**EOCap4Africa – 11 Validation/Accuracy Assessment**

**Sample solution - Confusion matrix**

Result table:

| Classification | Wetland | Savanna | Urban | Agriculture | Water | Sum | UA [%] | Com.Err. [%] |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wetland | 12 | 3 | 0 | 0 | 1 | 16 | 75.0 | 25.0 |
| Savanna | 2 | 28 | 1 | 3 | 0 | 34 | 82.4 | 17.6 |
| Urban | 0 | 0 | 15 | 2 | 0 | 17 | 88.2 | 11.8 |
| Agriculture | 0 | 2 | 4 | 21 | 0 | 27 | 77.8 | 22.2 |
| Water | 0 | 0 | 0 | 0 | 10 | 10 | 100.0 | 0.0 |
| Sum | 14 | 33 | 20 | 26 | 11 | 104 |  |  |
| PA [%] | 85.7 | 84.8 | 75.0 | 80.8 | 90.9 |  |  |  |
| Om. Err. [%] | 14.3 | 15.2 | 25.0 | 19.2 | 9.1 |  |  |  |

**Explanation and calculations**

**1. Matrix completion**

* Instance ‘Wetland’ vs. ‘Wetland’ = 12
* Instance ‘Urban’ vs. ‘Agriculture’ = 2
* Number of samples for ‘Urban’ (sum of Urban column) = 20
* Number of classified ‘Wetland’ samples (sum of Wetland row) = 16

**2. Accuracy metrics: Overall accuracy**

* Correct classifications = 12 (Wetland) + 28 (Savanna) + 15 (Urban) + 21 (Agriculture) + 10 (Water) = 86
* Total samples = 104
* OA = 86 / 104 = 0.8269 → 82.7%

**3. Accuracy metrics: Producer’s accuracy for ‘urban’**

* Correct: 15
* Total reference Urban: 20
* PA = 15 / 20 = 0.75 → 75.0%

**4. User’s accuracy for ‘urban’**

* Correct: 15
* Total classified Urban: 17
* UA = 15 / 17 ≈ 0.882 → 88.2%

**4. Omission error**

* Agriculture:  
   PA = 21 / 26 = 0.808 → Omission Error = 1 - 0.808 = 19.2%
* Water:  
   PA = 10 / 11 ≈ 0.909 → Omission Error = 9.1%

**5. Commission error**

* Agriculture:  
   UA = 21 / 27 ≈ 0.778 → Commission Error = 1 - 0.778 = 22.2%
* Water:  
   UA = 10 / 10 = 1.0 → Commission Error = 0.0%

**Sample solution – Validation in R**

Simply work through the script.

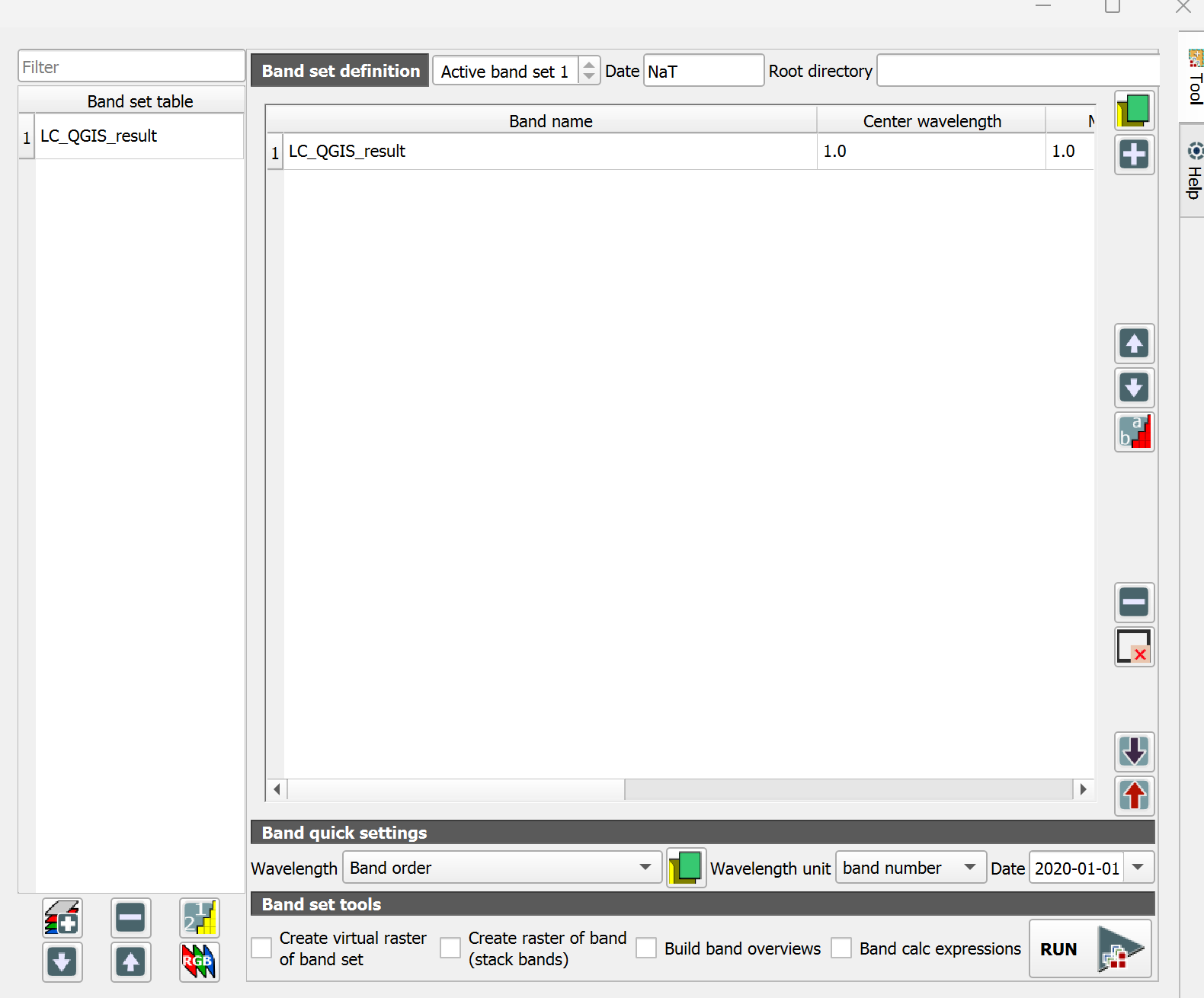
**Sample solution – Validation in QGIS**

**Project setup**

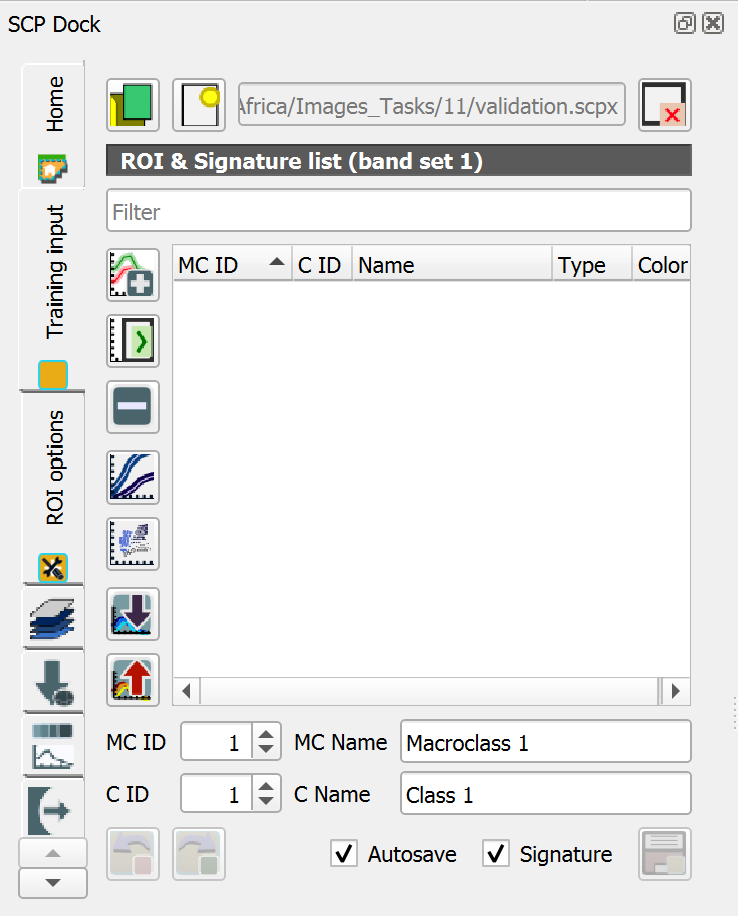
* Start QGIS and create a new project file.
* Get a background map using **Web -> QuickMapServices -> OSM -> OSM-Standard**.
* Load the Raster file containing your landcover classification results from lecture 9d and the shapefile “ground\_truth”.

**Set up the validation**

* First, we need to use the Band Set tool in SCP to set our classified raster image. Remember to select “Create virtual Raster of band set”

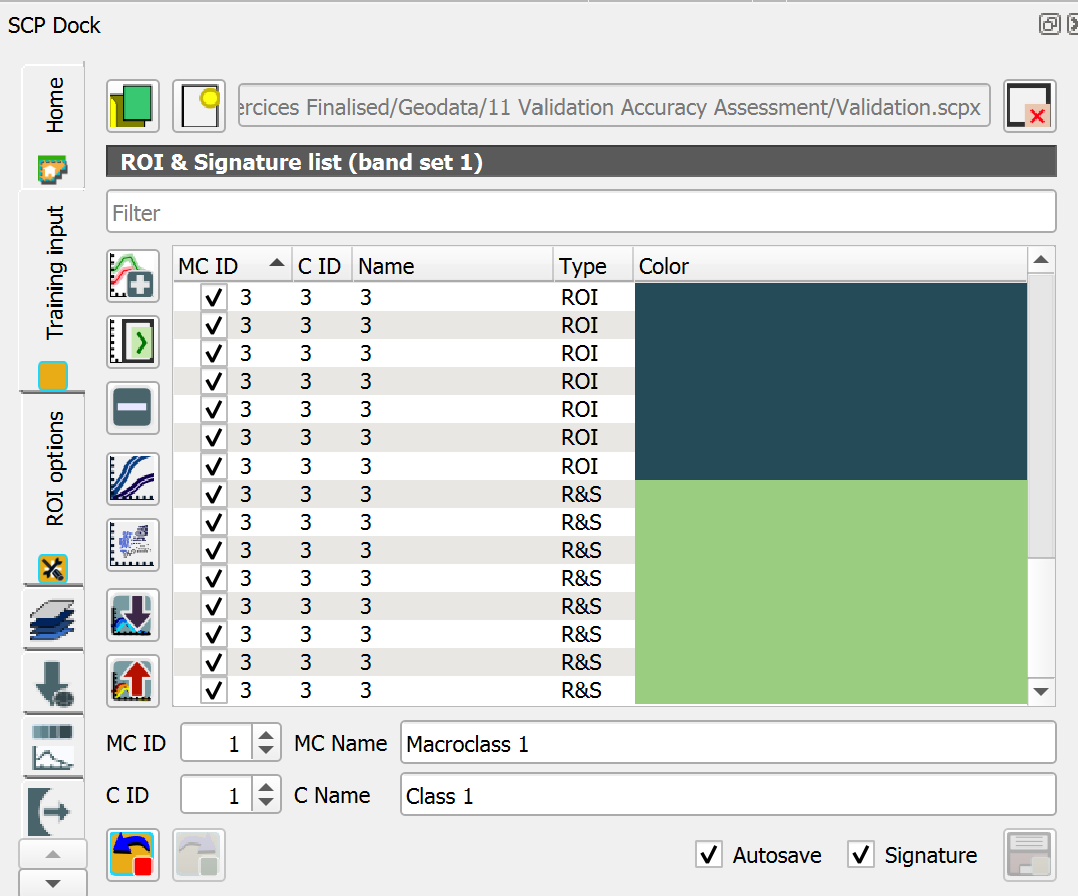


* Next, in the SCP dock, we need to create a new ROI to put out the ground\_truth shapefile. Create a new roi by clicking on the symbol with the yellow circle on the top left in the SCP dock and choosing a folder. Pick a suitable name, I chose “Validation”

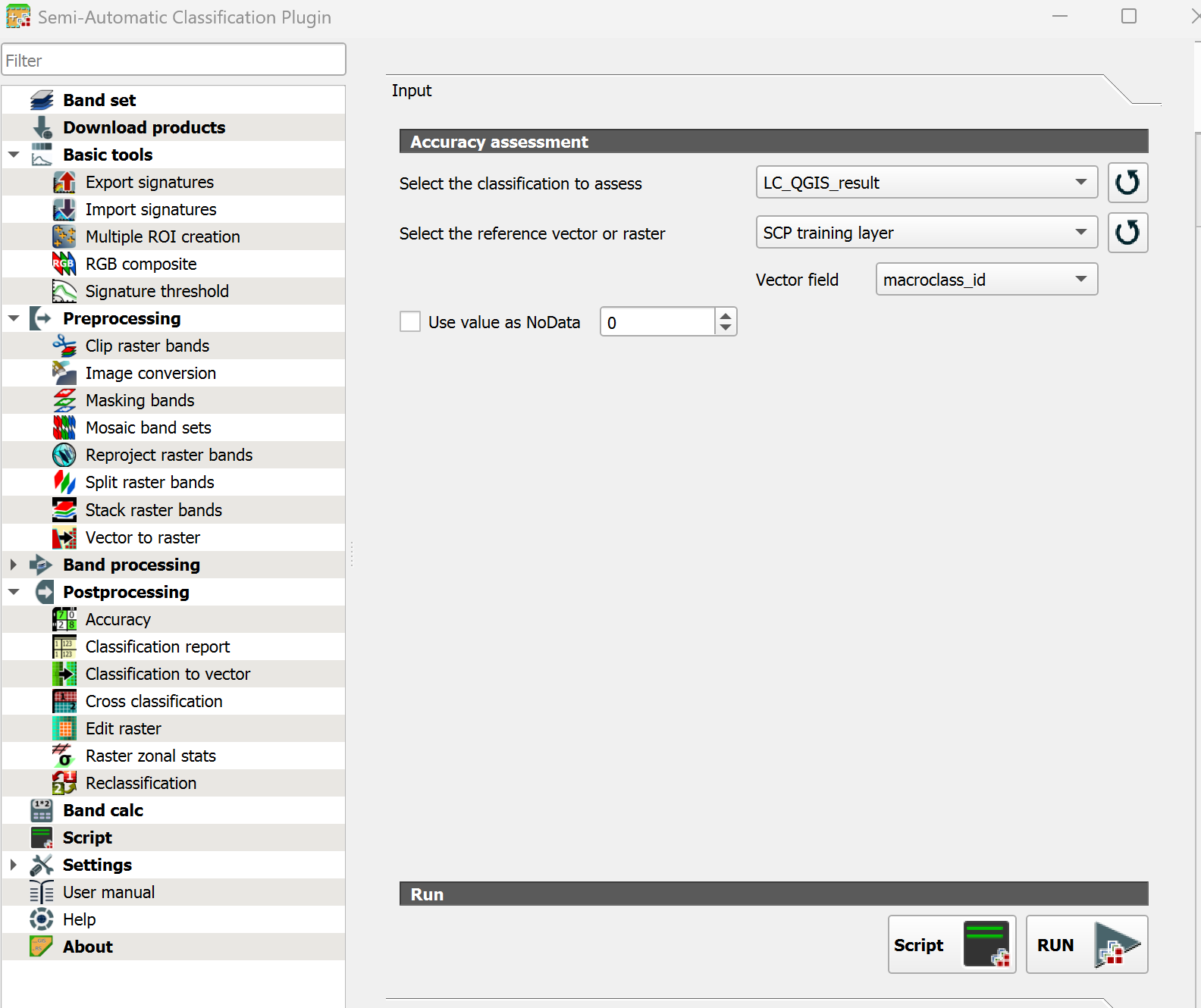


* Now we should add our shapefile. In the Basic Tools tab under Import signatures, select Vector import. Select the correct file path to the ground\_truth shapefile and use the truth\_no attribute for all fields, like so:
* Also, check the box “Calculate Signature” to receive more spectral information

**Results in dock:**



* Finally, we can run the Accuracy Assessment under Scp -> Post Processing -> Accuracy. In the classified Raster and your newly created ROI. Set the Attribute field to Macroclass and then run the tool



* SCP will have generated an output table with a Confusion Matrix

