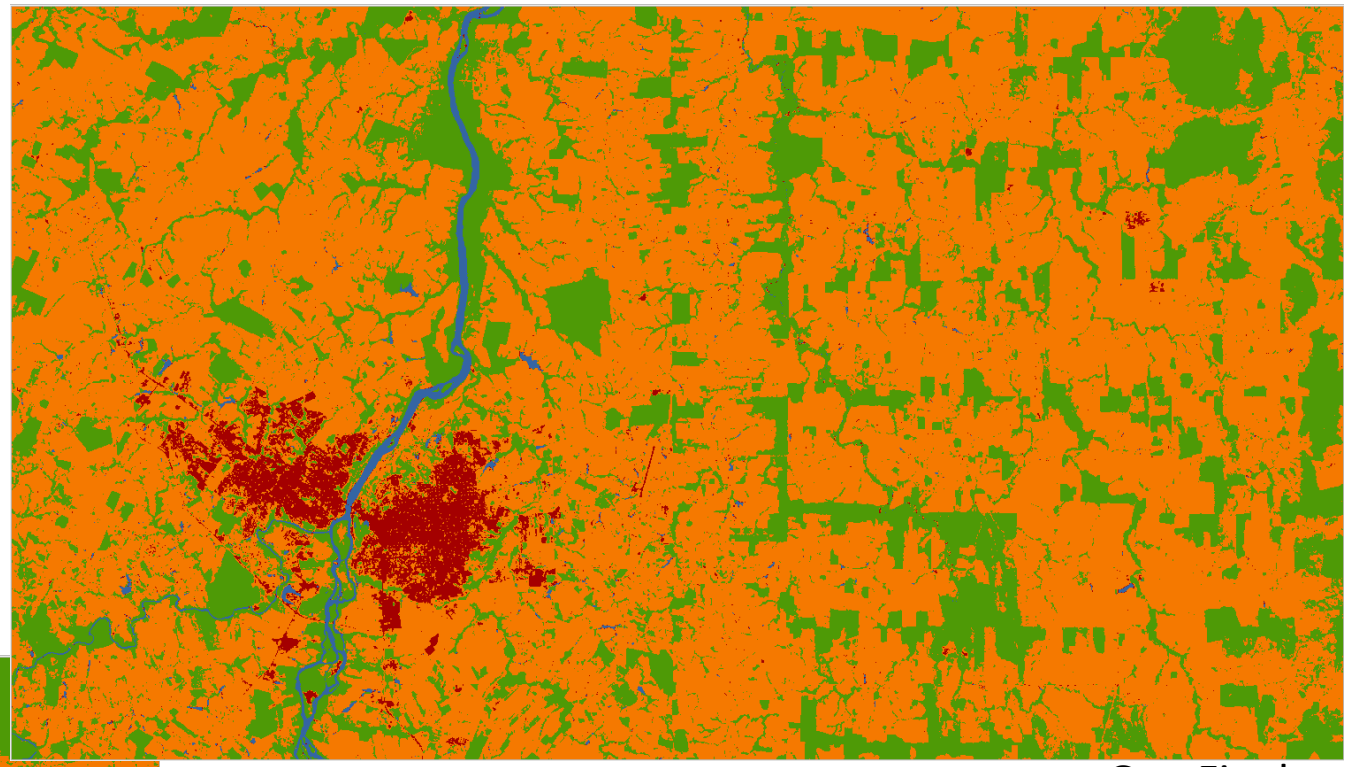
Starting Raster



Minimum Distance

Gen 1

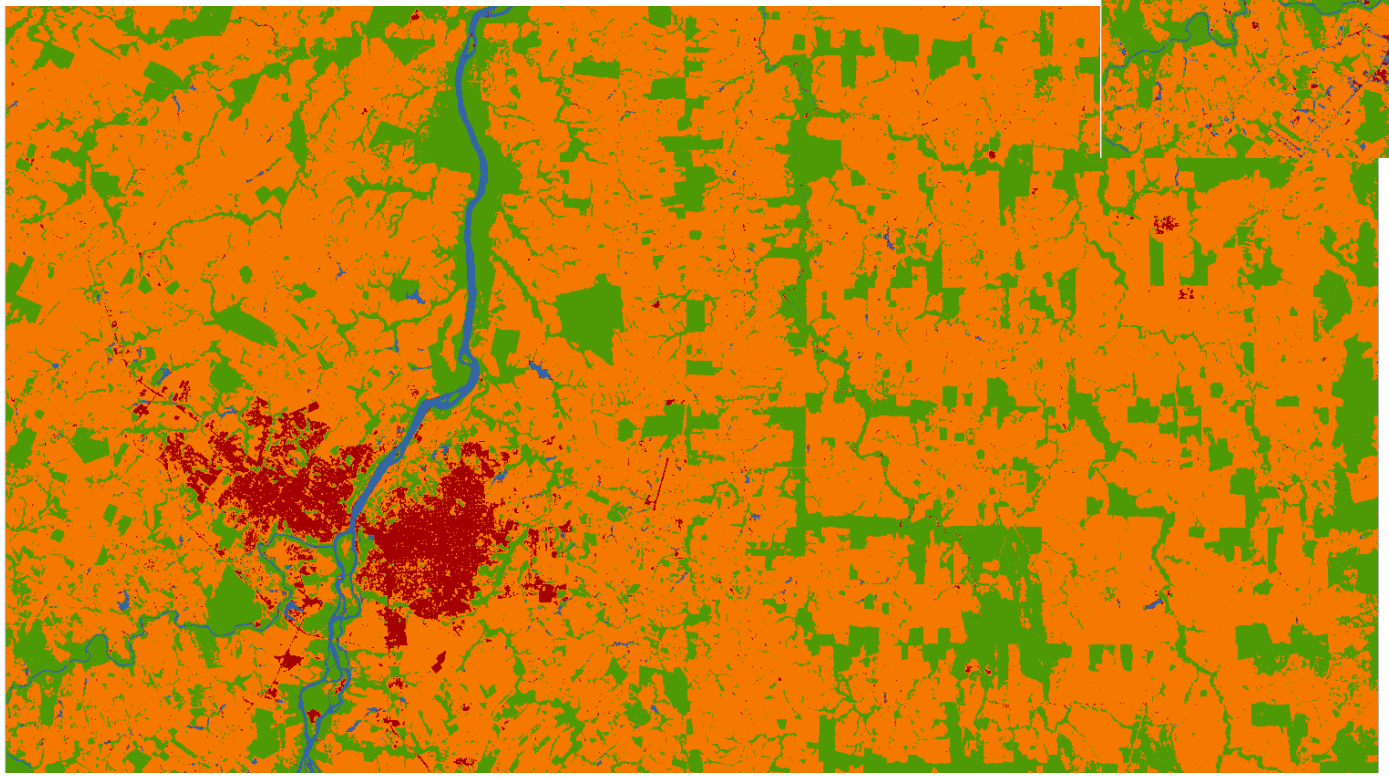


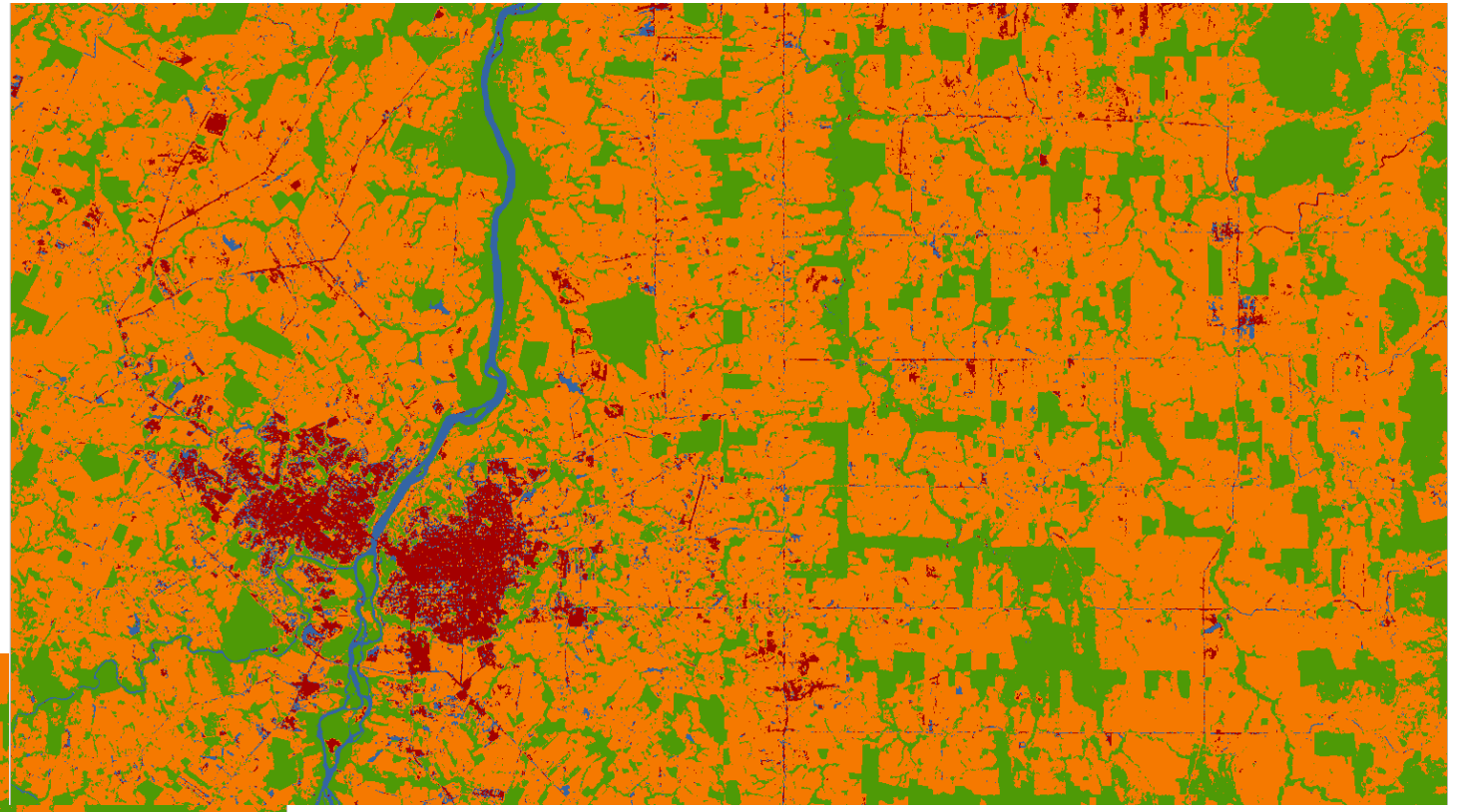


Gen Final

Spectral Angle Mapping

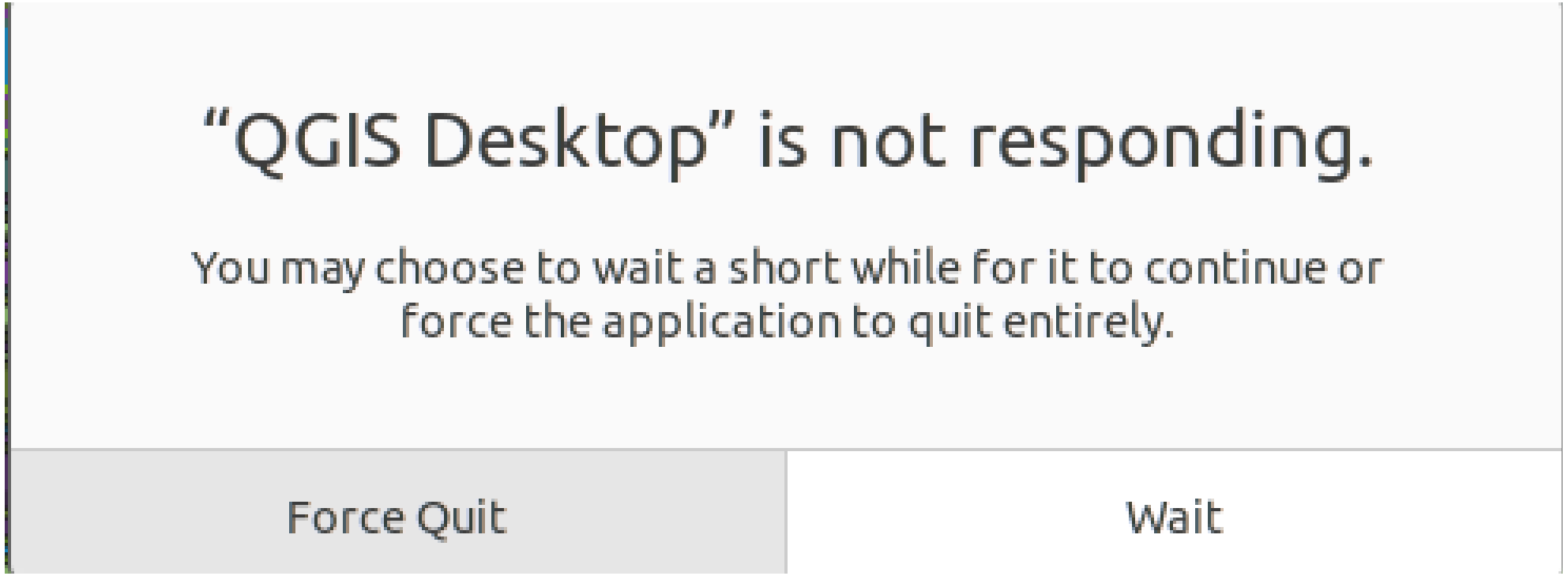
Gen 1





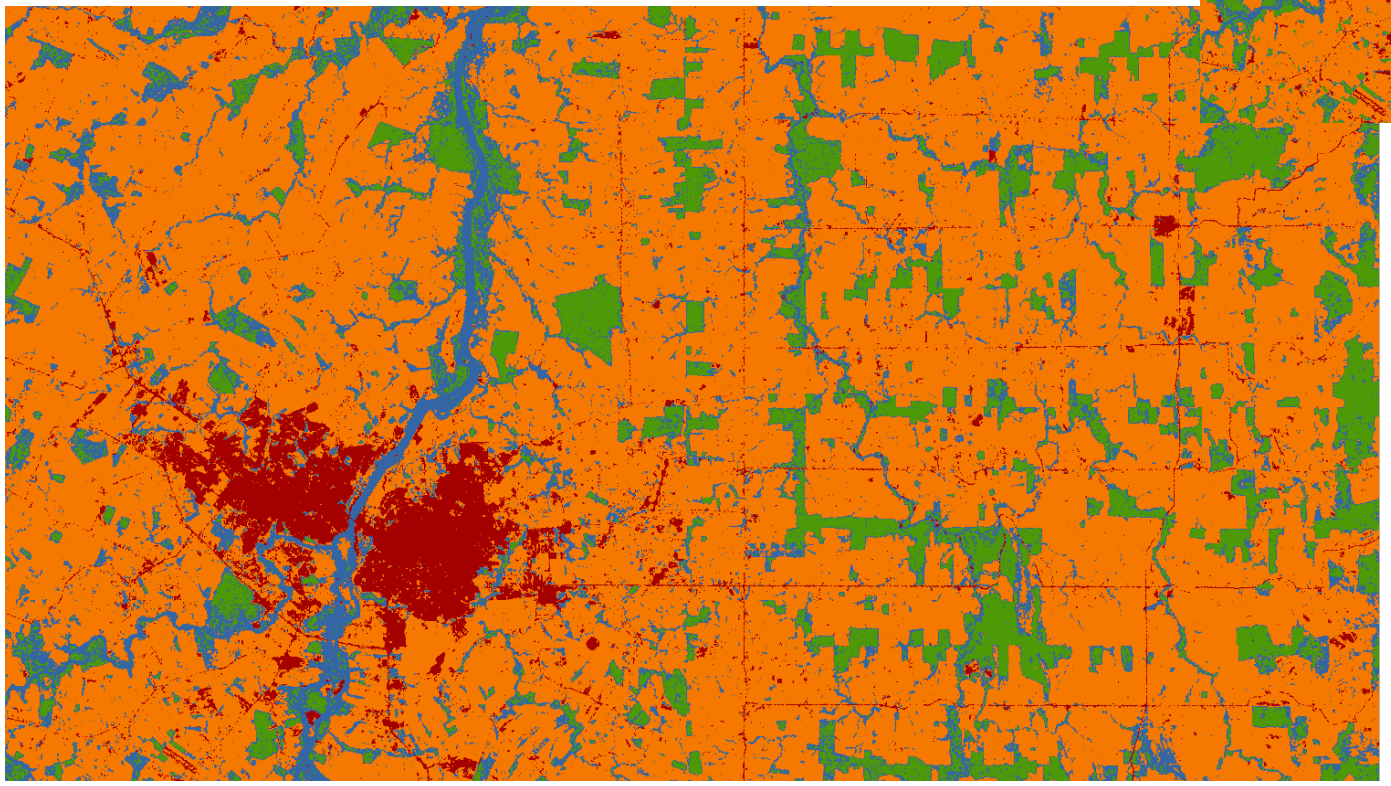
Gen Final

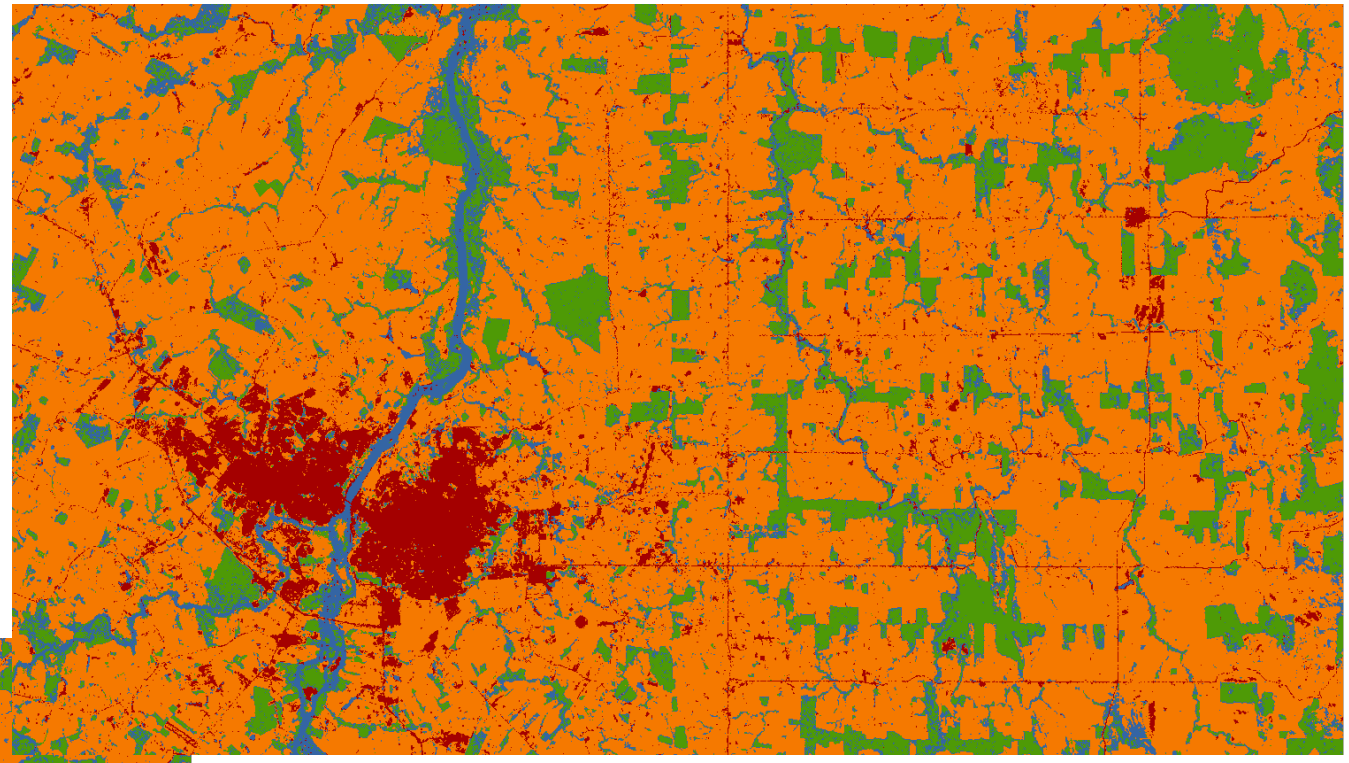
Maximum…….. Likelihood……



Maximum Likelihood

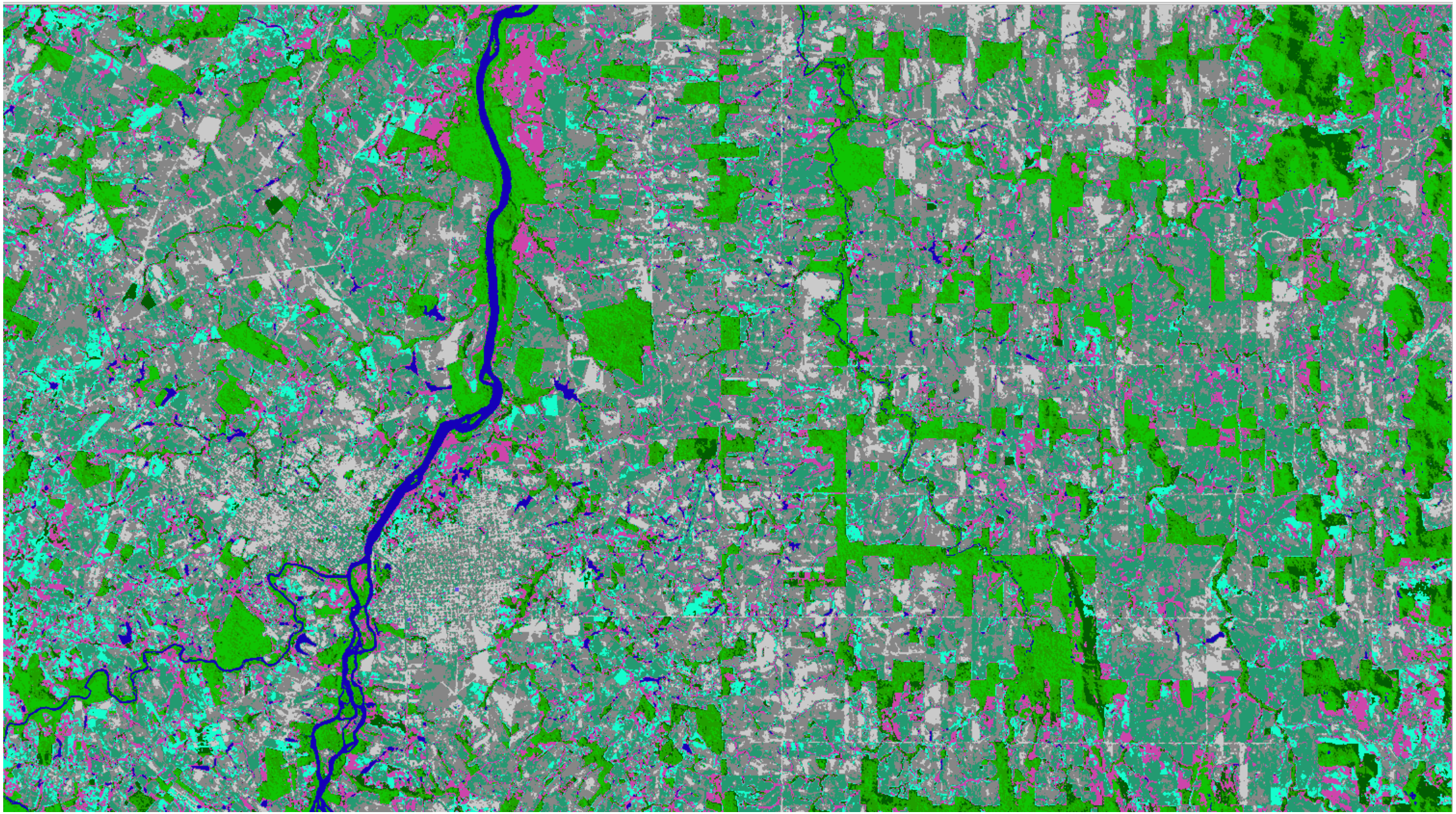
Gen 1



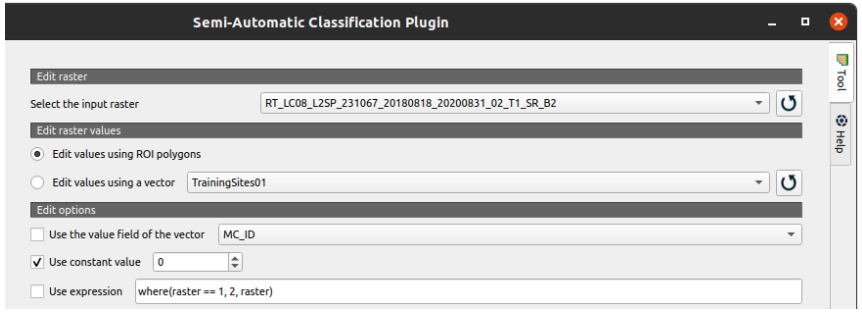


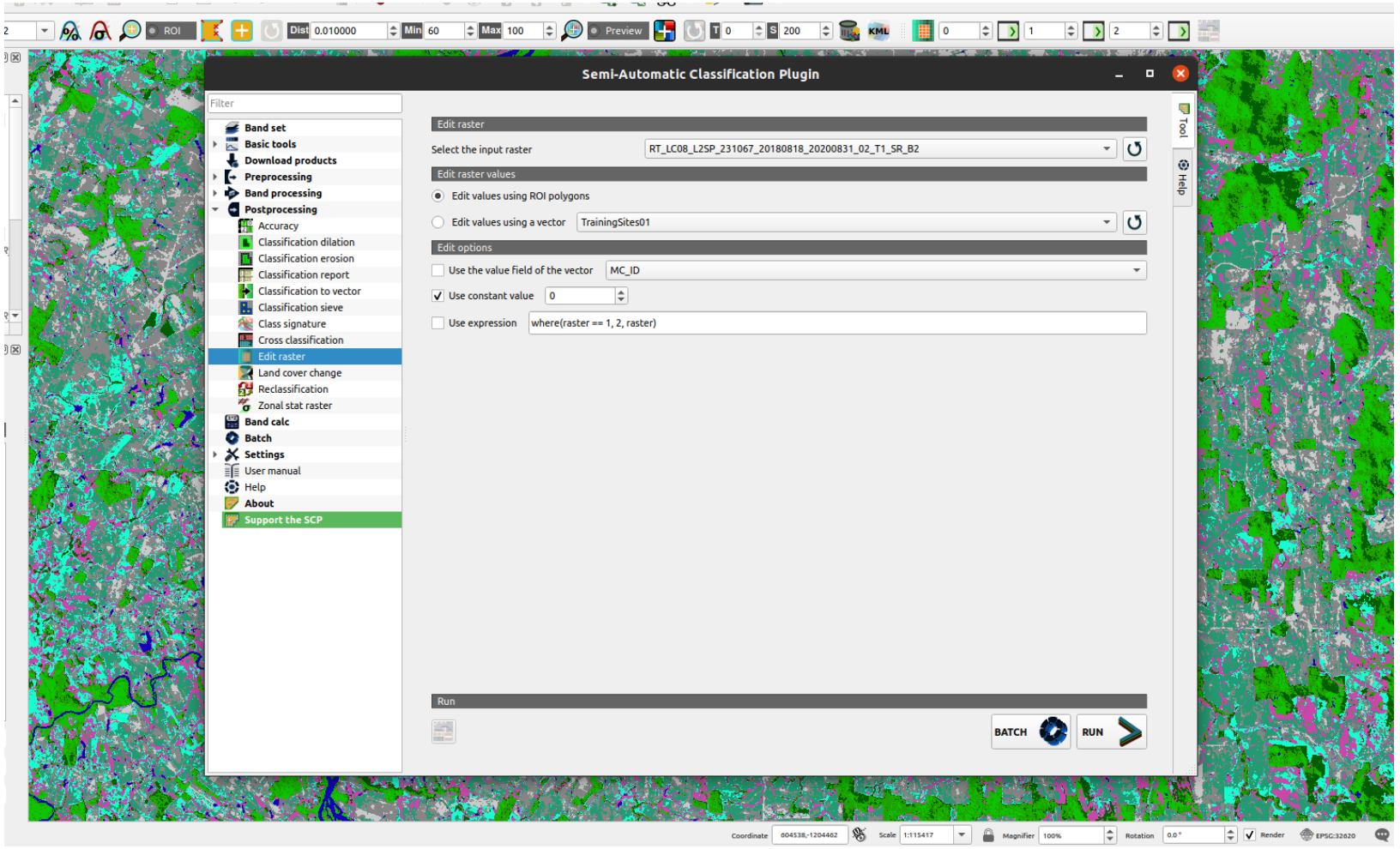
Gen Final

Ten Class Unsupervised

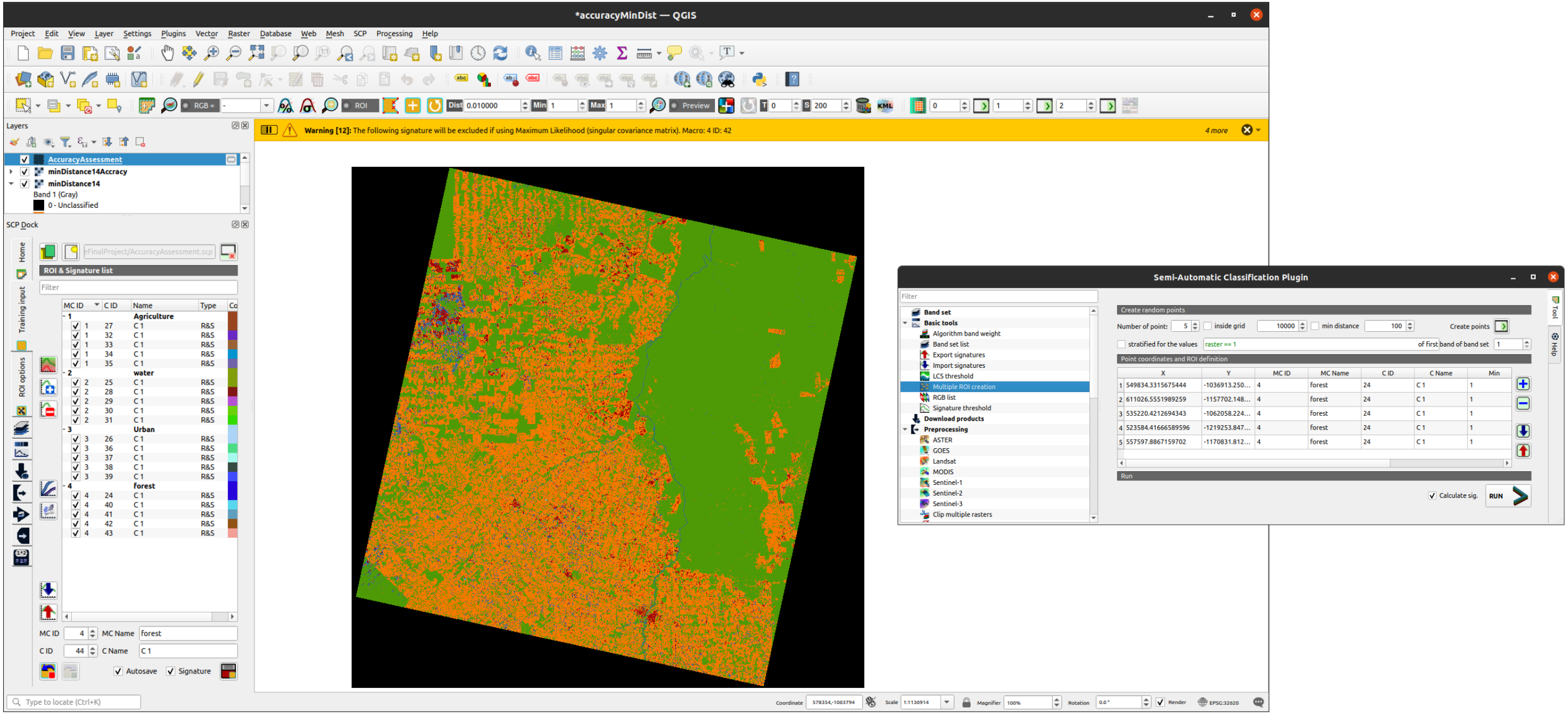


Post Processing: Reclassify and Edit

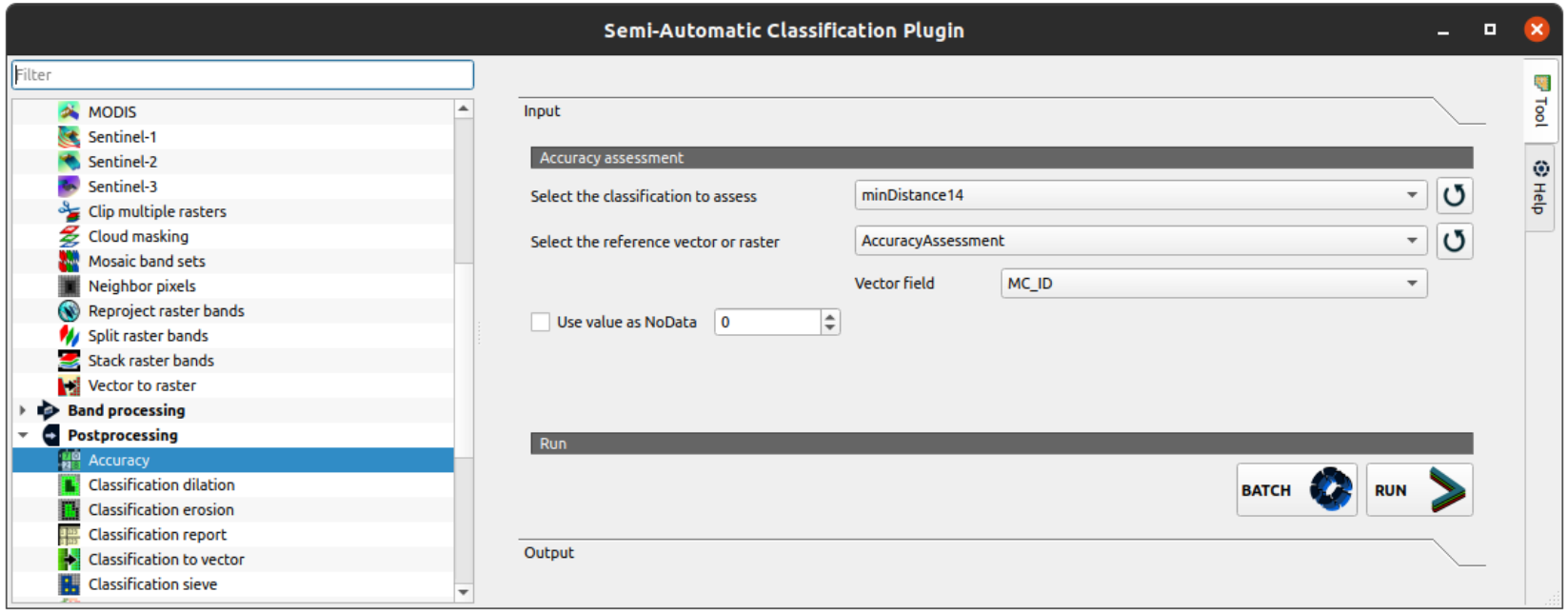




Accuracy Assessment: Generate Samples



Accuracy Assessment

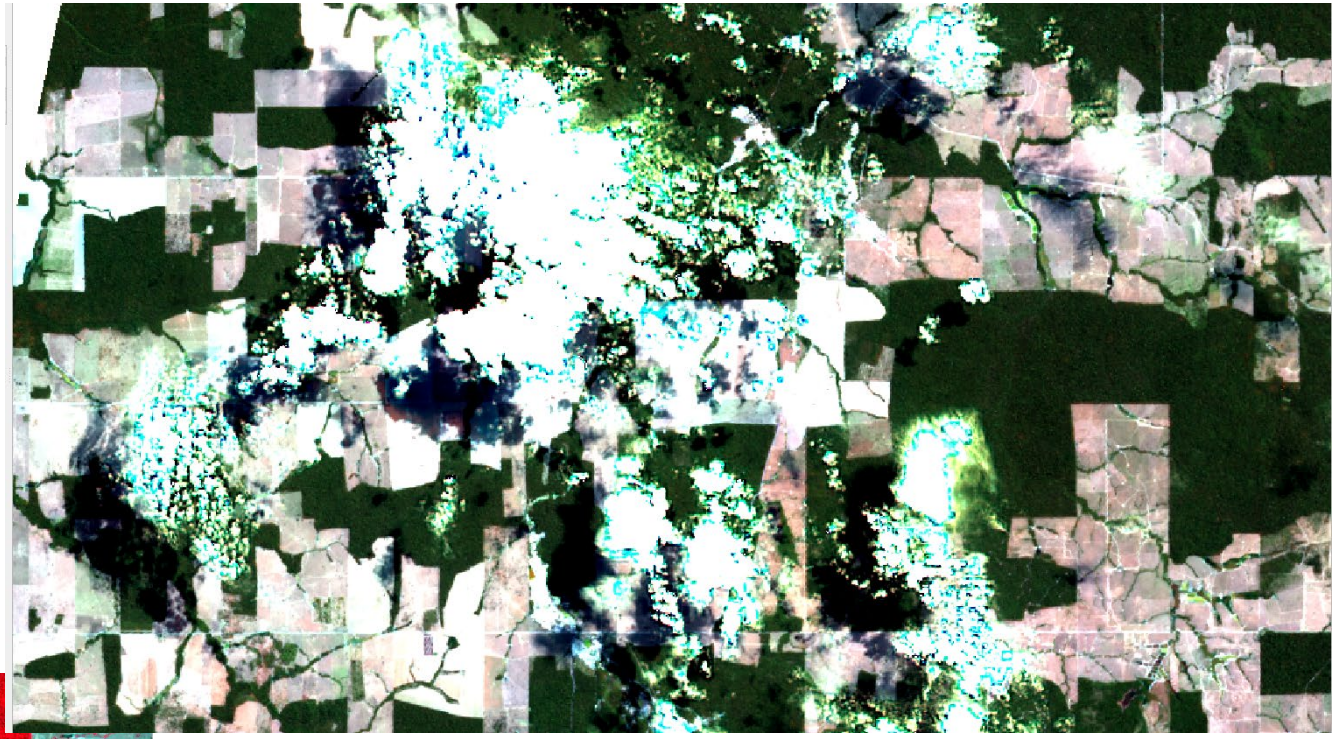


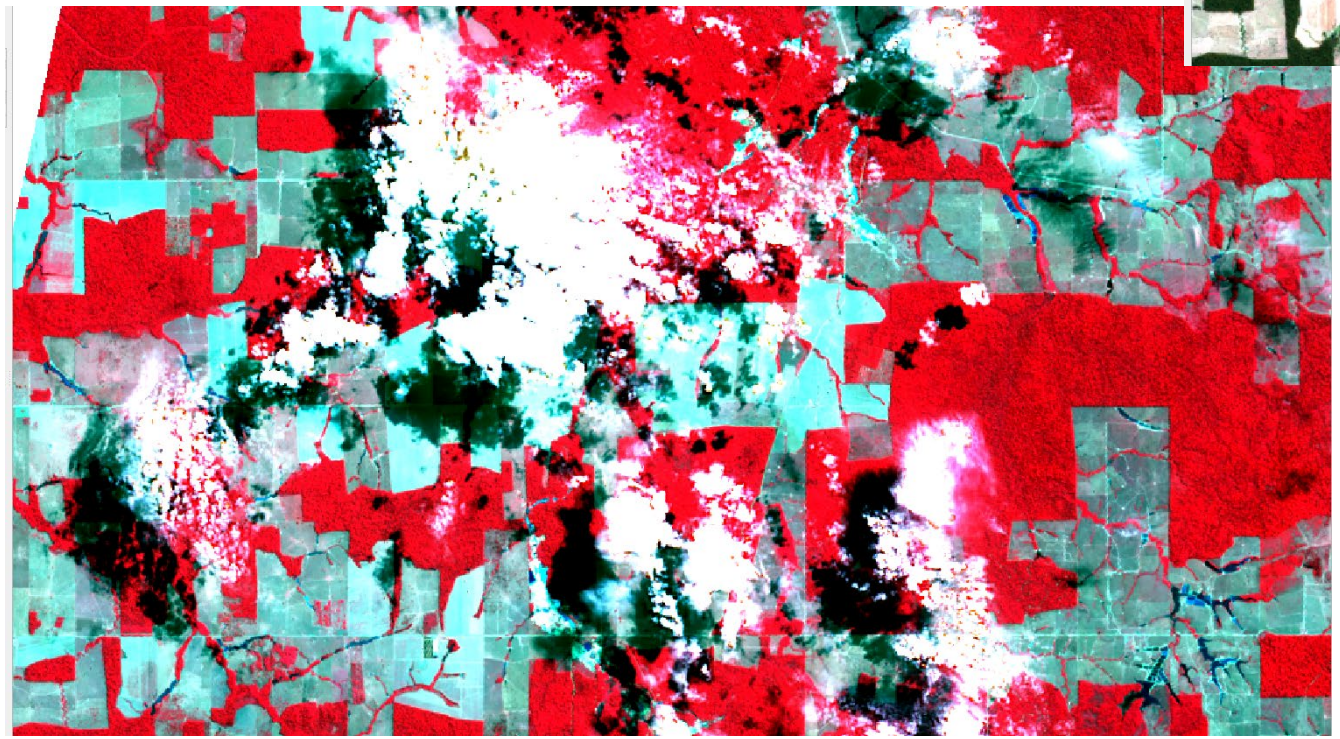
Output Algorithm	Overall Accuracy
Spectral Angle Mapping	37.6%
Minimum Distance	45.8%
Maximum Likelihood	41.9%
Unsupervised	29.3%

Issues and Problems

- Over exposure or dead pixels
- Narrow lines of pixels
- Groves, trees, orchards among agriculture and urban environments
- Software
  - Missing dependencies
  - Lack of community support

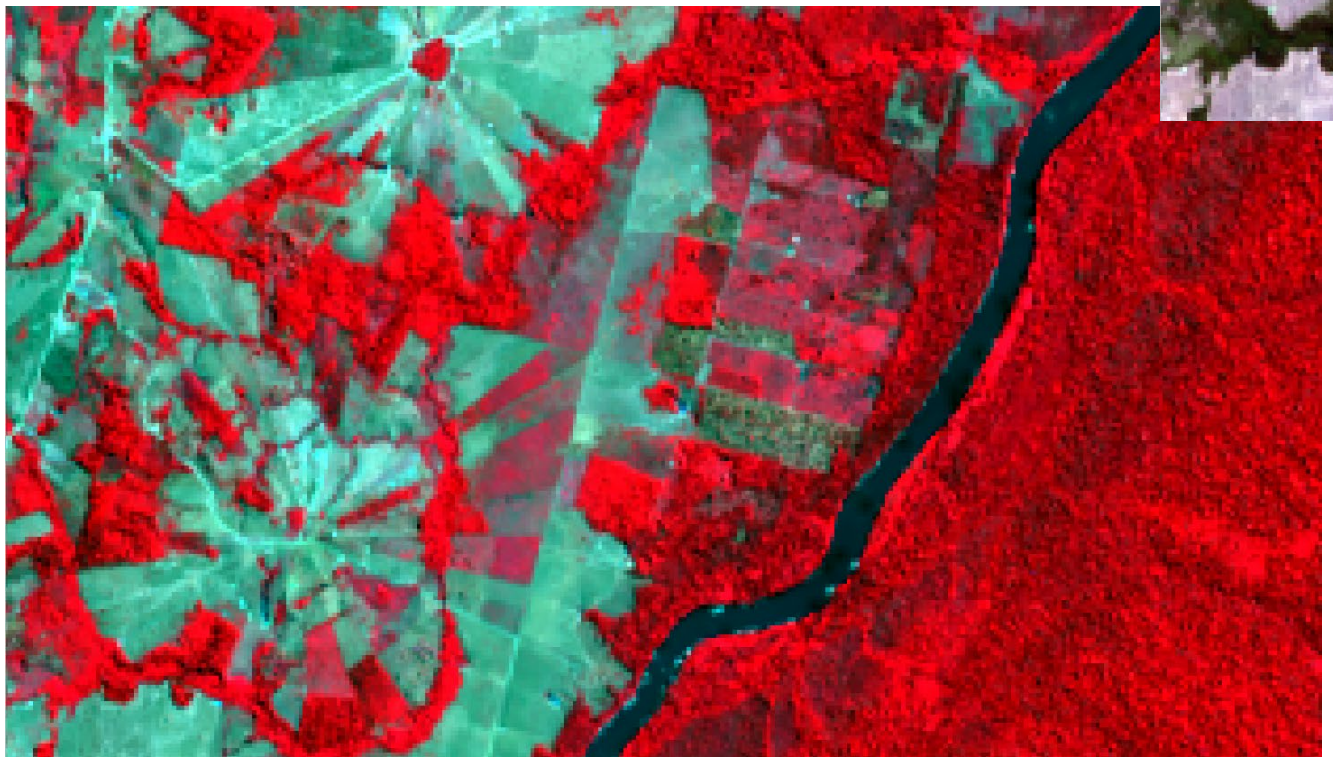
Over exposure or dead pixels



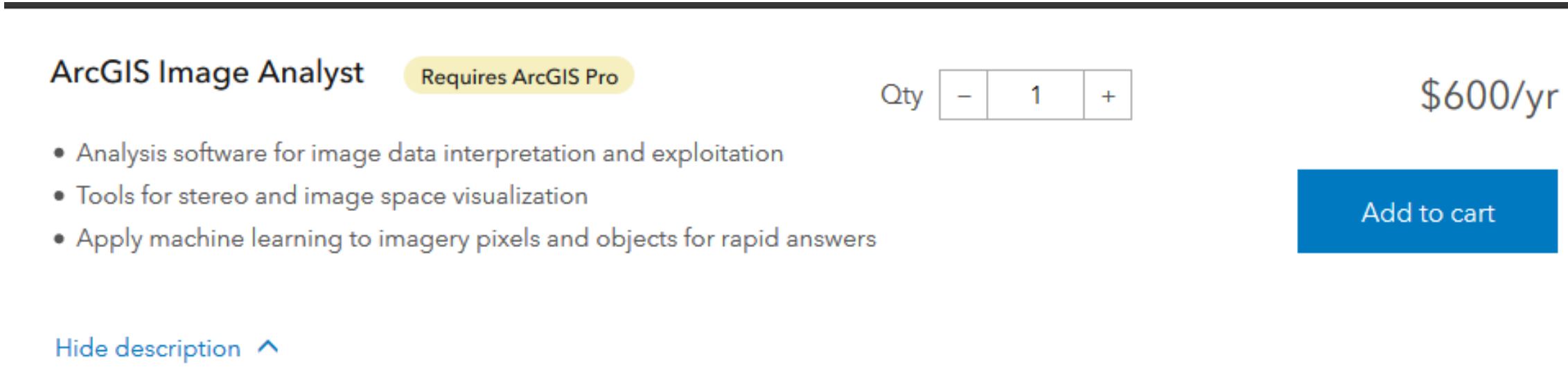


Narrow lines of pixels: Roads, Canals, Paths..?

Groves, trees, orchards among agriculture and urban environments



I really hate **S**oftware **A**s **A** **S**ervice.



Please Support Open Source

- https://qgis.org/en/site/
- https://www.postgresql.org/
- https://postgis.net/
- https://geonode.org/
- https://www.qcad.org/en/
- https://www.osgeo.org/
- https://www.linux.org/
- https://opensource.org/

- Feel free to contact me if you have questions about open source. Linux user as my only OS for 10+ years.

Exploring Image Classification of Agriculture, Rainforest and Urbanization of Rondolandia, Brazil using QGIS and SACP

Geography 342

Wynshum Luke

w0919266@apps.losrios.edu