National Institute for Space Research

TerraAmazon 7 Tutorial

Brazil

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Contents

1 Introduction

TerraAmazon[1] is a computational tool designed for monitoring tropical forests using satellite images. It provides functions such as:

- Image Processing tools
- Vector Processing tools
- Access to distributed databases
- Web service based data dissemination
- Access to time series
- Project management
- Multi-user production control

TerraAmazon is built based on the Terralib 5 [2] that is an open-source and multi-platform library that supports the development of customized GIS applications.

This tutorial details steps required in order to create and configure a server to start using all functions in TerraAmazon. By the end of it, the user is going to be capable of editing and classifying vector data, using a background image as the base, creating a project to map deforestation rates, similar to PRODES, that will be used as an example.

1.1 Types of login

The first screen displayed by TerraAmazon when it starts is represented in figure 1. This screen displays the options that the user will have when logging in the application, that are:

- Creator Profile;
- Administrator Profile;
- Operator Profile;
- GIS Profile.

[1] TerraAmazon Wiki
[2] Terralib Wiki

These options are better explained in the next sections.

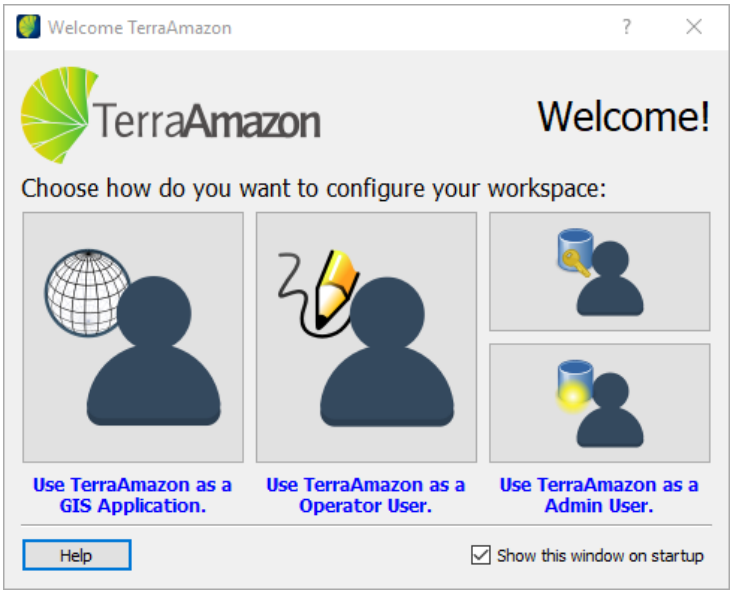


Figure 1: TerraAmazon Welcome screen

1.1.1 Creator Profile

The *Creator* option (Figure 2) is used to create the conceptual model, it enables the same options as an administrator profile and allows the user to create the conceptual model without log-in (the administrator user will be created during the conceptual model).

Figure 2: Configure a new server (Creator Option)

1.1.2 Administrator Profile

Once the conceptual model has been created it is already possible to log-in as an administrator (Figure 3) and configure a project, due to the fact that an administrator user with the same user name and password that was used to create the conceptual model is already created. The administrator is the only one that have access to **Administrator** and **Project Management** tabs (Figure 4).

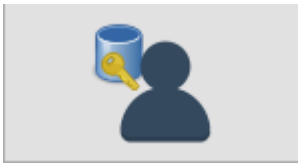


Figure 3: Connect to an existing server as an administrator (Administrator Option)

Figure 4: Administrator Tool Bar

1.1.3 Operator Profile

The *Operator* option is used by the user who will work on the configured project, adding the required layers, performing edition and classification operations routinely. The operator only have access to basic server and project functions, shown in figure 6.

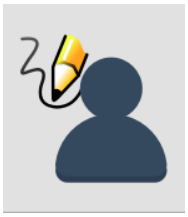


Figure 5: Connect to a server and get the settings made by the administrator (Operator Option)

Figure 6: Operator Tool Bar

1.1.4 GIS Profile

The *GIS* option is used by who only wants to use generic vector and/or image processing functions, shown in figure 8.

Figure 7: Use the tools and resources without being in an active server (GIS Option)

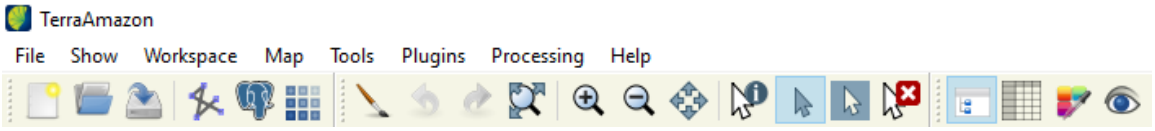


Figure 8: GIS Tool Bar

This option does not require the conceptual model to be created, but it is also the one with the most limited toolset, having no access to the edition and classification tools (which depend on the conceptual model to function properly).

2 Welcome to TerraAmazon

To start using TerraAmazon for the very first time, execute the installation package. So far, TerraAmazon is available for Microsoft Windows, Linux and Mac OS.

Access to a database management system (DBMS) will be required in order to create the conceptual model. On a corporate environment, the DBMS should be installed on the server machine, while the local computer should have TerraAmazon installed. It is possible to have both DBMS and TerraAmazon running locally, that is, in the same computer, which will be the method followed through this tutorial.

This tutorial was developed using the free open source DBMS PostgreSQL [1]. TerraAmazon is not related with PostgreSQL.

2.1 Installation

Download the latest version of TerraAmazon installer [2] and then execute the installer and follow the steps to set the destination folder and other installation options.

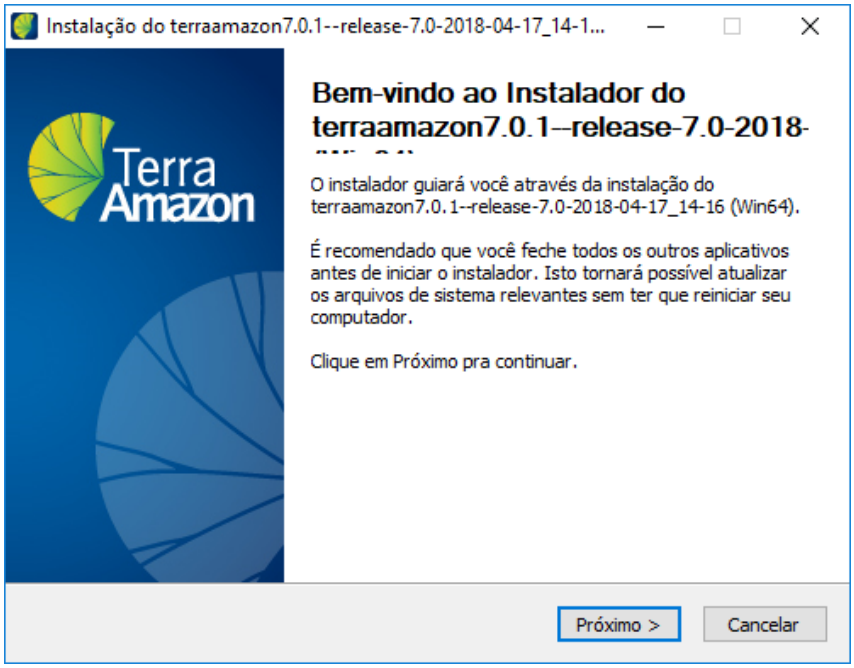


Figure 9: TerraAmazon Installer welcome screen

[1] PostgreSQL
[2] TerraAmazon Wiki Download

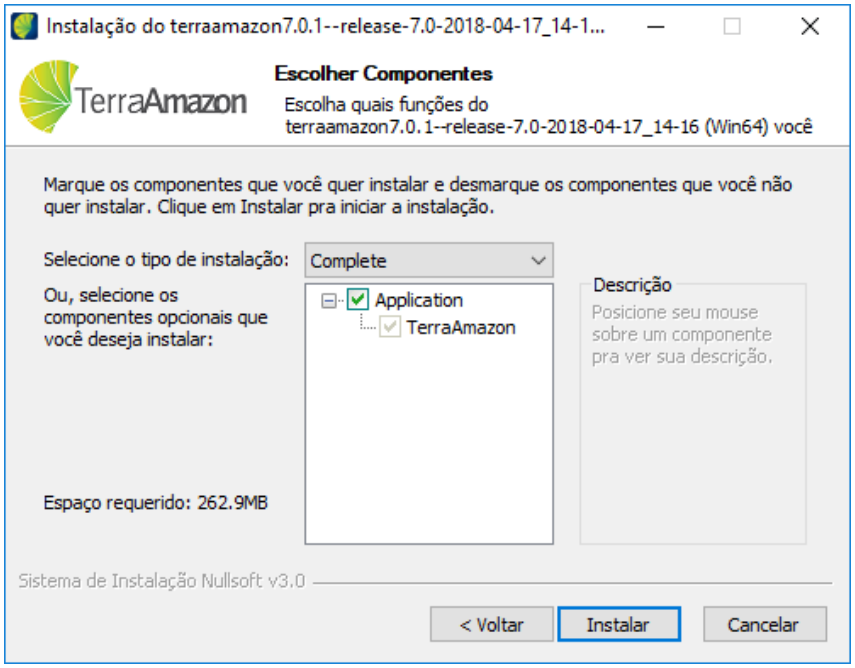


Figure 10: TerraAmazon Installer install screen

A spatial extension is required in order for the system to work, you can use the **Stack Builder** tool to ensure that the PostGIS[3] extension is installed or download an independent installer from the link at annex A. Figures 11, 12 and 13 show the Stack Builder process.

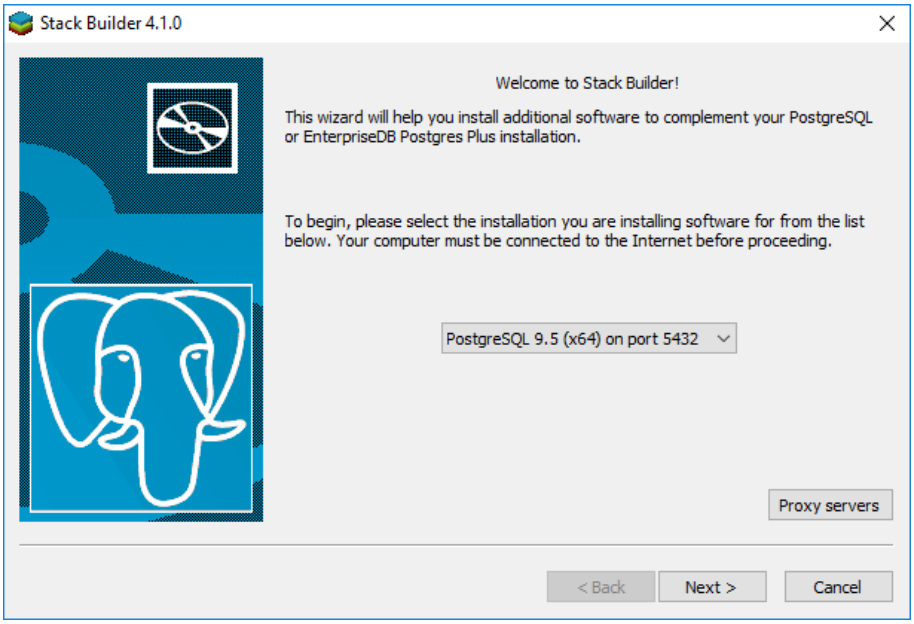


Figure 11: Stack Builder screen - Used to install PostgreSQL extensions

[3] PostGIS

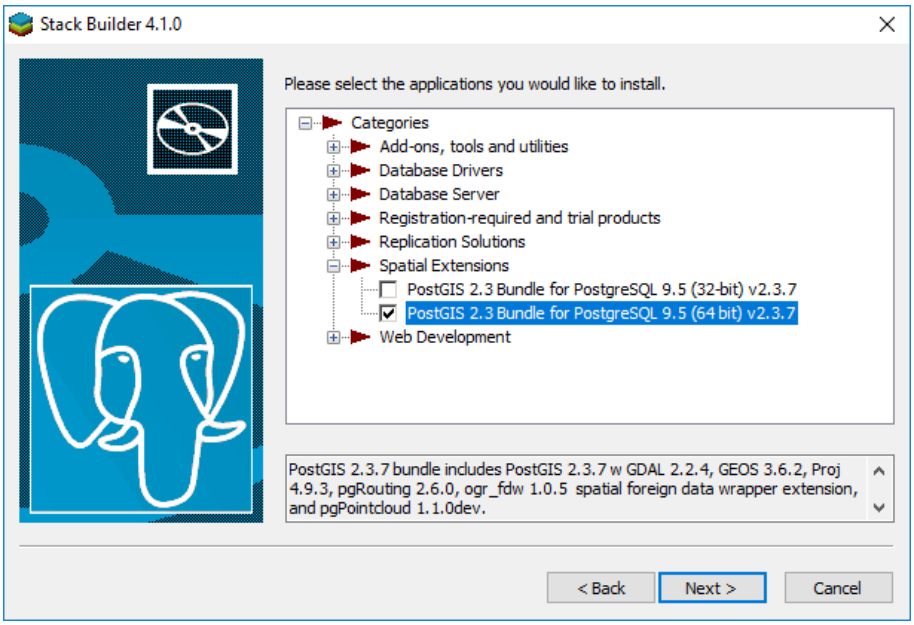


Figure 12: Stack Builder screen - Select the PostGIS extension

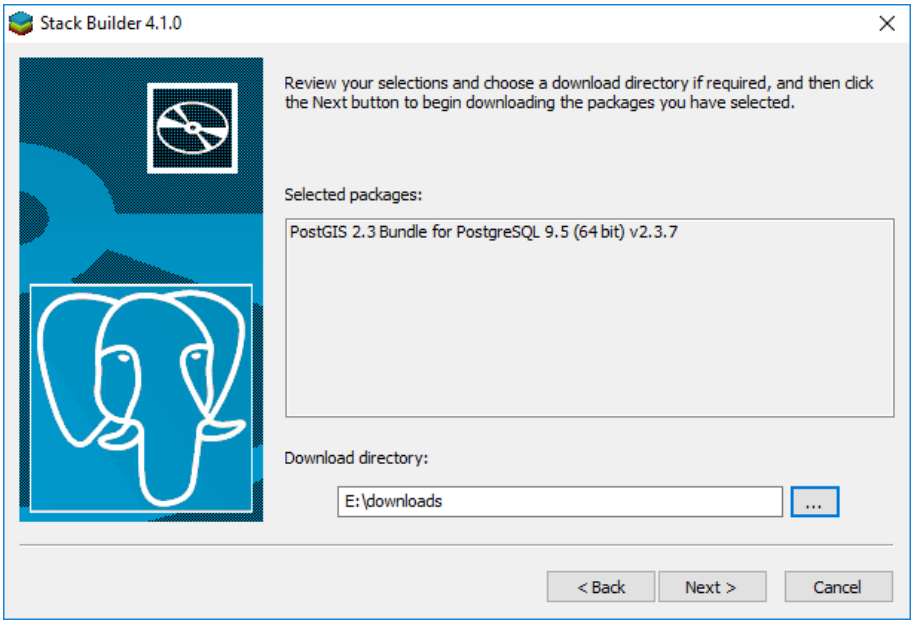


Figure 13: Stack Builder screen - Select the download directory - Then run the installation

3 Configuring a new project

3.1 Creating the conceptual model

The first thing that must be done to use TerraAmazon is to create and configure a server. To do that, you must enter the system using the option  in the welcome screen. TerraAmazon does not automatically create the Conceptual Model given that the size of the cells layer box created in the process depends on the area that will be worked on. To create the *Conceptual Model*, go to the menu:

Administration -> Create Conceptual Model

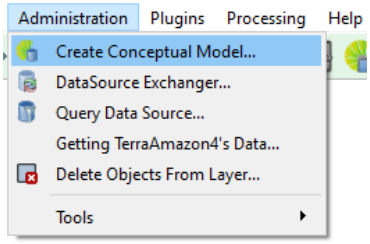


Figure 14: Accessing Create Conceptual Model screen

After follow the menu option you will see the conceptual model creation screen, the one shown at figure 15.

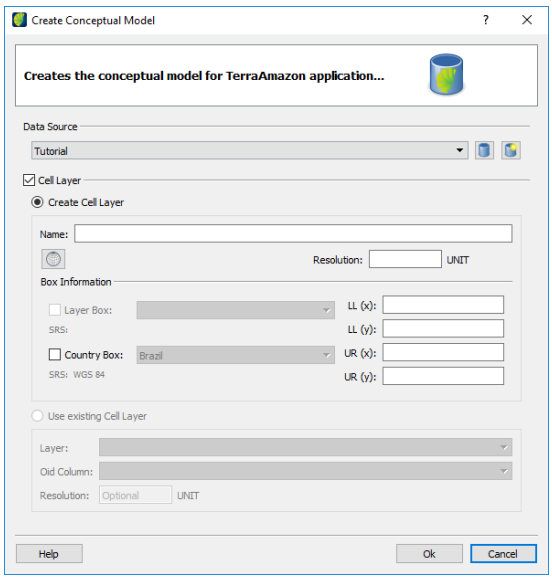


Figure 15: Create Conceptual Model view

3.1.1 Configuring the data base

For this tutorial, choose to create a new database by clicking on the  button. The screen shown at figure 16 will pop-up.

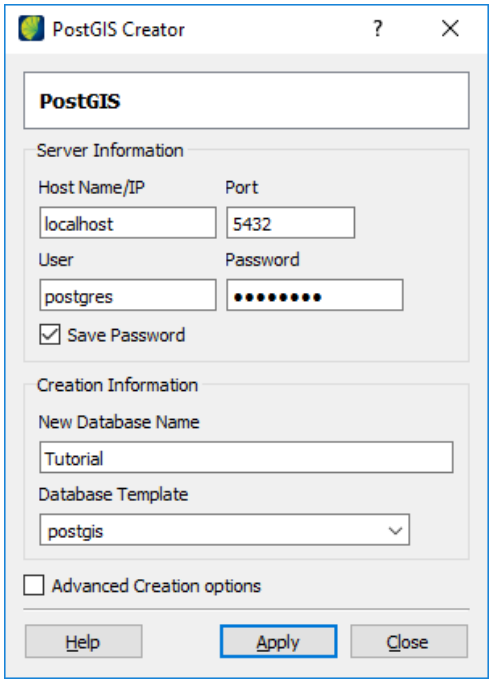


Figure 16: Database connection screen

In this screen, you must provide the information required to connect to the database:

1. **Host:** The host address of the server, for this tutorial, use **localhost** as it will connect to your local database;
2. **Port:** The port to which the server is listening for connections, by default it listens to port **5432**;
3. **User:** The name of a user with administration permissions in the database, the user **postgres** is created by default;
4. **Password:** The password for the **postgres** user is **postgres** by default;
5. **New database name:** The name for the database that you are creating, the example names it **Tutorial**.
6. **Database template:** The template for the database that will be created, the **postgis** template is created when the spatial extension is installed, choose that template.

Once the connection information has been provided, just click the *Apply* button and a connection will be made. The new database will be added to the list of servers to be populated with the conceptual model tables, which is the next step.

3.1.2 Configuring a cell Layer

Many TerraAmazon operations are based on the existence of this layer, such as the classification process. To create a new Cell layer in the Conceptual Model screen set the following fields: **Name** (cell layer name) and **Resolution** (this resolution is the same on horizontal and vertical directions since cells are square geometries).

In the **Resolution** field the measurement unit is defined by the selected projection in the **Projection** field and informed in the **Unit** field on the right side of the resolution.

Check the **Country Box** option, just choose Brazil and the values above will be automatically filled, as the tutorial example (Figure 17).

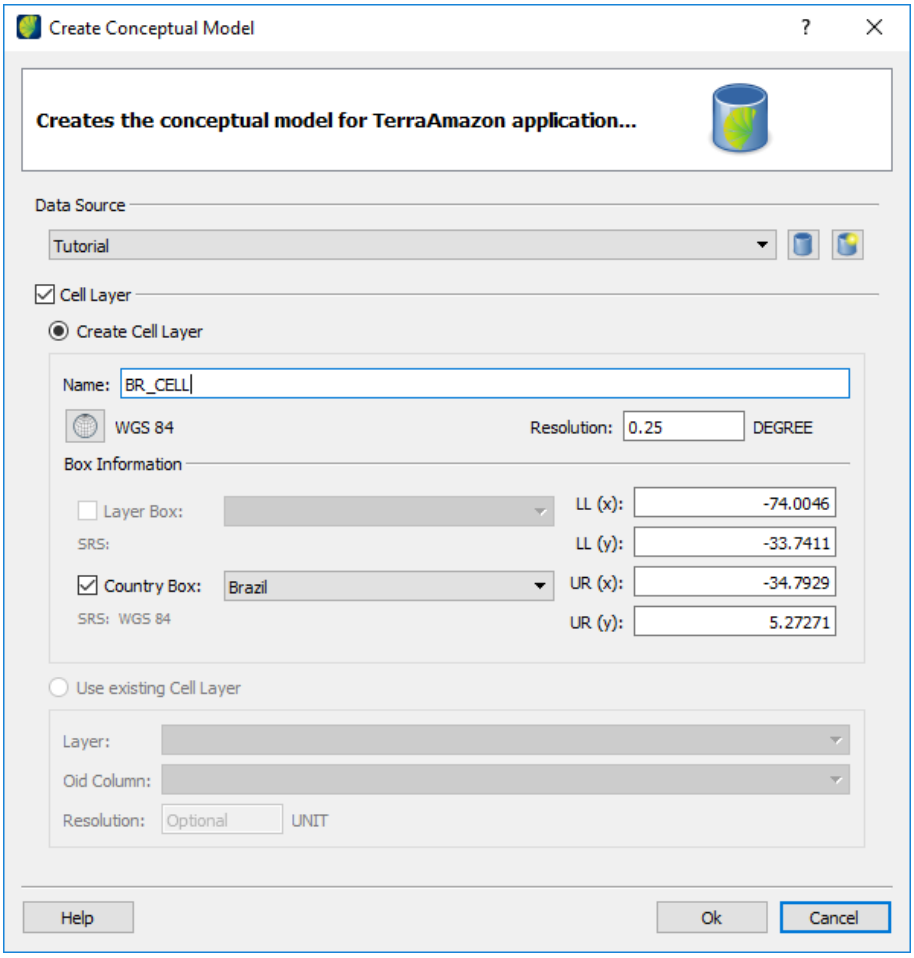


Figure 17: Conceptual Model screen filled

Click on the *OK* button to apply the informed values and trigger the creation of the Conceptual Model.

3.2 Creating Project

To optimize and speed up the initial setup of TerraAmazon and project creation it has a wizard named **Project Wizard**. To start up the tool click on:

Project Management -> Project Wizard

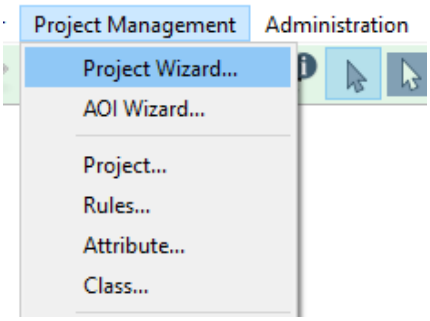


Figure 18: Accessing the Project Manager Wizard

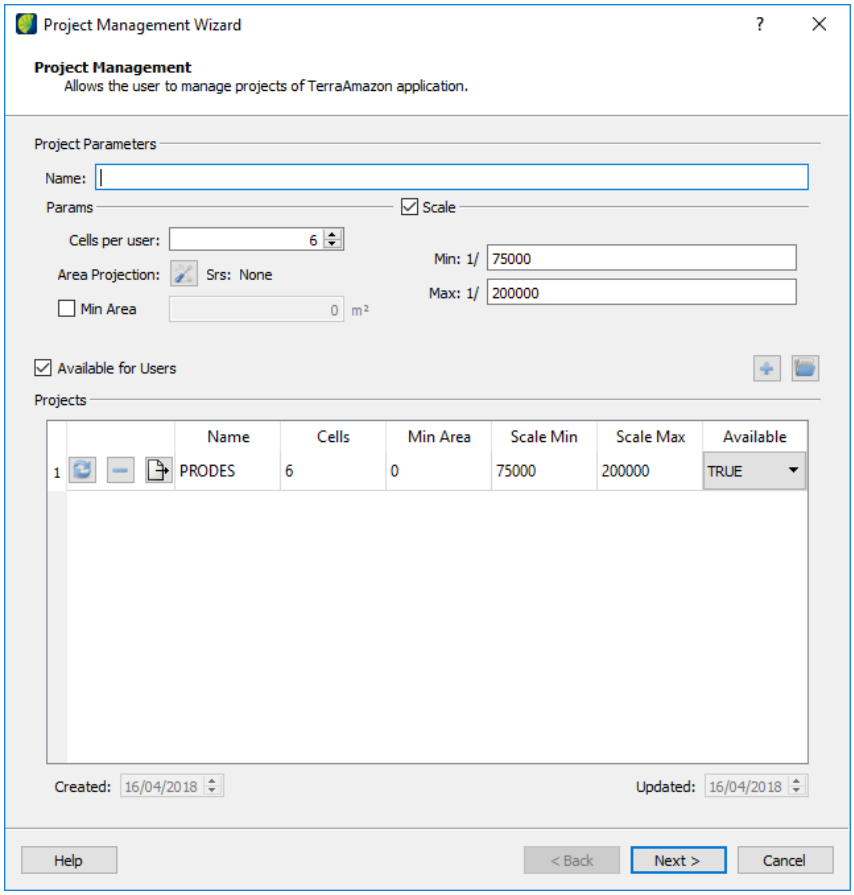


Figure 19: Project creation page

3.2.1 Configuring a project

To create a new project in the screen shown at Figure 19, set the following fields: **Project Name** and **Cells per user**. In this tutorial, use *PRODES* and accept the default number of cells, which is 6.

The box **Available for Users** means the project is available to be worked on by others, and the **Scale** section defines the minimum and maximum zoom limits for your users when working on the project, you can accept the default values for these. Finally, click on the icon  to add a new project then click on the **Next** button.

3.2.2 Creating output layer

The result of the classification operations is persisted in what is called an output layer, this stage of the project creation wizard, shown at figure 20, is about creating this layer and customizing the operations that will be performed before persisting data to it.

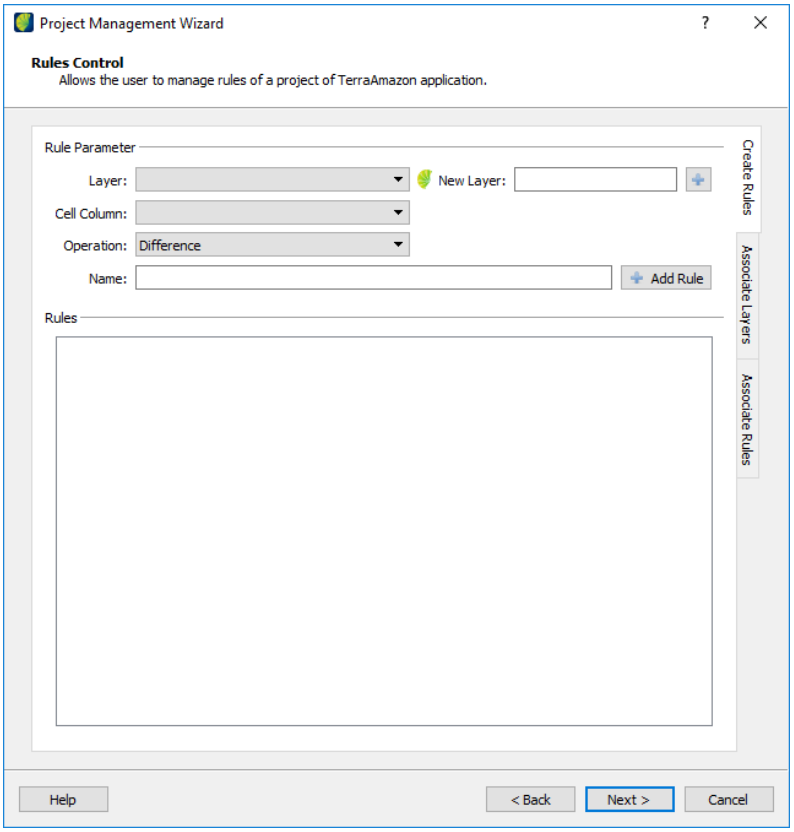


Figure 20: Rules control page

The first step is to set the name of the output layer, enter the name as shown in Figure 21 and click on the icon  . Select the new layer in the Layer field.

Once the layer has been added, you will see it in the list of output layers as shown in figure 22.

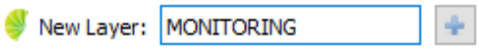


Figure 21: Layer name example

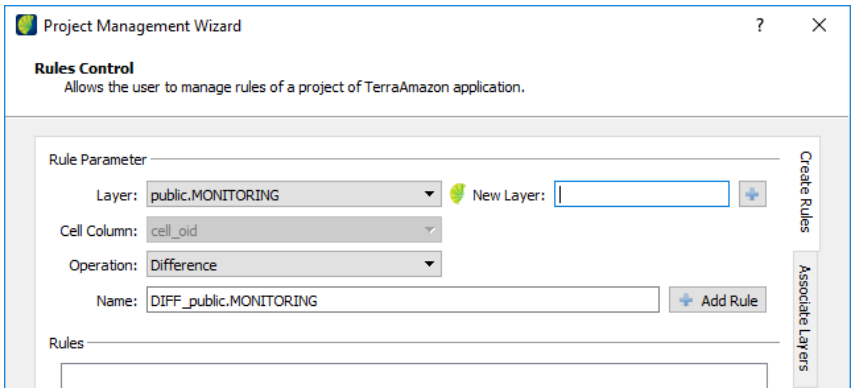


Figure 22: Output layer created and added to the list

Click on the *Associate Layers* tag. To move on to the next step.

3.2.3 Associating an output layer to project

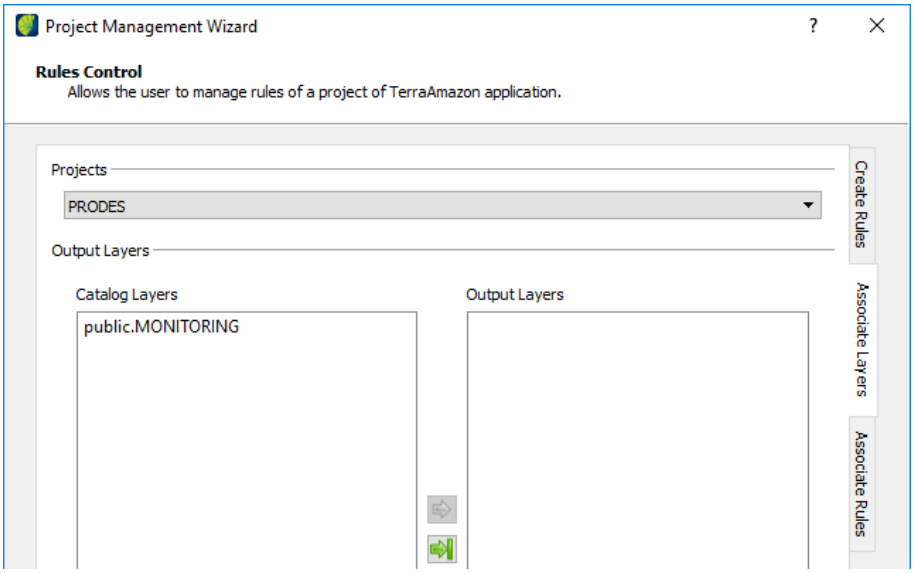


Figure 23: The layer association tab

The screen shown in figure 23 has a list of projects in the top, this is where you can choose which project you are going to associate the output layer with. Below that are the lists of catalog layers (on the left) and layers associated with the project as output layers (on the right). Now you can select the layer in the **Catalog layer** list and click on the right arrow to transfer to the **Output Layers** list. The result is displayed on figure 24.

Click on the *Associate Rules* tag. To move on to the next step.

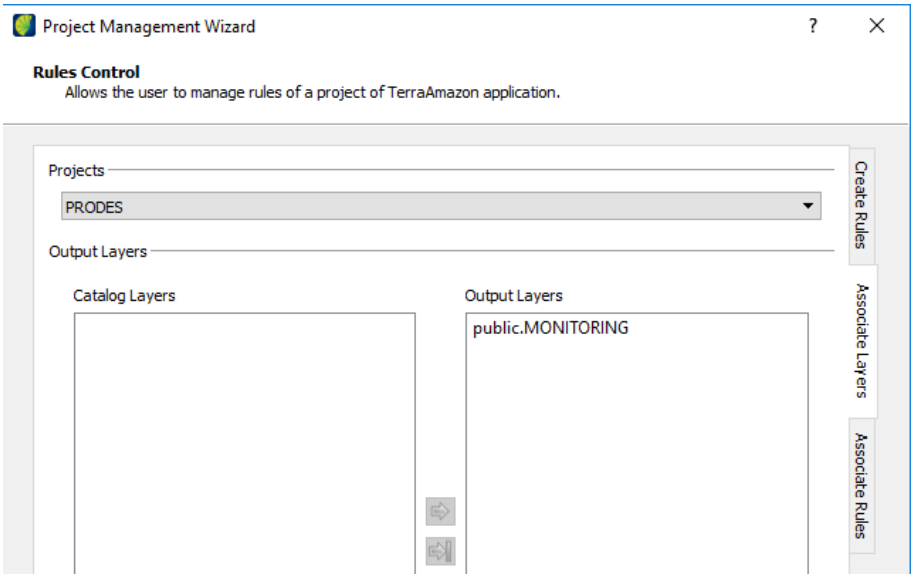


Figure 24: The layer has been successfully associated with the project

3.2.4 Associating rules to output layer

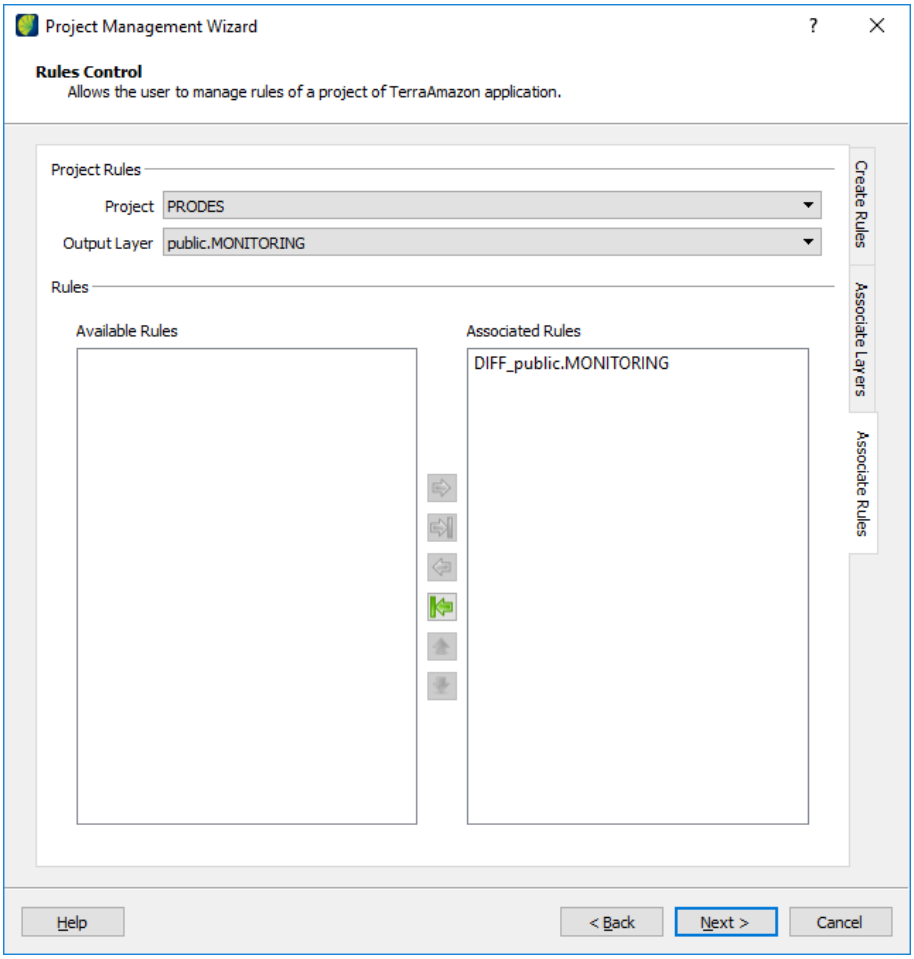


Figure 25: The rules association page

The screen shown in figure 25 has two lists, you can select the **Project** and **Output Layer** fields and after that the available rules will be shown below. In this step you can choose which rules you are going to associate with the output layer. You can select the rule in the **Available rules** list and click on the right arrow to transfer to the **Associated Rules** list. In this tutorial, we will use only the difference rule, which is created by default, but if you want to know more, check out annex B. Click on the *Next* button.

3.2.5 Associating classes to output layer

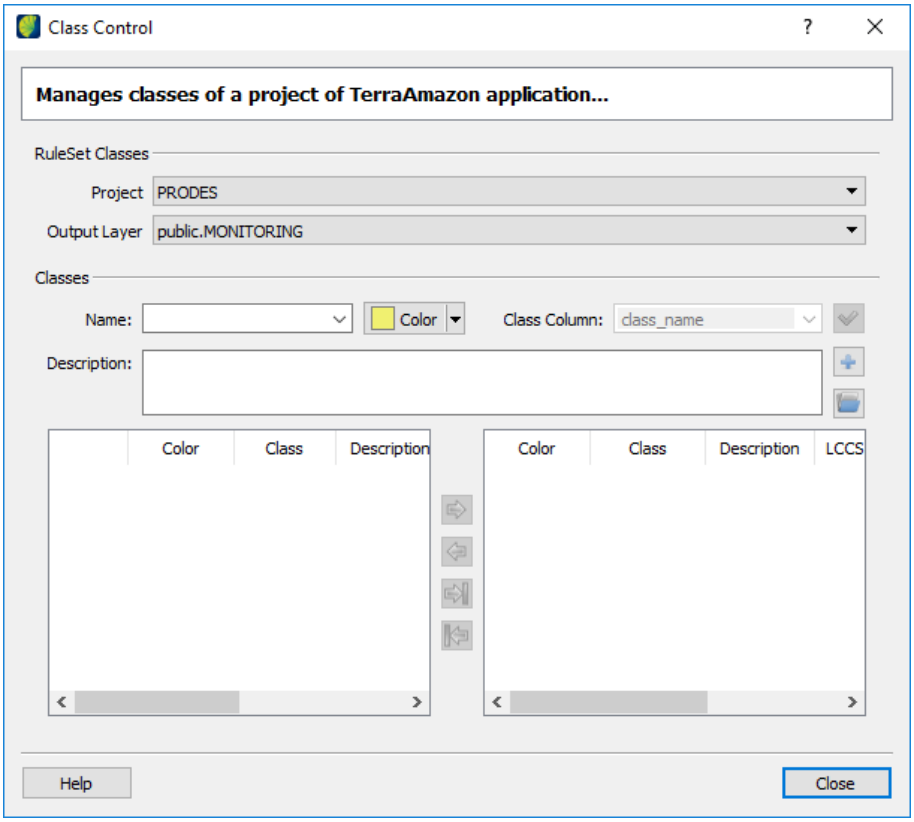


Figure 26: The class control page

In the screen shown in figure 26 the **Project** list contains the projects and the **Output Layer** list contains the output layers associated with that project. In this step, you will choose which classes will be associated with each output layer. In the **Name** select a class from the list and change the color if needed. To add a new class enter the name, the color and click on the icon . The result will look like figure 27.

Select the classes to associate with the class column and click on the right arrow button to move them to the right list. This means that the chosen output layer from the chosen project will receive the result of any classification made with those classes. The result will look like figure 28.

To conclude the wizard configuration click on the *Finish* button.

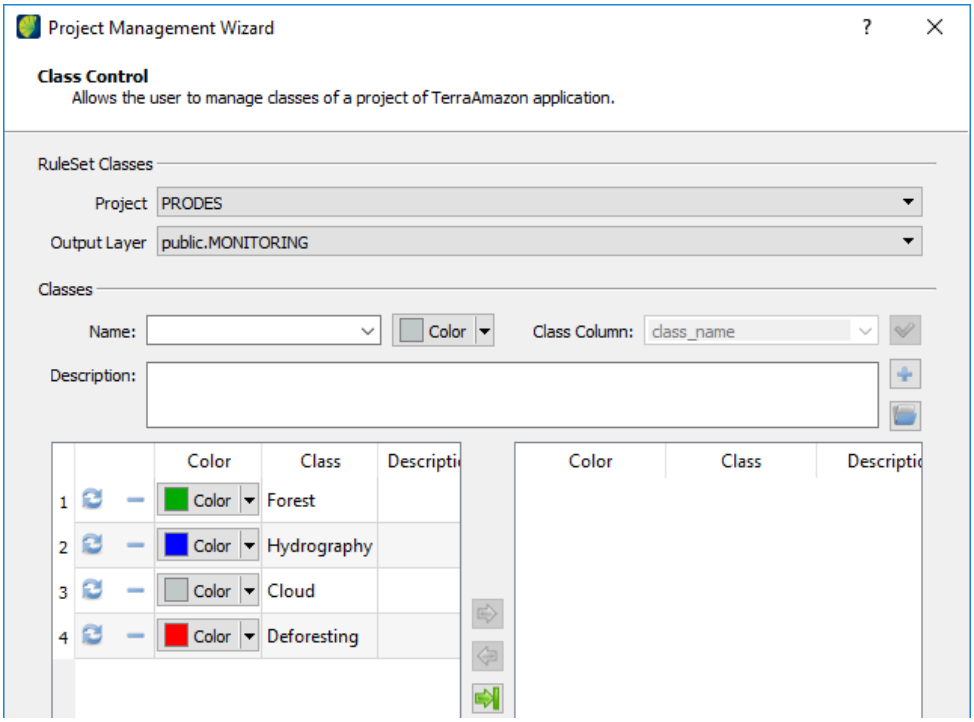


Figure 27: A few classes have been added to the list

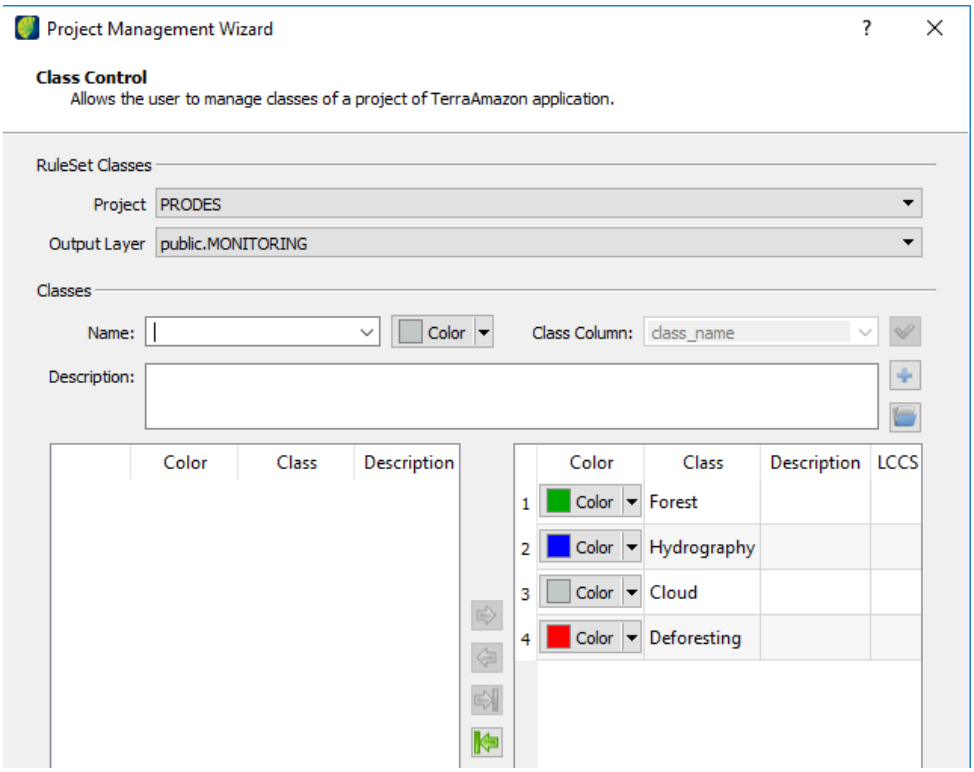


Figure 28: A few classes have been associated with the output layer.

3.3 Configuring the area of interest

An area of interest (AOI) defines the limits of where the classification work will be done. The operators will not be able to perform any classification outside the bounds of an AOI. For that reason, before using the wizard the layer that will define the AOIs must be inserted.

3.3.1 Inserting a vector data to area of interest

In order to insert the layer containing the data that will define the AOI, you must right-click on:

Layer-Explorer -> Add Layer -> Vector File

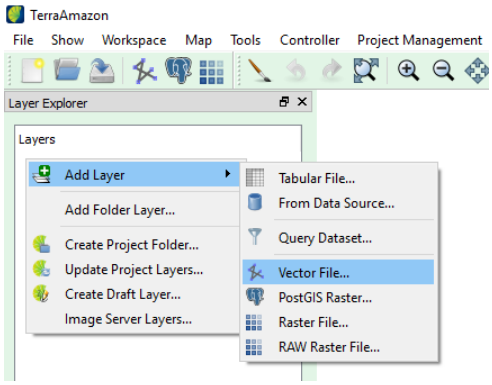


Figure 29: Adding a vector data layer

A dialog will be shown, prompting you to select a file. In this tutorial we will use a shapefile called GRID_TM_PATHROW_pol, and the result is shown at figure 30.

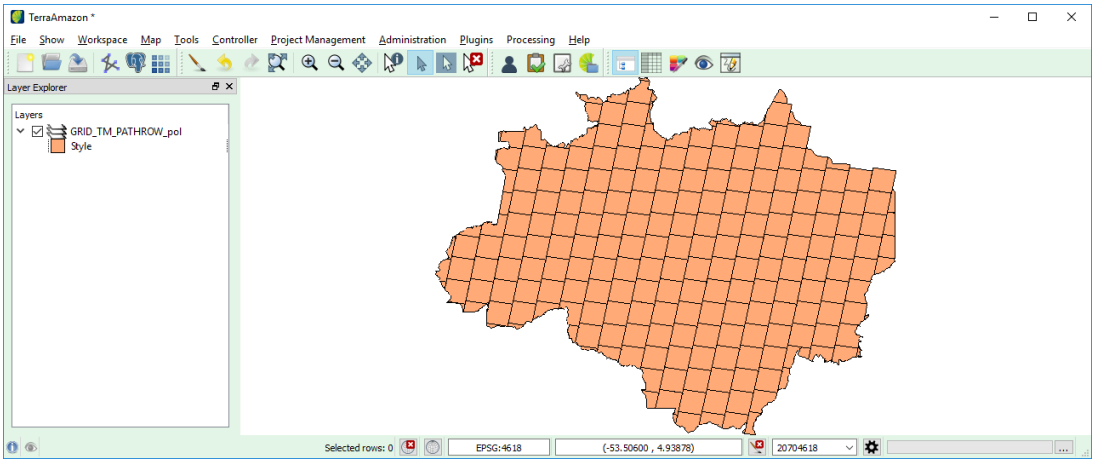


Figure 30: Vector data successfully inserted

3.3.2 The Area of Interest wizard

To optimize the setup of the area of interest it has a wizard. To start up the tool click on:

Project Management -> AOI Wizard

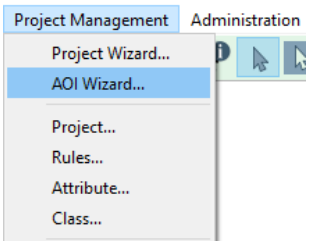


Figure 31: Accessing the area of interest wizard

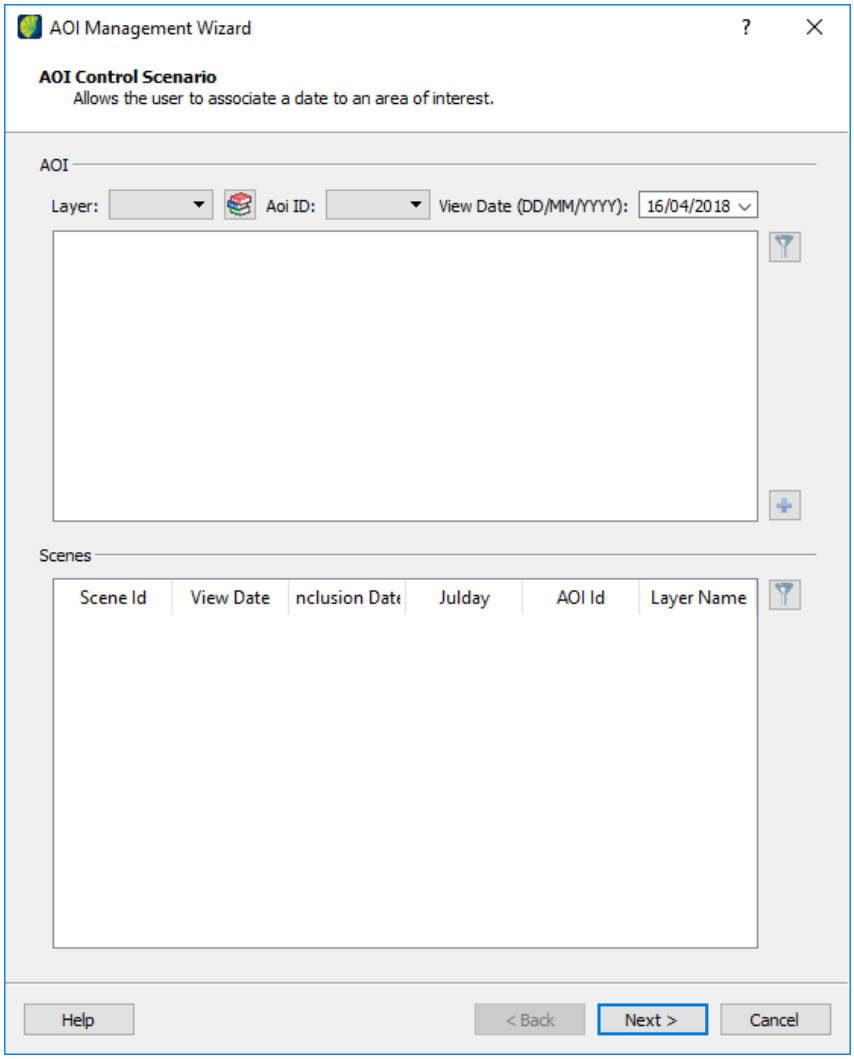


Figure 32: The Area of Interest wizard - first page

The screen that will be displayed will look like figure 32. In this screen, you can:

- Define the layer that contains the geometries that will define the areas of interest;
- Define which geometries that will define the areas of interest, thus creating a scene;
- Define which column will be used as the unique identifier of a scene;
- Define the date on which that scene was observed;

3.3.3 Inserting data on the catalog

In order for a layer to be eligible to become an AOI, it must first be included in the catalog of project layers. You can access that by clicking on the icon  and you will see the screen shown at figure 33.

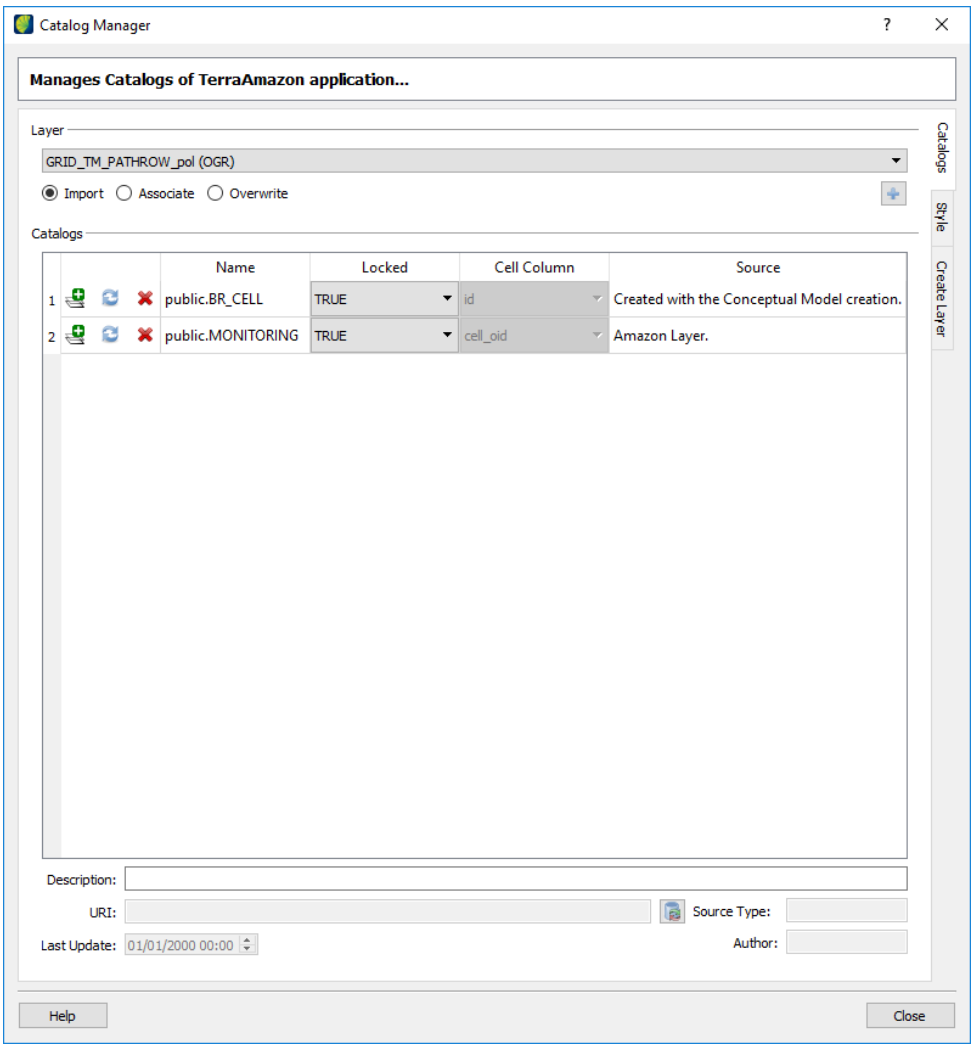


Figure 33: The Catalog Manager screen

The catalog of layers are the official layers of the project, these are the layers required in order to work on the project. This screen shows the list of layers already included in the **Catalogs** section. You will see that the layer you have just inserted will be shown on the list of layers that can be included in the catalog. Click the + button and the layer will be imported into the catalog. The result should look life figure 34.

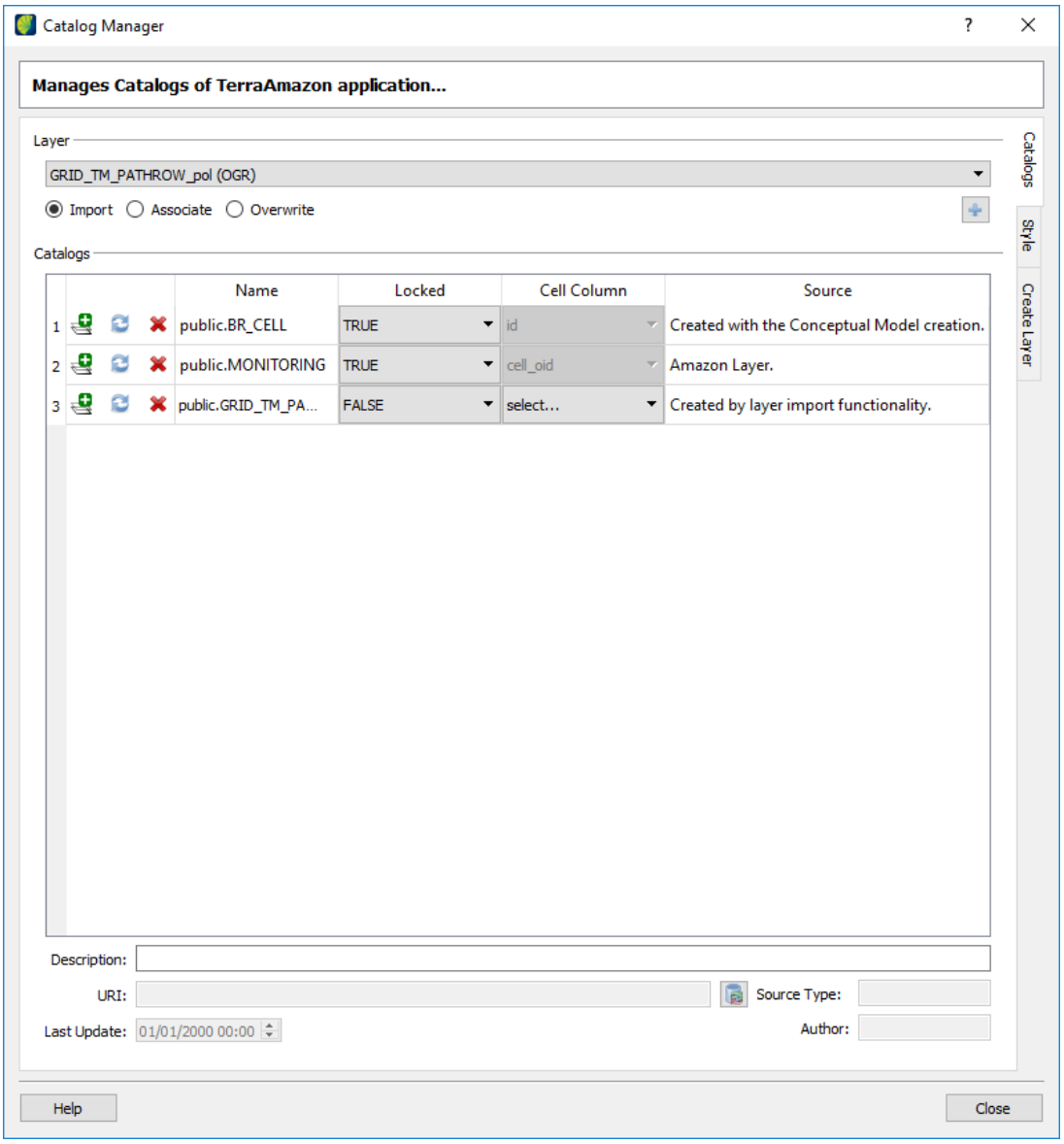


Figure 34: The AOI layer is now in the catalog of project layers

3.3.3.1 Defining style for all data in project

The *Catalog Manager* screen also allows the administrator to customize the style of all the official project layers. This can be done by accessing the *Style* tab. An example of a customized style is shown at figure 35, where the style of the *BR_CELL* has been customized. The style defined in this screen will be applied when an operator creates their

own project folder, you can check more details about this function on section 4.1.2. Once you have finished, click the *Close* button to return to the AOI wizard.

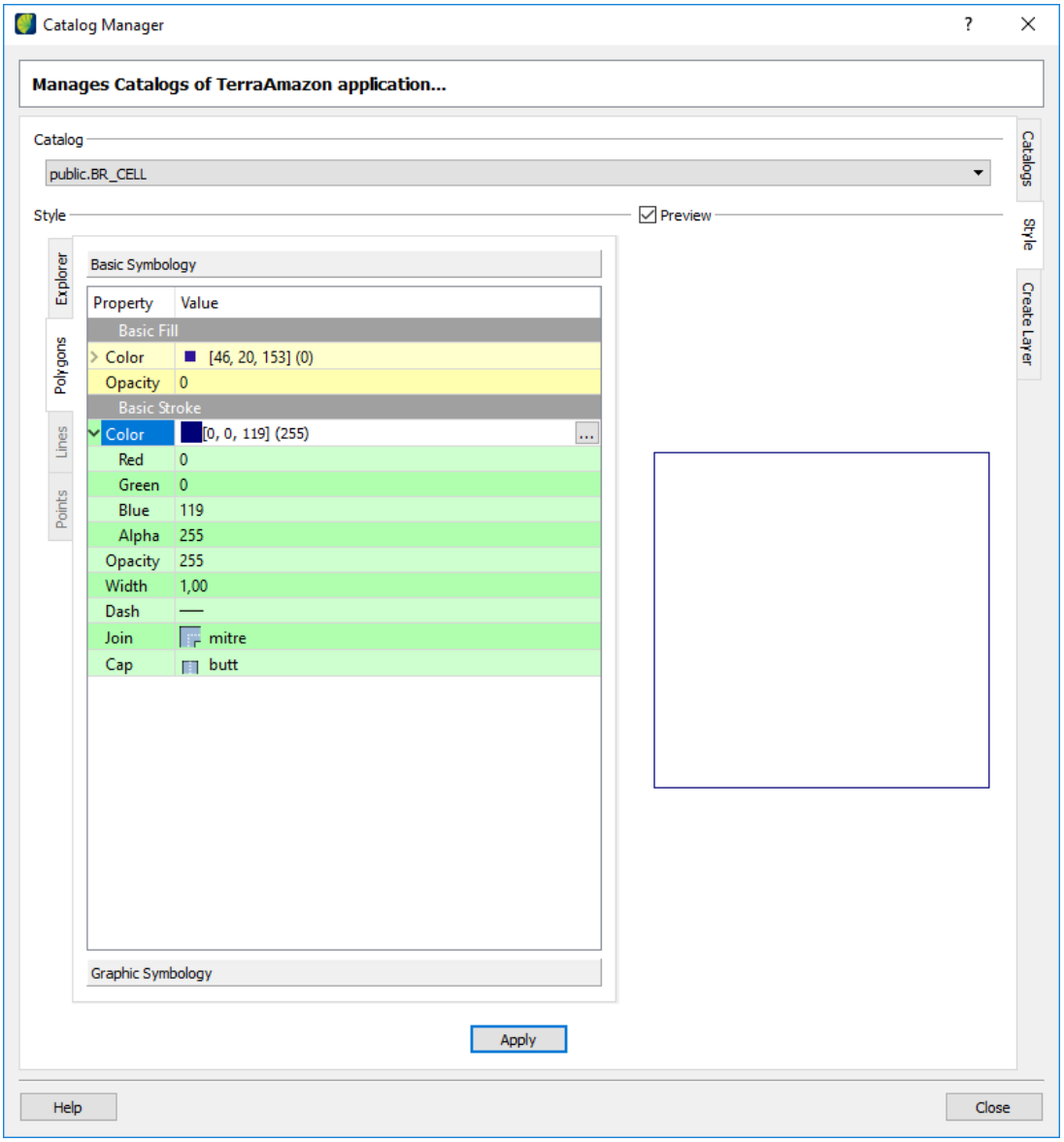


Figure 35: Defining the style of the Cell layer

3.3.4 Creating scenes

Once you have added the layer in the catalog, the AOI wizard will list the data as shown in figure 36. To define an AOI layer, select it in the **Layer** combo and the correspondent **Aoi ID** (in this tutorial set the "pathrow" column as the id).

To locate specific geometries in the AOI layer for scenario composition click on the icon  that will open the search interface shown in figure 37.

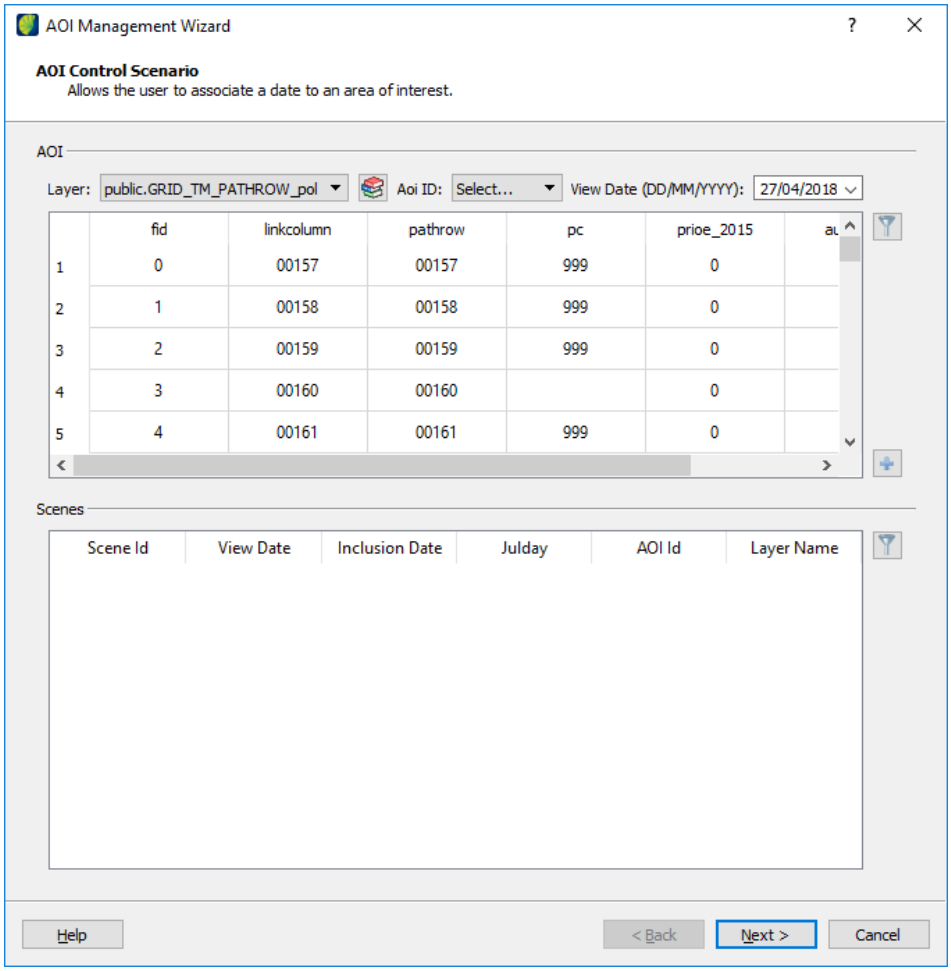


Figure 36: The list of features that can become scenes

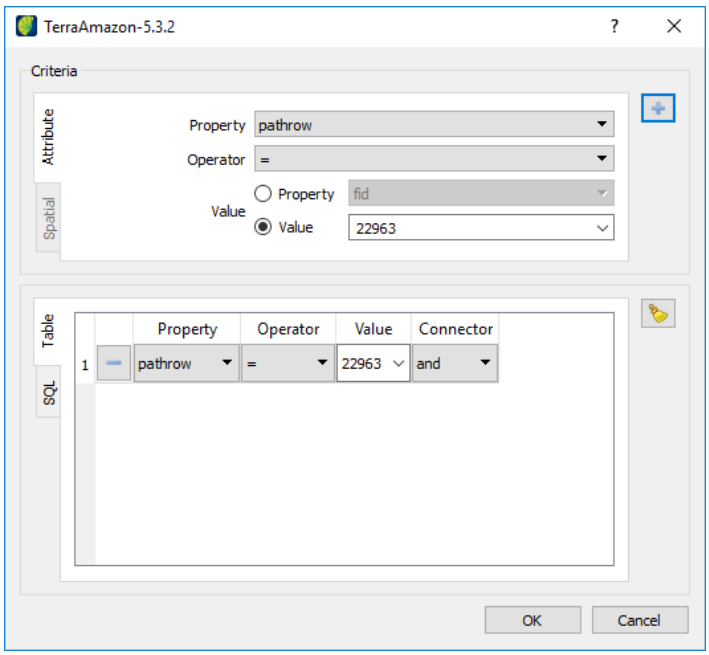


Figure 37: The screen that creates a filter to be applied in the list of geometries

In this screen, you must provide the information required to filter the data according to your needs:

1. **Property:** Select the reference attribute;
2. **Operator:** Select the operation type to execute in the filter;
3. **Value:** You can create a filter based on two different options:
    a) **Property:** Will create a filter based on your chosen operator and the value at the specified column;
    b) **Value:** Will create a filter based on your chosen operator and a specific value you have provided;

For this tutorial, we will use the *pathrow* 22963, as shown in figure 37. After you've filled the required information click on the + icon to add the filter condition. And you will only see one scene in AOI wizard. The last details that must be set is the *View Date* which must correspond to the date which the data was first acquired, but for this tutorial you can accept any date you wish. Now click on the + icon once more to add it as a scene. An example of how the page will look like once it has a few scenes is shown in figure 38.

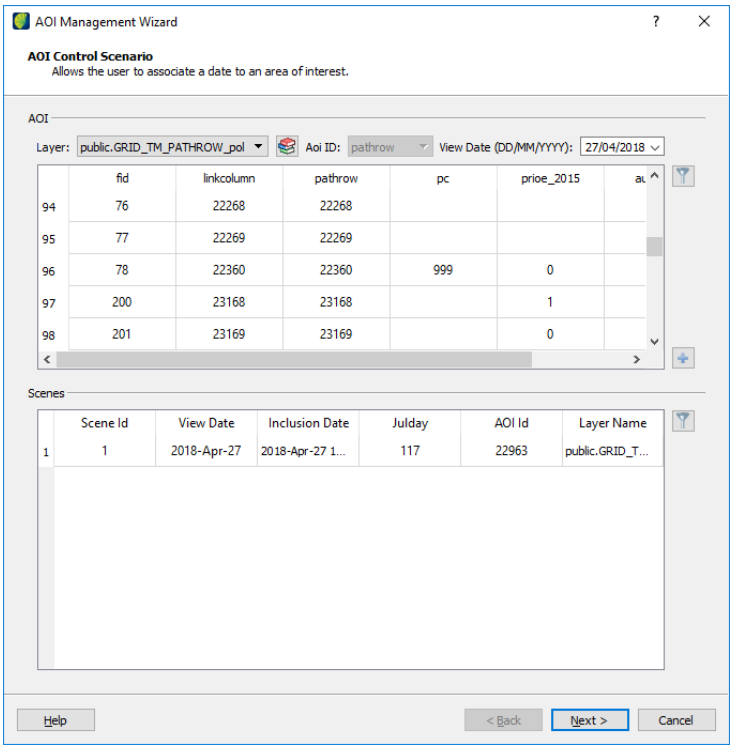


Figure 38: The list of scenes, with one scene inserted.

3.3.5 Associating scenes to project

Once there are scenes to be worked on, they must be associated with their respective projects (one scene may be associated with multiple projects). The last step to be performed in this wizard is to select the scene by clicking on it and then clicking on the button. Once it is done, it should look like the figure 39.

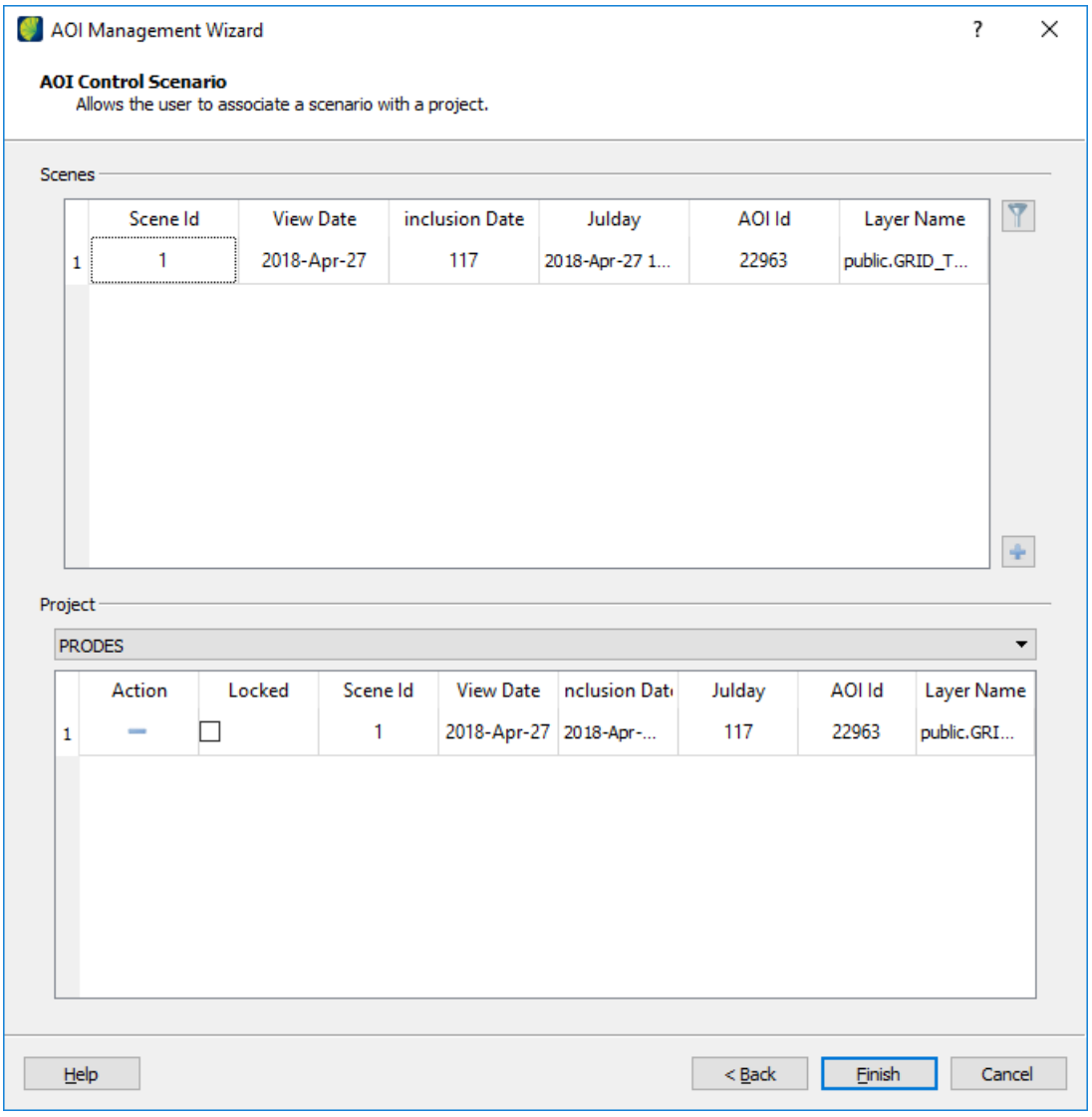


Figure 39: The second page of the wizard, showing a scene associated with a project

3.4 Managing users

Create users is possible at any time after the creation of the Conceptual Model. Access the interface by going to the menu:

Project Management -> User

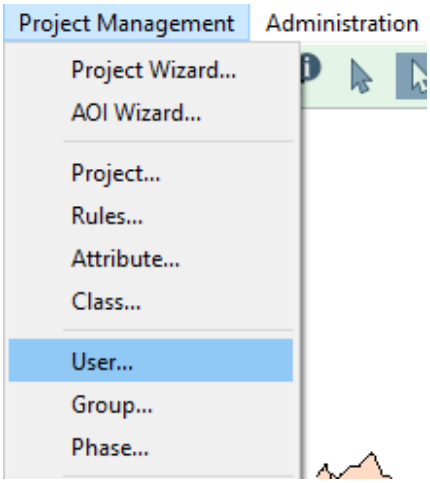


Figure 40: Accessing the User Control screen

Note that there is an user already in the **User List**, called "postgres" in this example. This is due to the creation of the conceptual model, which generates an user with administrator privileges inheriting the name and password of the DBMS user employed to create TerraAmazon.

To create a new user, type the desired name in the **User Name** field, mark the desired group in the **Group List** and click on + button, the created users are shown in the **User List** field, like shown in figure 41.

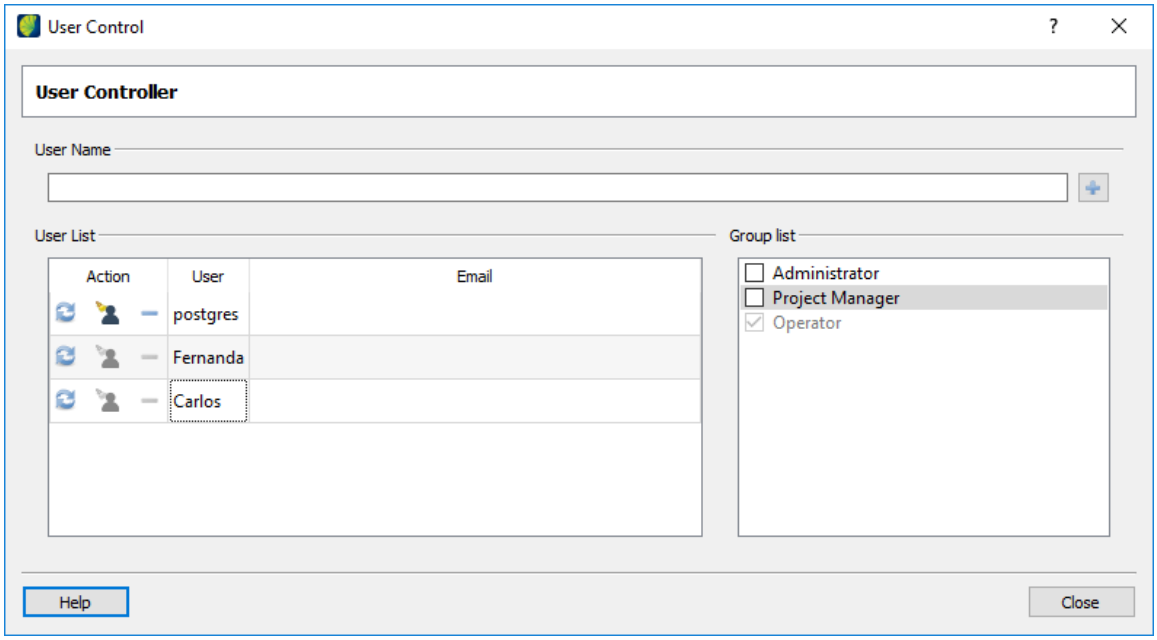


Figure 41: Creating new user example

In this example, the user name is "Carlos" and the group for this user is "Operator". This group is the default option but there are groups "Administrator" and "Project

Manager" as well (Figure 42).

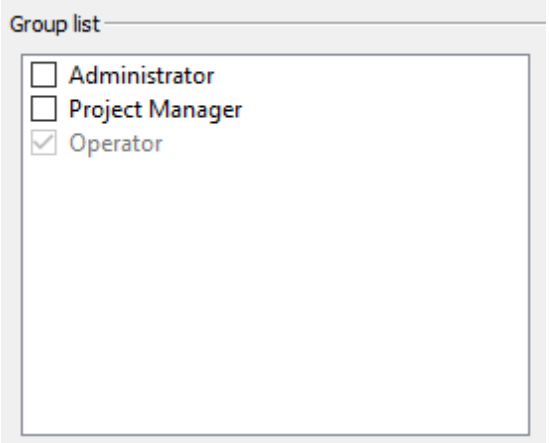


Figure 42: User groups

The "Operator" has access to edition operations and can activate projects to work on, the "Project Manager" is an operator with permission to access the project management operations and the "Administrator" has all permissions including some administrative operations (to remember the types of user and their permissions take a look at section 1.1).

There is no password at this point, users need to change their own passwords in the first connection. If an user ask to reset the password just click on the button to reset.

To update the **User Name**, double click in **User** field and type the wanted name. To enter or update an email, double click in the **Email** field and type the user email address. To save the changes, click on the button.

To Remove an user click on the button. If the remove icon is not enabled it means that the user was activated before, so cannot be removed in order to preserve the history of their actions.

3.5 Viewing the project summary

You can review all the the information of the generated project in project summary screen, shown in figure 44. In order to access it, click on:

Project Management -> Information

You are ready to close or restart TerraAmazon to log-in as the operator user you created in section 3.4. The process will described in section 3.6.

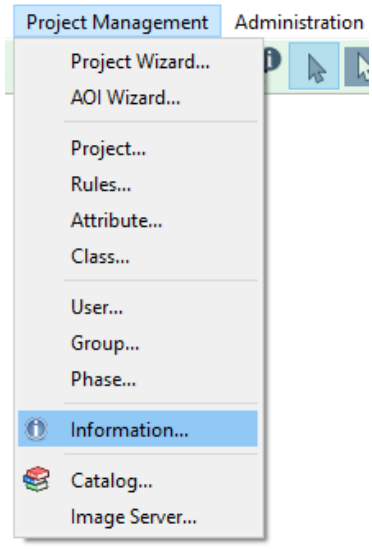


Figure 43: Project summary access

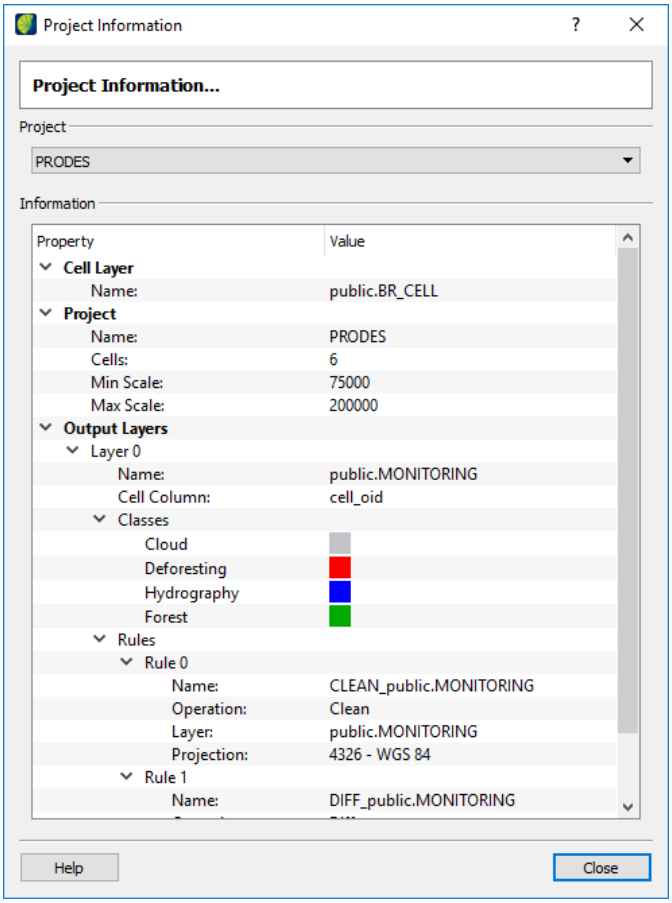


Figure 44: Project summary

3.6 Log-in to TerraAmazon

It is now possible to log-in in the newly configured server and the process is the same for both an operator and an administrator (note that the GIS user and the Creator user do not go through the log-in process, since neither of these will have the conceptual model created). You could choose the option to log-in as an administrator, but for this section, choose the option to log-in as the operator. The process goes through these steps:

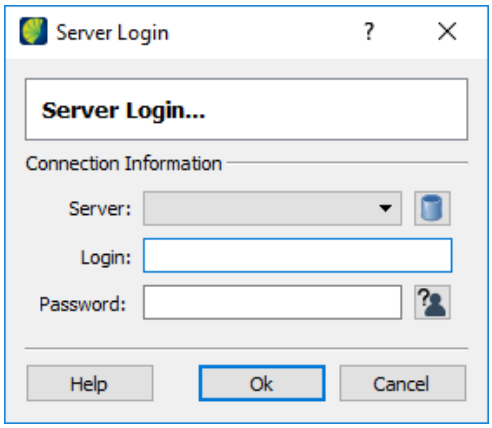


Figure 45: The log-in screen that will be displayed when the operator or administrator option is chosen

1. The user selects a server from a list of possible servers;
   - You may have to add the server you just created by clicking the button;
   - The screen shown at figure 46 will pop-up;

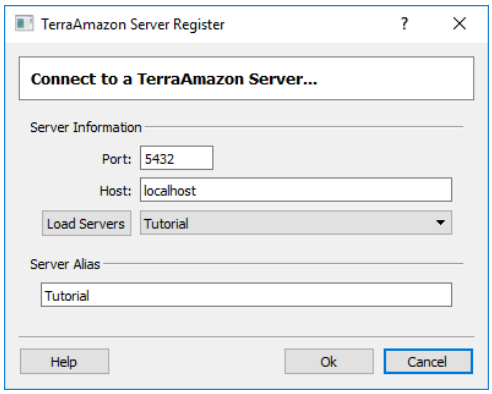


Figure 46: Add server screen.

   - Type the port and the host (explained in section 3.1.1), then click the *Load servers* button;

- A list of possible servers will be loaded, choose the one you just created and then click *OK*;

2. If it is the first access, a password and an e-mail must be set;

   - Trying to connect with the default password or an empty one will trigger the warning at figure 47:

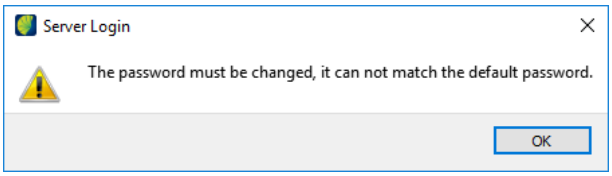


Figure 47: First connection warning.

   - The log-in screen will change to allow the user to insert the required info:

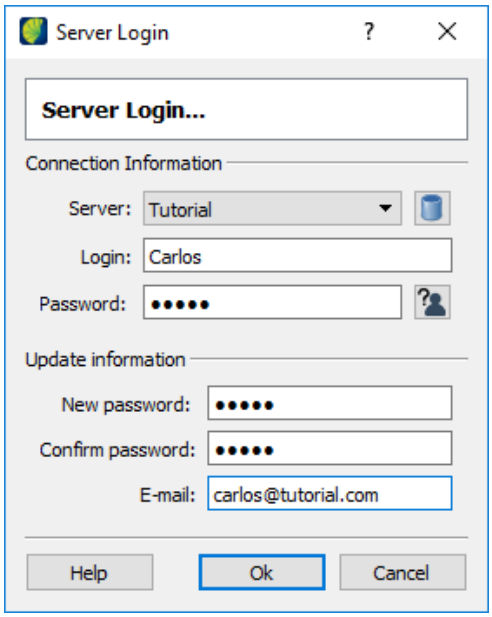


Figure 48: New user information input screen

   - Type in your new password and your email, then click *OK*:

3. If the log-in is successful, the interface will be adapted to the operator as shown in section 1.1;

4 Preparing the operating environment

4.1 Work environment

After the log-in operation has been performed, refer to section 3.6 for instructions on how to do that, there are a few more steps required in order to prepare the work environment, those are detailed in this section.

4.1.1 Activating project

The first step is activating the project you are going to work on, this can be done by clicking the button highlighted in figure 49.

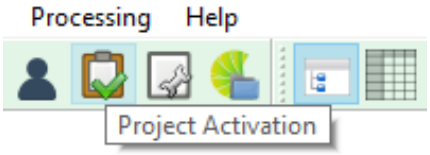


Figure 49: Project activation shortcut

A new screen will pop-up with the **Project** field that shows a list of projects from the server you are connected to and **Active** field that shows which project you are currently working on. To activate a project, select it in the list and click the button. The result should look like figure 50.

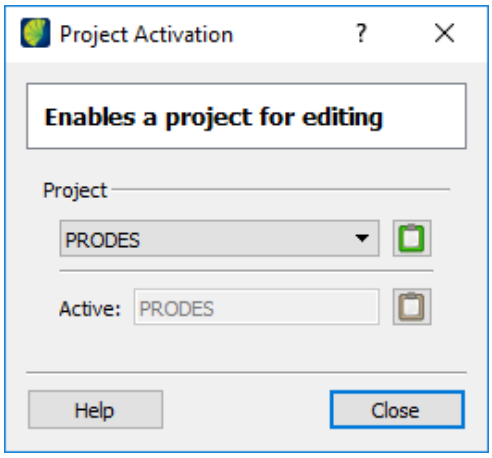


Figure 50: Project activation screen

4.1.2 Creating project folder

With the project activated, you can now create a folder that will contain all the layers required to work on that project. To create this layer you must right-click on:

Layer-Explorer -> Create project folder

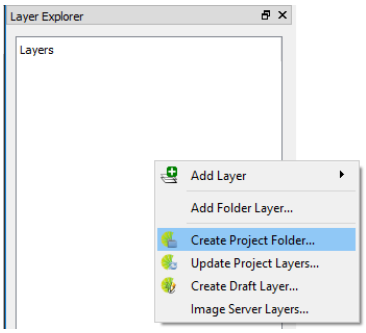


Figure 51: Create project folder shortcut

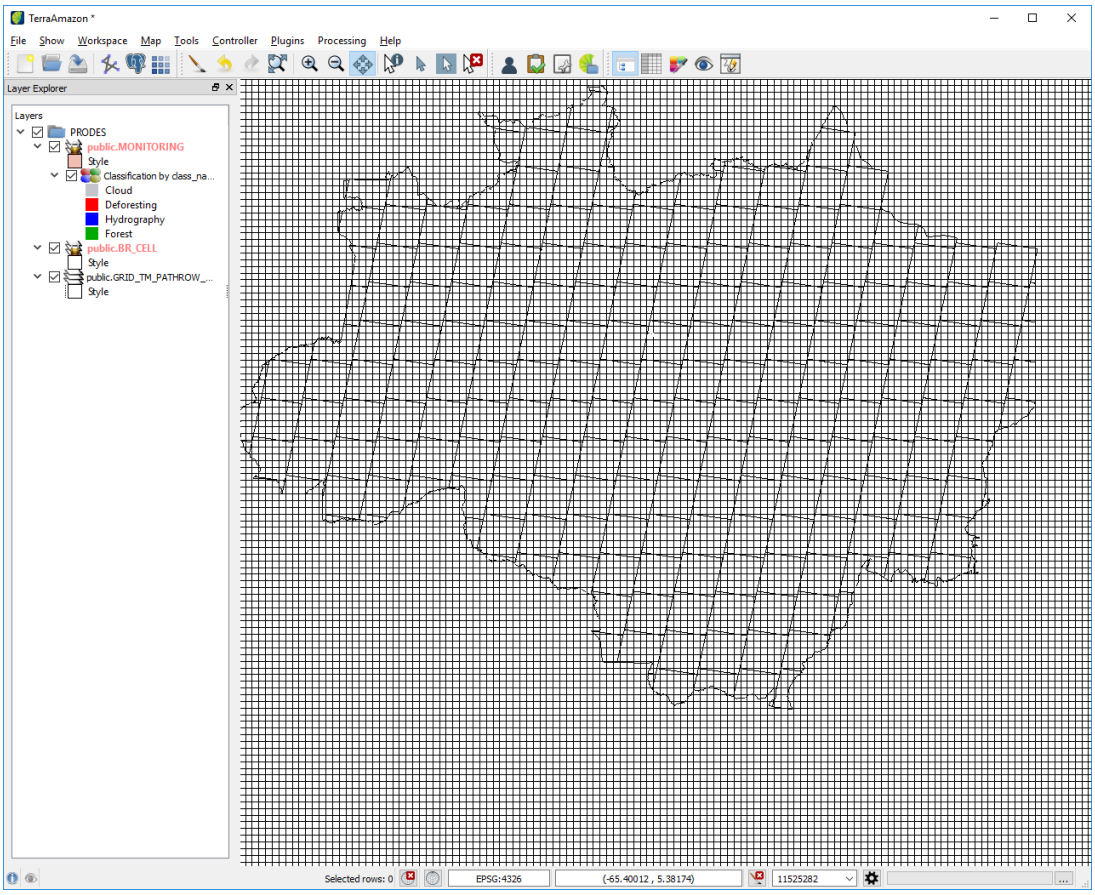


Figure 52: Create project folder result

4.1.3 Creating draft layer

A draft layer is used to edit or create polygons that will be candidates to be classified. In order to create one, you must right-click on:

Layer-Explorer -> Create Draft Layer

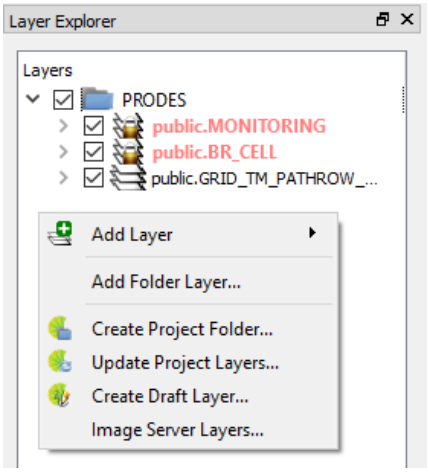


Figure 53: Draft Layer creation shortcut

A dialog will be shown, prompting you to select the directory where the layer will be created and to give it a name. For this tutorial, name it "prodesDraft" as shown in figure 54.

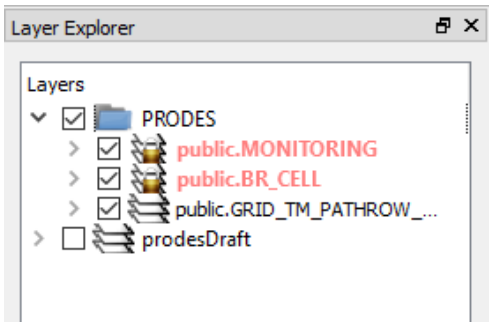


Figure 54: Draft layer successfully created

4.1.4 Inserting work data

The classification process involves interpreting data from an image and transforming it into vector data that can be analyzed, so you will need a background image to work on. In order to insert this image you must right-click on:

Layer-Explorer -> Add Layer -> Raster File

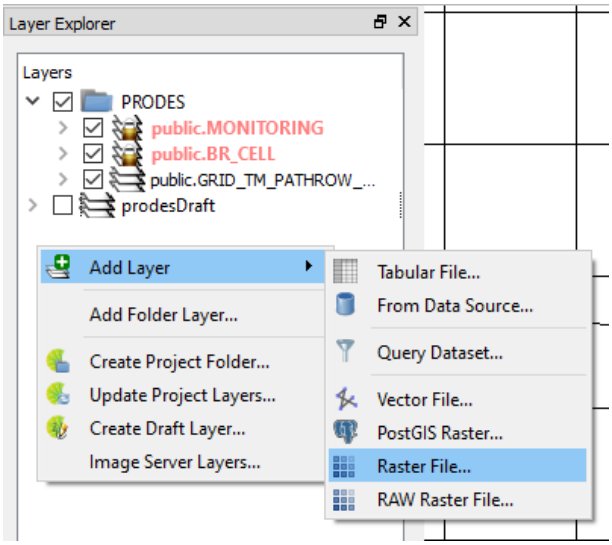


Figure 55: Add raster image access

A dialog will be shown, prompting you to select a file. In this tutorial we will use a raster called Landsat5TM_22963_23072008.tif, and the result is shown at figure 56.

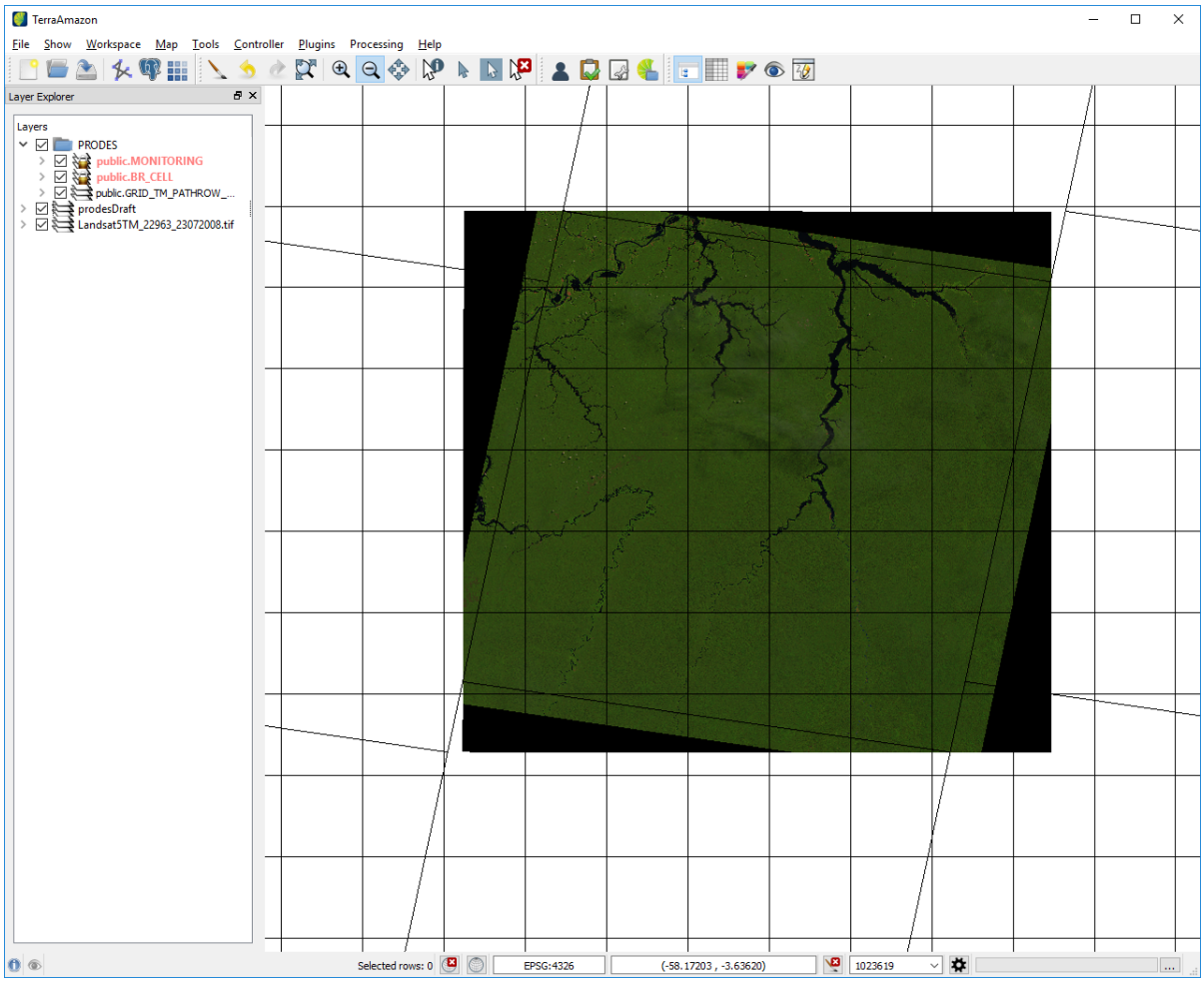


Figure 56: Add raster image result

4.2 Tasks

A *Task* identifies the area that a certain user will work in (Area of Interest) and the observation date that will be assigned to the created polygons. Usually, the area of interest is based on a certain satellite grid and the observation date refers to the date in which the image was taken.

Each user must add their own task to their own list. It is possible to have more than one user working on the same area of interest and observation date, but each one will have their own task. To add a task, go to the menu:

Controller -> Process Control

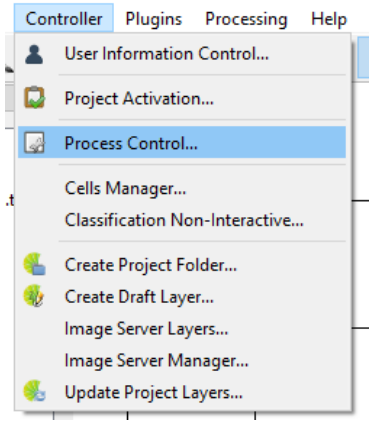


Figure 57: Accessing Process Control

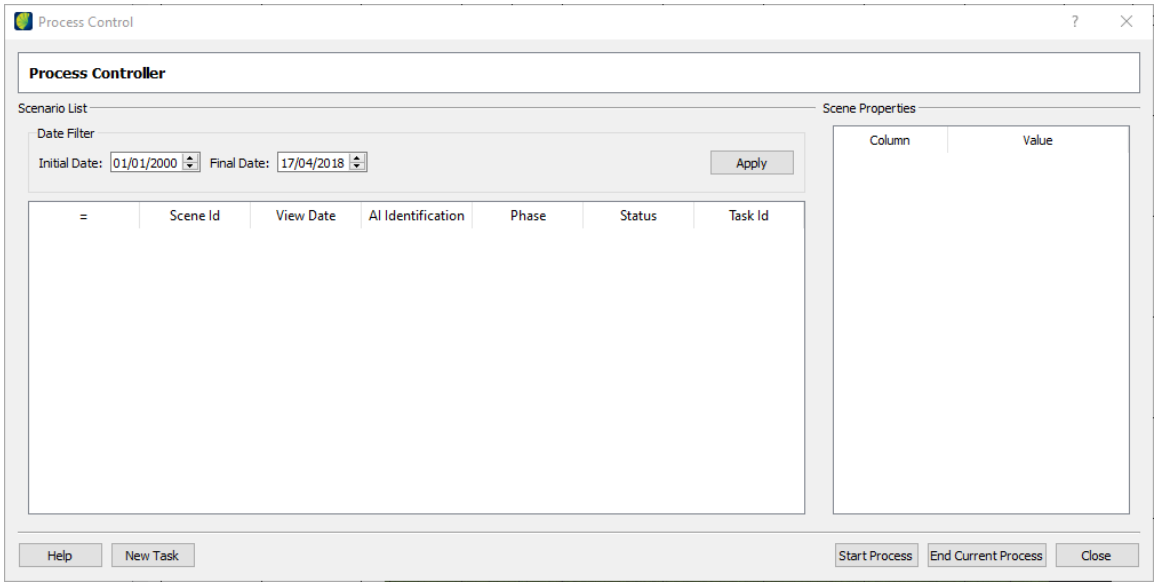


Figure 58: Process Control Screen

Initially, the list of tasks is empty and will remain empty until a task is added. The area at the left of the interface shows the task list, which will grow as tasks are added during the project. The area at the right shows the columns of the layer that contain the geographic boundaries of the area of interest selected to work in.

4.2.1 Creating new task

To add tasks just click on *New Task* button, shown in figure 58.

The composition of a date associated to an area of interest is called *Scene*. Click on a scene in the list at the left, see the area at the right of the interface to check the area of interest and select the correct *Phase* as shown on figure 59.

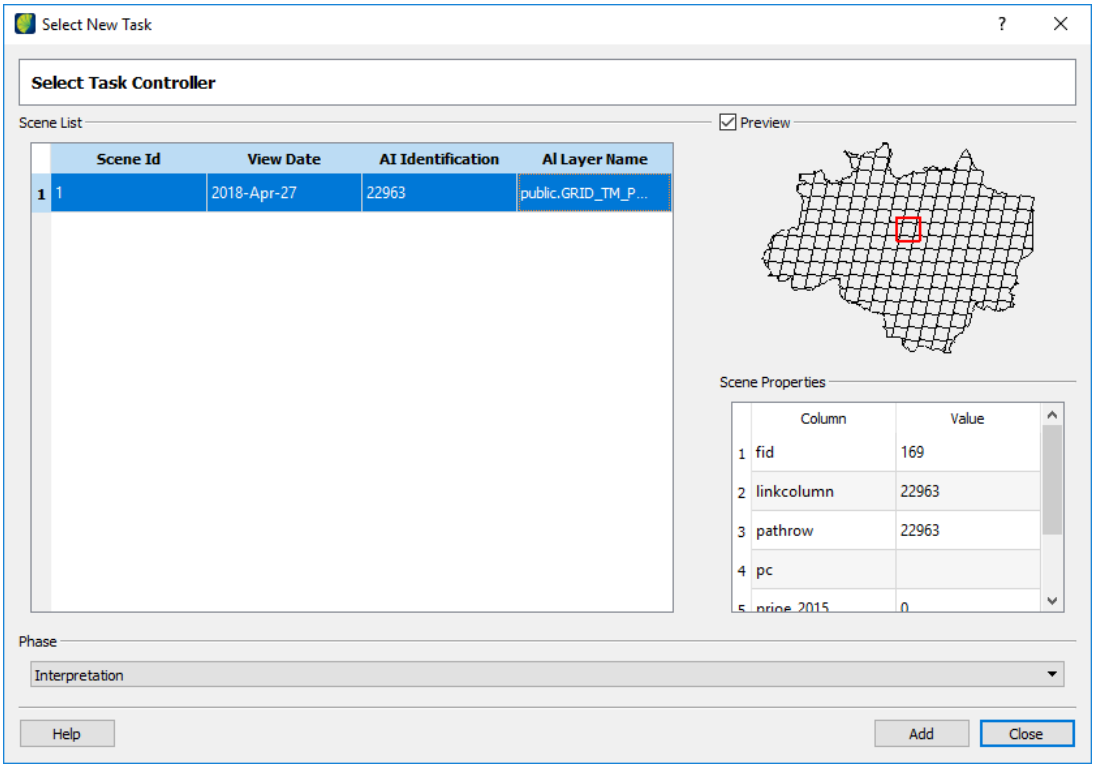


Figure 59: Creating a new interpretation task based on the selected scene

To add the task just click on the *Add* button. Tasks can be added only once, after that, it cannot be removed by any other user, including administrators. It becomes part of the log for the activities executed along the project. After adding the task, close the interface and the new task will be displayed in the **Process Control** interface, as shown in figure 60.

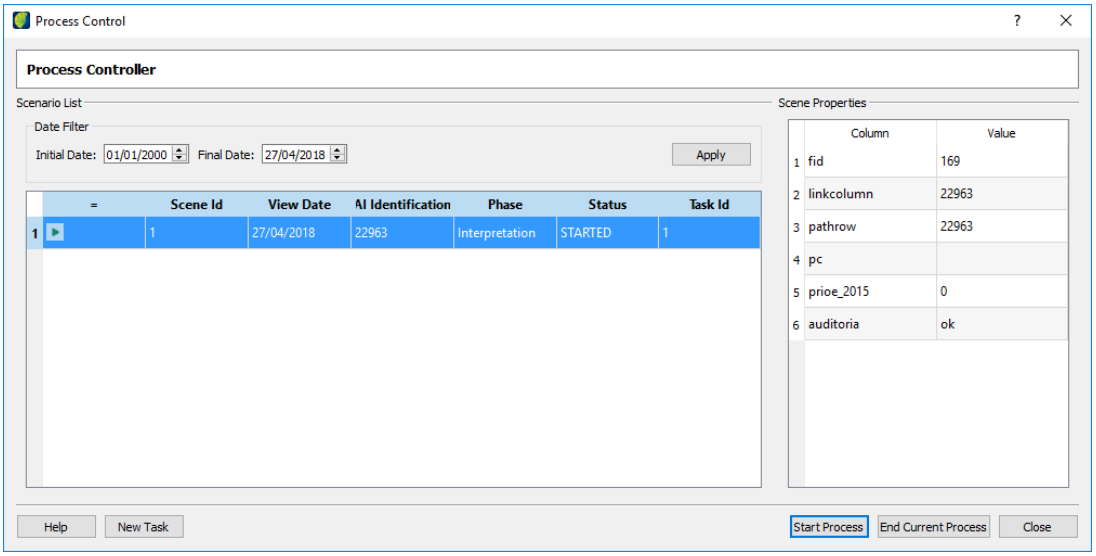


Figure 60: Processes list

4.2.2 Controlling tasks

A process represents the development of a task in time along with a project. Before opening the edition mode, the user must add the task related to the work that must be done, as shown in section 4.2.1, and then start its process.

In the task list, locate the task to work on, click on it and use the area at the right of the interface to check if the selected task is the correct one. Select the task and click on *Start Process* button.

Closing a process is a procedure needed to:

- Inform the system that the task has been finished;
- Release the user's locked cells making them available for other users;
- Signal that the current phase is finished and that the cell is ready for the next phase;
  - e.g. Close an *Interpretation* task to signal that an *Audit* task can be opened;
- Stop the clock of the task's time control;

Closed processes can be reopened at any time by proceeding the same way as to start it. A process should be closed every time the user stops working on the task. However, there are different status that can be attributed to a task when closing processes.

Select the task on the task list and click on the *End Current Process* button, that will show the represented screen in figure 61.

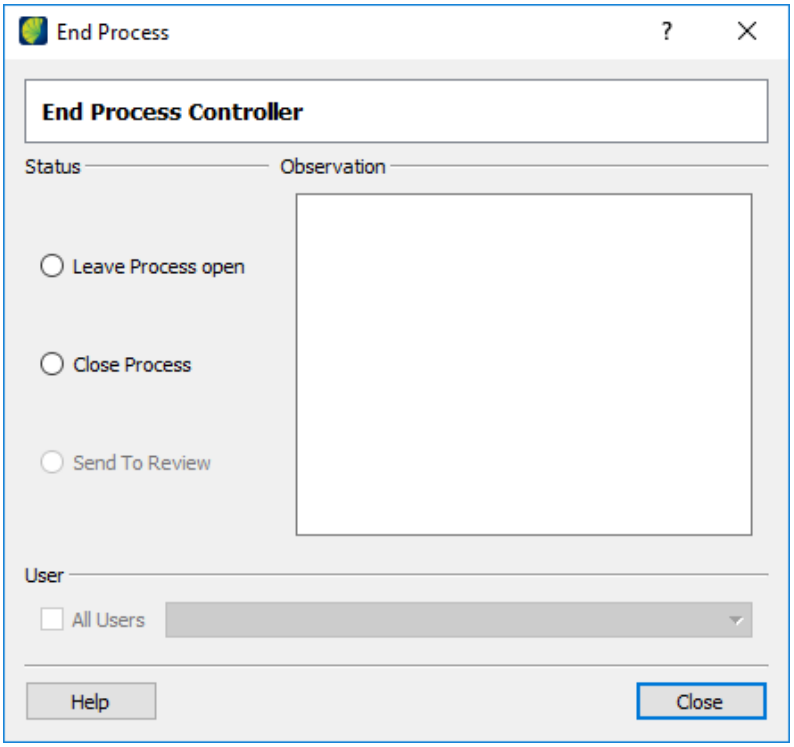


Figure 61: Project summary

The user should choose between one of the available options: "Leave Process Open" or "Close Process". To leave the project open, select the option **Leave Process Open** or you must close TerraAmazon while your process is started. When leave a process opened the cells locked by the user are not released and other users will not be able to select them for edition. Administrator users can unlock these cell at any time, if necessary. To just close the process select the option **Close Process**.

The icons present at the processes list show the status of the process. See their meanings below:

Task Status	
Icon	Description
	New processes
	Started processes
	Processes left open
	Closed processes

For now, it will not be necessary to do anything other than starting the task you just created to proceed to the next phase.

4.3 How to start editing and classifying data

4.3.1 Activating edition mode

Now that the work environment has been set, you can enter edition mode to begin the classification mode. This can be done by clicking the  button in the toolbar. Once edition mode is activated you will see that the draft layer is highlighted in blue, as shown in figure 62.

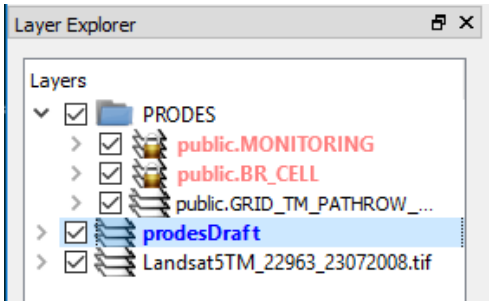


Figure 62: Draft layer highlighted in edition mode

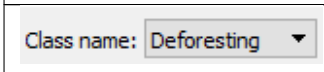
Additionally, a new toolbar is shown, which includes the tools that enable the edition and classification operations. The toolbar is presented in figure 63. These tools will be explained in greater detail in section 4.3.2.

Figure 63: Edition Tool Bar

4.3.2 Edition Tools

Edition Tools	
Icon	Description
	**Save**. Saves the changes made in existing polygons using any other edition tool. (shortcut [S])
	**Cancel** editions. This tool does not alter polygons already finished or classified. (shortcut [Shift+Esc])
	**Select** geometries in a draft layer or in an output layer. (shortcut [D])

	**Select cells**. Cells that have been previously selected by an user (locked cells) cannot be selected by anybody else working on any of the projects from that database. It is only possible to select cells that are completely or partly within the Area of Interest. (shortcut [Y])
	**Select cells in selection area**. The number of cells that can be selected using this tool will depend on the project's configuration. It is only possible to select cells that are completely or partly within the Area of Interest defined by the started process. (shortcut [T])
	**Unselect** all cells. Unlocks any cell you have selected for the project you are currently working on. (shortcut [U])
	**Create polygons**. Every polygon created is automatically selected when finished. Visualization tools can be used while creating polygons without releasing this tool. (shortcut [A])
	**Rotate** a geometry. (shortcut [K])
	**Move** geometries. (shortcut [M])
	**Move geometries by coordinates**. Allows you to move a geometry to a specific combination of X and Y coordinates you provide. (shortcut [J])
	**Vertex Tool**. Inserts, moves and deletes vertexes of a geometry. Available for lines and polygons. (shortcut [V])
	**Aggregate** Geometry. Adds a new area to the polygon. The new area must intercept the selected polygon. It is necessary to save the change using the **Save** tool. (shortcut [G])

	**Subtract** Geometry Area. Removes a determined area from the polygon. The drawn area must intercept the selected polygon. It is necessary to save the change using the **Save** tool. (shortcut [B])
	**Merge** Geometries. Attaches two or more polygons keeping the attribute of one of them. It is necessary to save the change using the **Save** tool. (shortcut [N])
	**Split** Polygon. Cuts a polygon in multiple smaller polygons, keeping the same attributes but with different ids.(shortcut [P])
	**Magic Wand**. Automatically creates polygons that can be classified based on a background image. (shortcut [I])
	**Draw Minimum Area** Rectangle. Shows a rectangle that represents the minimum area that can be classified. (shortcut [E])
	**Delete** geometries. Deletes geometries from the draft, note that deletion is permanent. (shortcut [Del])
	Class box. Shows the classes available for the active project. Select the desired class in this box and then use one of the classification tools to attribute it to the outcoming polygons of the classification process.
	**Classify** geometries. (shortcut [C])
	**Reclassify**. Changes the classification applied to previously classified polygons. (shortcut [R])
	**Clear classification**. Removes the areas of the output polygons that are overlapped by the input polygons. Affects only the polygons in the output layers. (shortcut [X])
	**Clear Class Classification**. Removes the class classification of the output polygons that are overlapped by the input polygons. (shortcut [L])

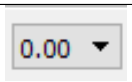
	**Select** multi-layer and Select multi output layer. Selects geometries from the output layers that are visible in the drawing area. (shortcut [H])
	**Snap tool**. Attracts the cursor to vertexes and edges of existing polygons.
	Digitalization step in millimeters.
	**Audit Polygon**. Analysis of a geometry contained in a cell. (shortcut [F])

Table 1: Edition Tools Description

4.3.3 Selecting Cells

After activating edition mode, as shown in section 4.3.1 you must select the cells to be worked on. Doing so will "lock" the cell, so that no other user can concurrently edit the same area. With the  tool activated, click on a few cells. An example of the result is shown at figure 64.

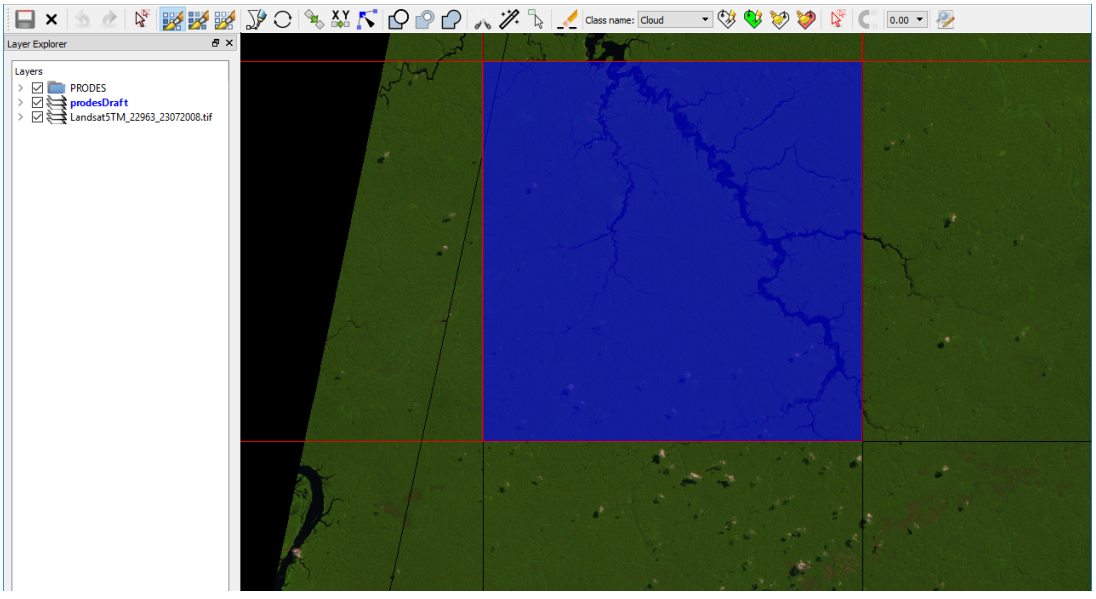


Figure 64: Selecting cells

The cells displayed with a red contour are locked by other users, and you can not work on them. Upon selecting a cell, it is displayed with a blue highlight to indicate the one you have chosen. Once you have finished, click on the  to begin the edition process,

the cells you have locked will be displayed in a green contour, as shown in figure 65. You are now ready to draw and edit polygons to be classified.

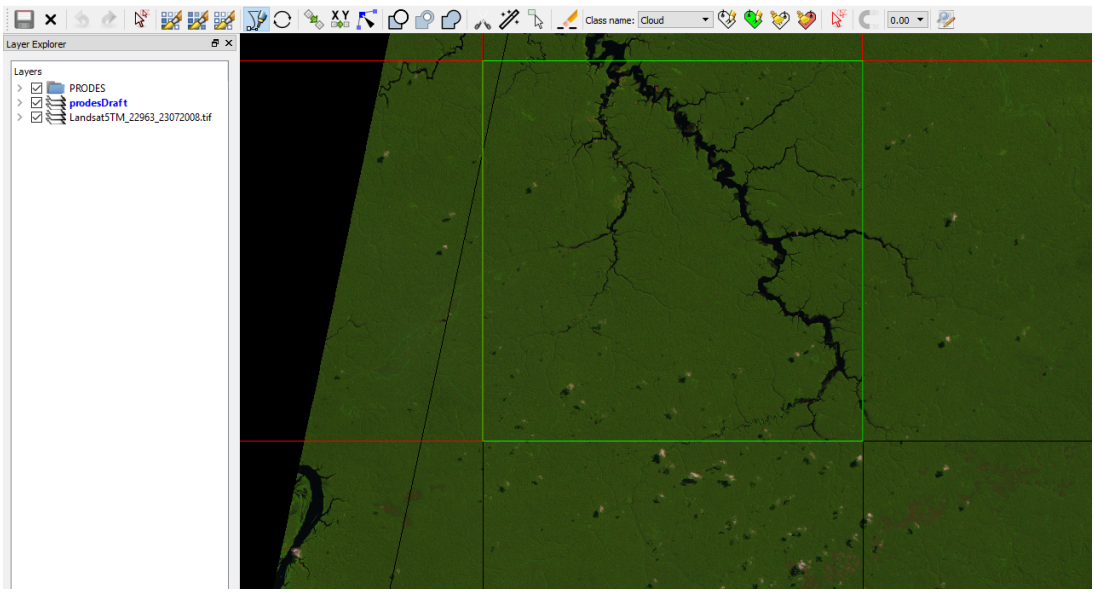


Figure 65: Cell locked by the current user

4.3.4 Drawing draft polygons

With at least one cell enabled, as shown in section 4.3.3, insert lines and create polygons. To do that, click on the  to enable the polygon creation mode. While this tool is active, each click will create a point that correspond to a new vertex in the polygon. During the polygon creation process, the unfinished polygon will look like figure 66.

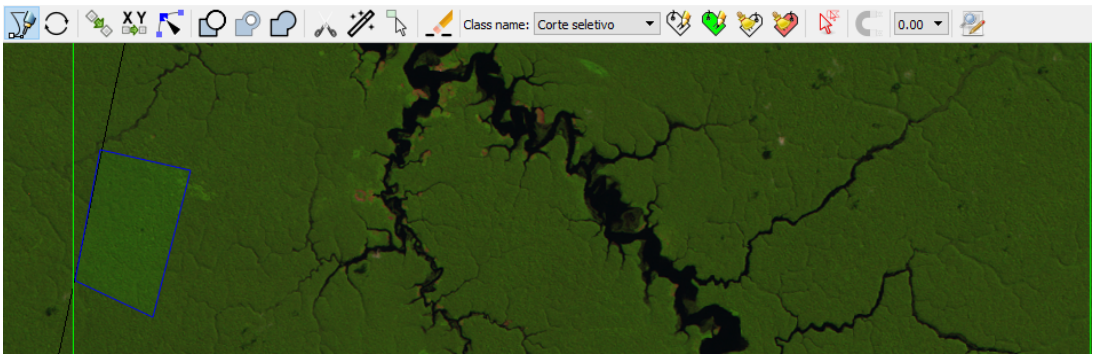


Figure 66: A polygon being created

Once you are done, click with the right button of the mouse to close the polygon, this will create the polygon in the draft layer. The result should look like figure 67.

Alternatively, it is possible to create more complex polygons clicking and holding the left mouse button. Closing the polygon is also done by releasing the left mouse button

Figure 67: A new polygon has been created in the draft layer

and then clicking with the right mouse button. This gives you the option to create polygons like the one shown in figure 68.

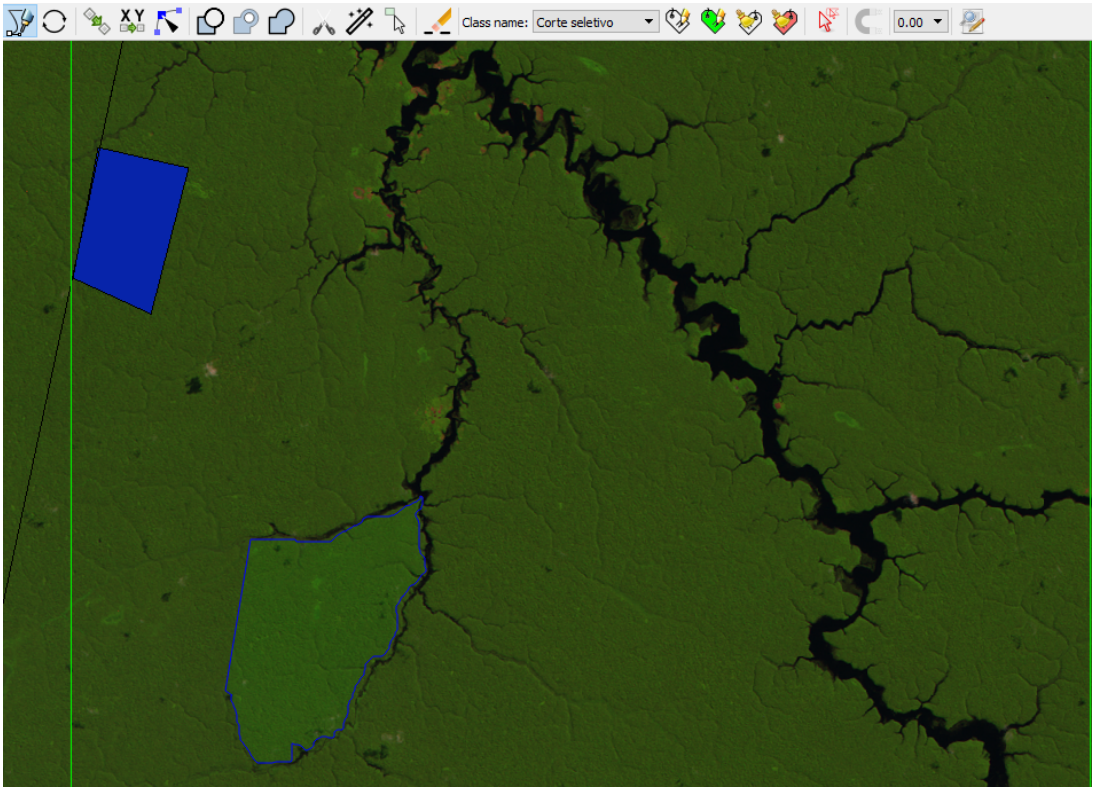


Figure 68: A more complex polygon being drawn

Once a polygon has been finished, it is ready to be classified.

4.3.5 Editing draft polygons

Once a polygon has been drawn and saved to the draft layer, it can still be edited. Some examples of these operations are:

4.3.5.1 Selecting polygons

In order to edit or classify any polygons, you must first select them using the tool. The first type of selection is by clicking on a polygon, the result is shown at figure 69.

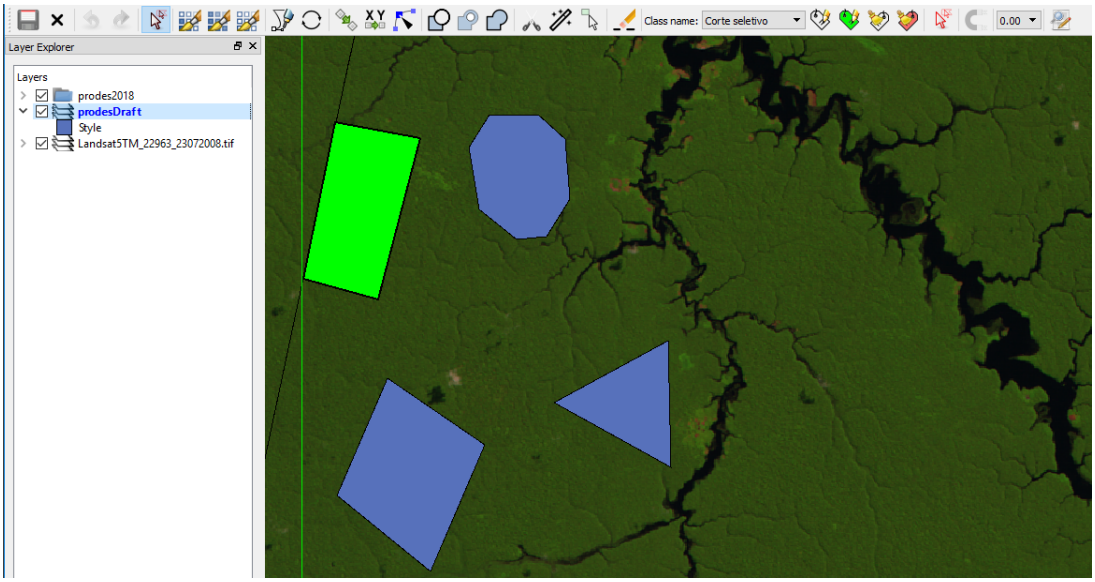


Figure 69: A single polygon has been selected by clicking on it

Notice that the selected polygon is highlighted with a different color than the style of the draft layer. You can also select more than one polygon by drawing a selection area, like shown in figure 70, and any polygon that overlaps that area will be selected, like shown in figure 71.

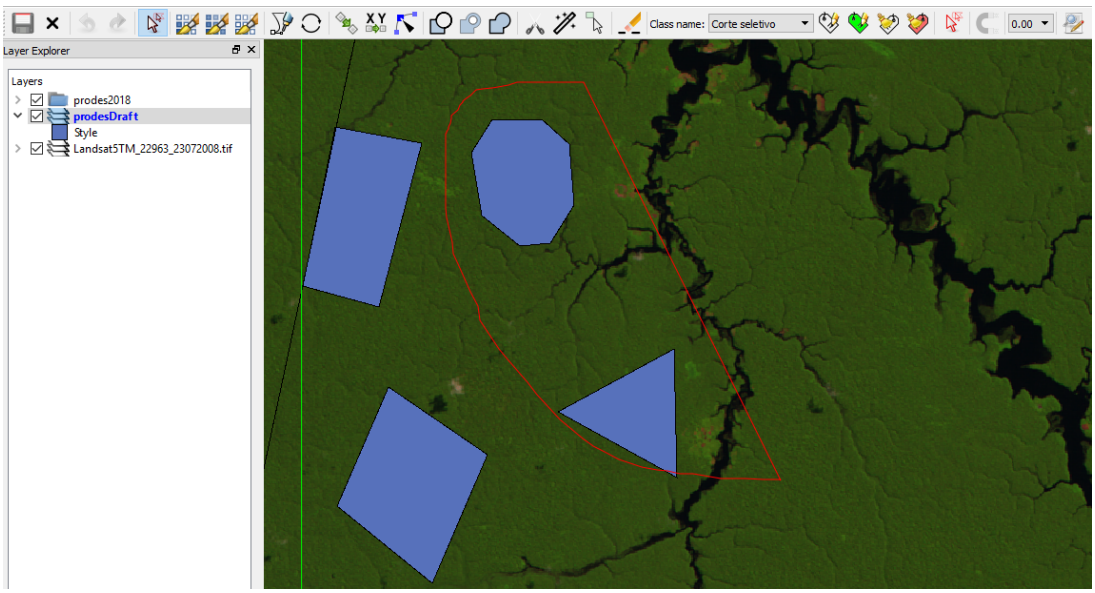


Figure 70: A selection area being drawn over two polygons

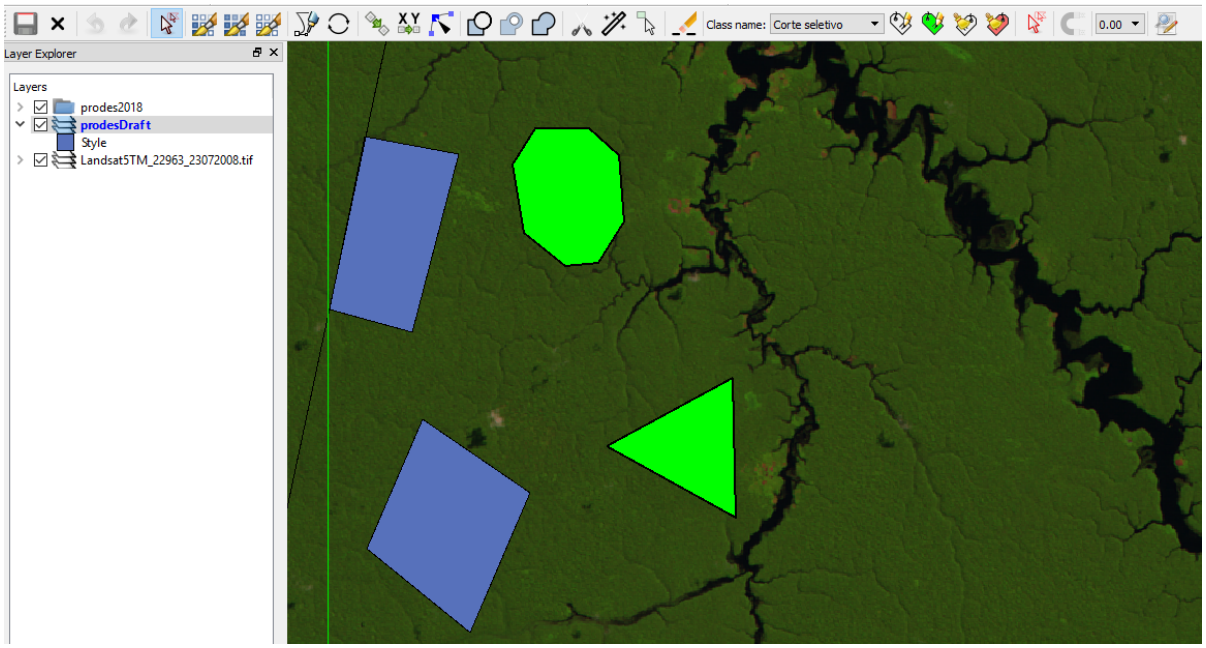


Figure 71: Multiple polygons being selected at the same time

4.3.5.2 Editing vertexes

Start by selecting the polygon you wish to edit, click the  tool and you will see the vertexes available to be edited as shown in figure 72.

Figure 72: The vertexes of a polygon being highlighted for edition

You can double click over a line in the polygon to add a new vertex, once a new vertex is added you can edit it. Figure 73 shows an example of a new vertex being moved.

Figure 73: Preview of the result of a vertex being moved

Once you are finished, click the  and the edited polygon will be saved in the draft layer, as shown in figure 74.

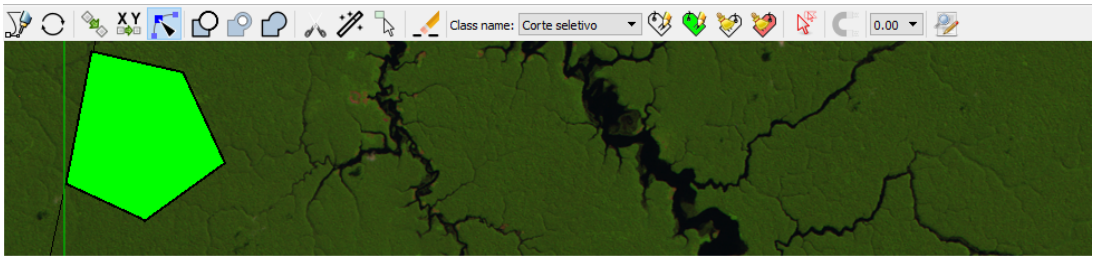


Figure 74: Polygon with a new vertex being saved in the draft layer

4.3.5.3 Merging polygons

To start, select at least two geometries key, as shown in figure 75.

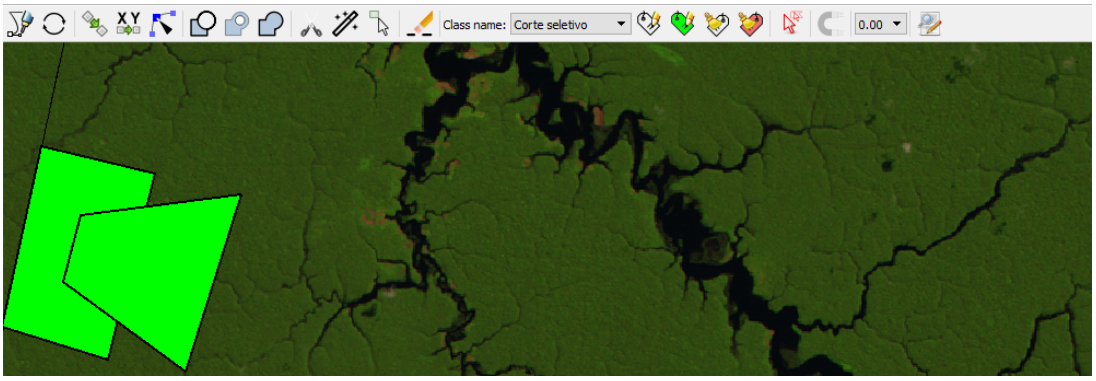


Figure 75: Two geometries selected and ready to be merged

With the polygons selected, click the  tool and a dialog window will pop-up, it will list the ids of the selected polygons and prompt you to choose which one to preserve.

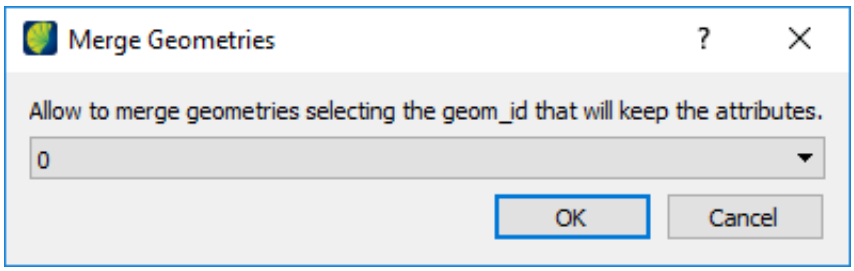


Figure 76: Select the id of the new polygon

Once you have chosen an id and clicked the *OK* button you will see a preview of the new polygon. Click the  tool and the edited polygon will be saved in the draft layer, as shown in figure 77.

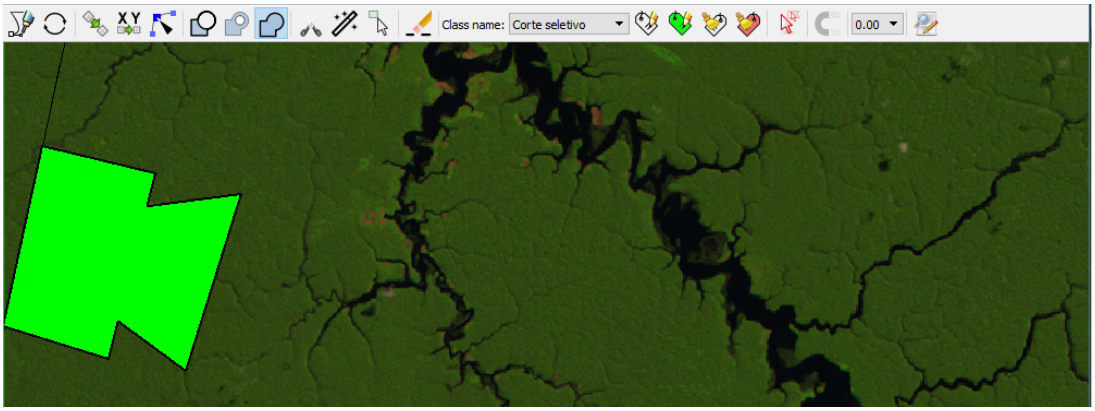


Figure 77: The merged polygon

4.3.5.4 Aggregating polygons

Start by clicking the tool, it will enter a mode where you can draw a new polygon that will be aggregated to the selected polygon (or polygons). The two polygons must overlap, or at least touch. The result will look like figure 78.

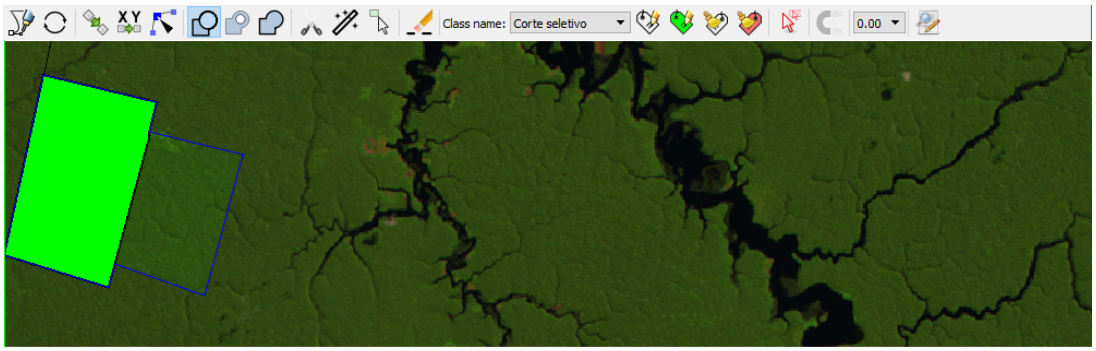


Figure 78: The aggregation preview

Click the tool and the new polygon will be saved in the draft layer, as shown in figure 79.

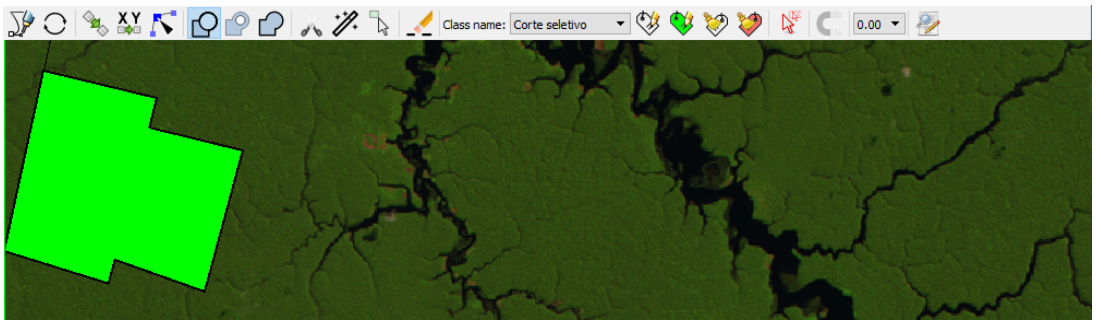


Figure 79: The aggregation result

4.3.5.5 Subtracting polygons

Start by clicking the tool, it will enter a mode where you can draw a new polygon that will be subtracted from the selected polygons. If the polygons do not overlap, so changes will be made to the selected polygon in the draft layer. A preview of the area to be subtracted is shown at figure 80.

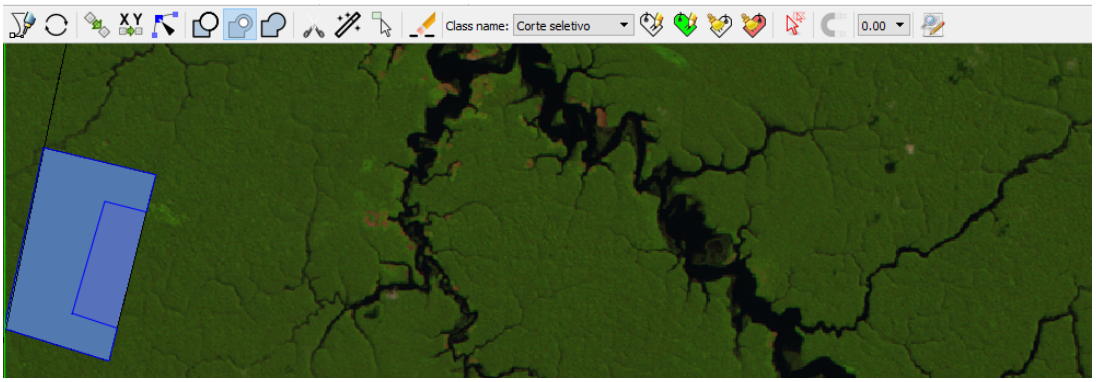


Figure 80: The aggregation preview

Click the tool and the new polygon will be saved, as shown in figure 81.

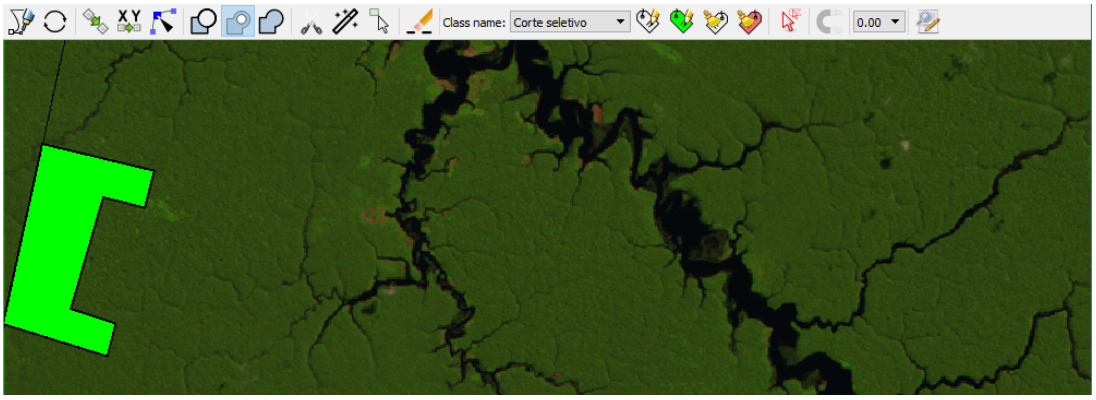


Figure 81: The aggregation result

4.3.5.6 Moving polygons

Start by clicking the tool, and then click and hold the mouse button on the polygon (or polygons) you wish to move. Then, drag the mouse to move the polygon to the position you wish. A preview of the result is displayed, like shown in figure 82.

Click the tool and the new position of the polygon will be saved in the draft layer, as shown in figure 83.

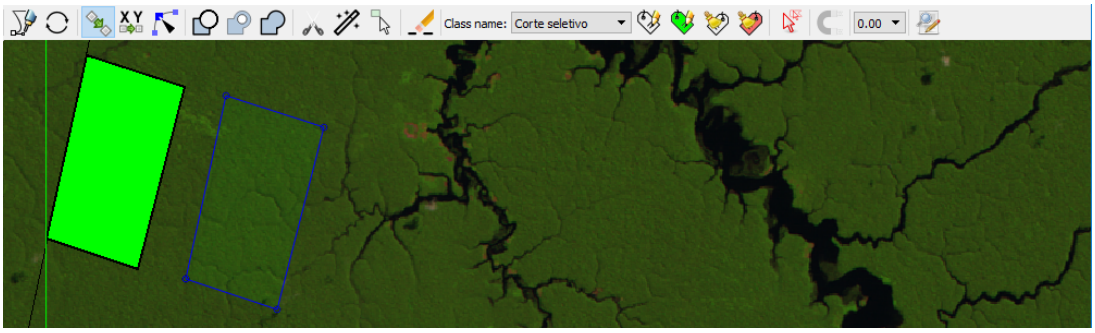


Figure 82: Moving polygon preview

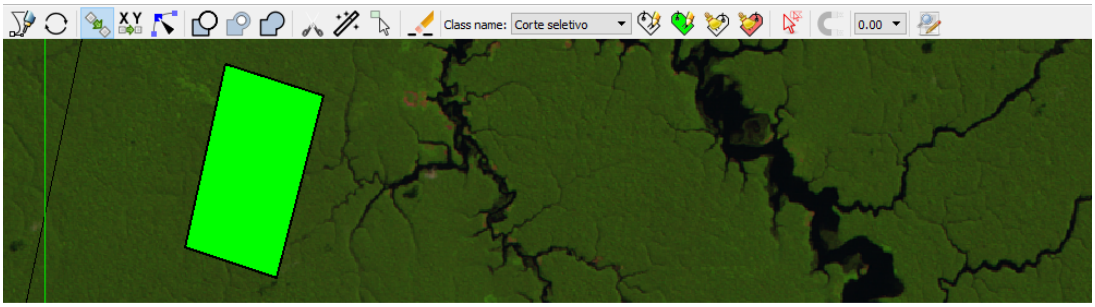


Figure 83: The new position of the polygon

4.3.5.7 Splitting polygons

Start by clicking the tool, and then draw a line that represent the area where you wish to cut polygons at, click the right mouse button once you are finished and you will see a preview of the result like in figure 84.

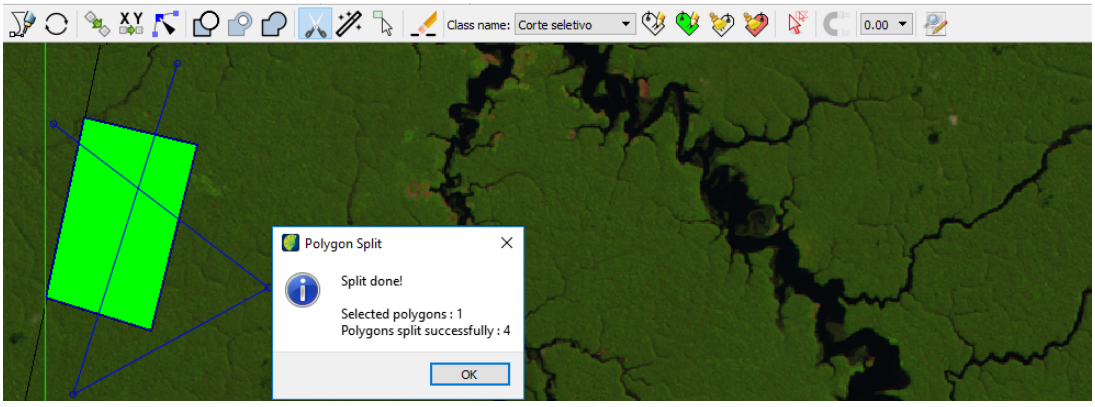


Figure 84: Split polygon preview

This operation generates two (or more) polygons with unique identifications but that share the same attributes of the original. Click the tool and the new polygons are saved in the draft layer, as shown in figure 85.

Figure 85: The new polygons

4.3.5.8 Snap tool

This tool must be used in conjunction with other edition tools, since it's purpose is only to assist you to locate vertexes. An example is shown at figure 86, in this example the  and the  tools are being used together to create a polygon with one vertex being identical to the one that will be merged (the arrow indicates which vertex has been snapped).

Figure 86: The vertexes of two polygons are snapped together

4.3.6 Classifying polygons

After performing the operations described in section 4.3.1, you are ready to begin classifying vector data. For this tutorial, create a few polygons in any shape or form you wish, an example is shown in figure 87.

Note the polygons are only in the draft, so their style match the draft layer style. Moreover, the output layer style has a legend, with each entry corresponding to one of the output classes created in section 3.2.5, once a layer is classified, the style will match the style of this legend. To classify a polygon, select it following the instructions in section 4.3.5.1 and they will be highlighted in green, like shown in figure 88.

With the polygons selected click on the class list and choose the **Forest** class, now you click the  tool and the polygons will be classified as that class, the example shown in figure 89 demonstrates the expected result.

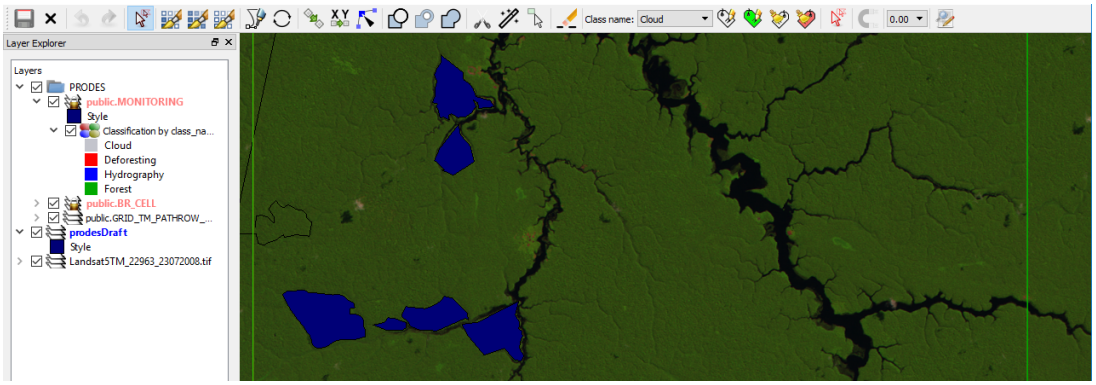


Figure 87: A few polygons created in the draft layer

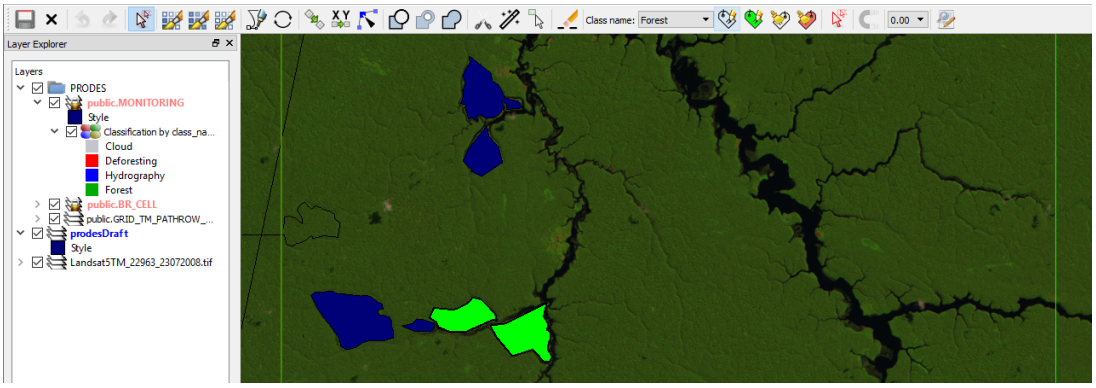


Figure 88: Two polygons are selected and ready to be classified

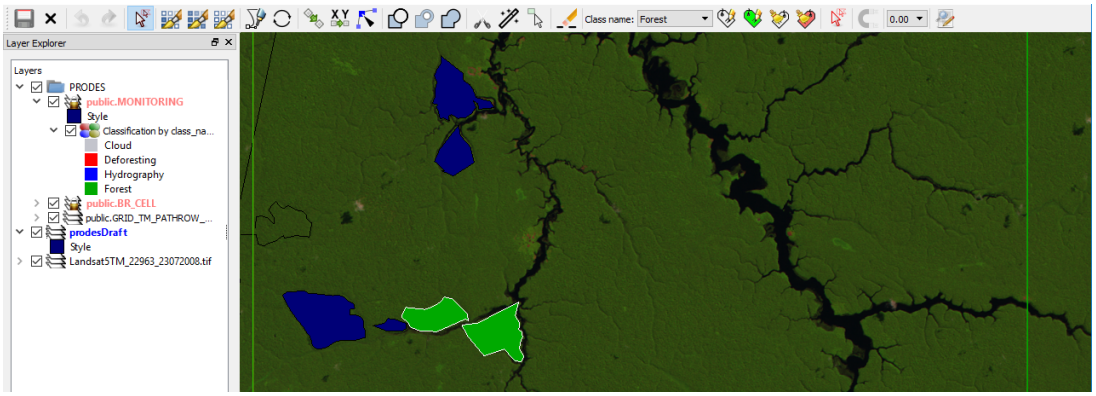


Figure 89: Two polygons have been classified with the Forest class

This is the basic process of how polygons can be classified. repeat the process for the polygons that are still unclassified. The example shown in figure 90 has two **Forest** polygons, two **Deforesting** polygons, one **Cloud** polygon and one **Hydrography** polygon.

In some cases, a polygon may require a classification change. In order to do that, select the polygons you wish to reclassify with the tool. You can select polygons of any class for this operation, like shown in figure 91.

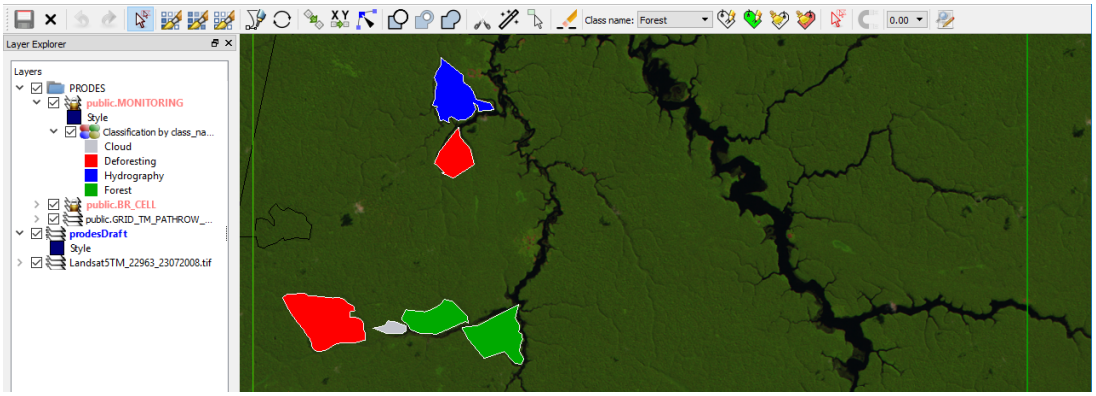


Figure 90: All polygons are classified

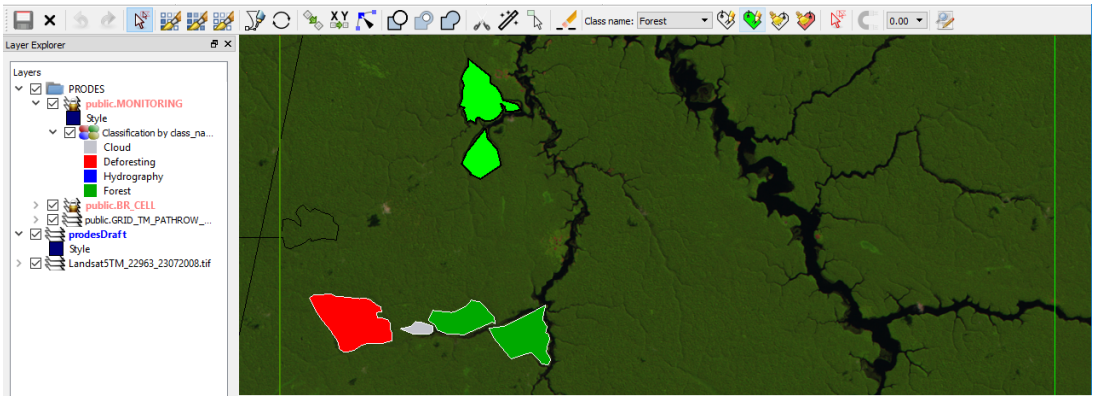


Figure 91: Hydrography and Deforesting polygons selected for reclassification

Once you have selected the polygons and you wish to reclassify, click on the tool and all the selected polygons will have their previous classifications cleaned and replaced with the new one. In the example shown in figure 92 both have been reclassified with the **Forest** class.

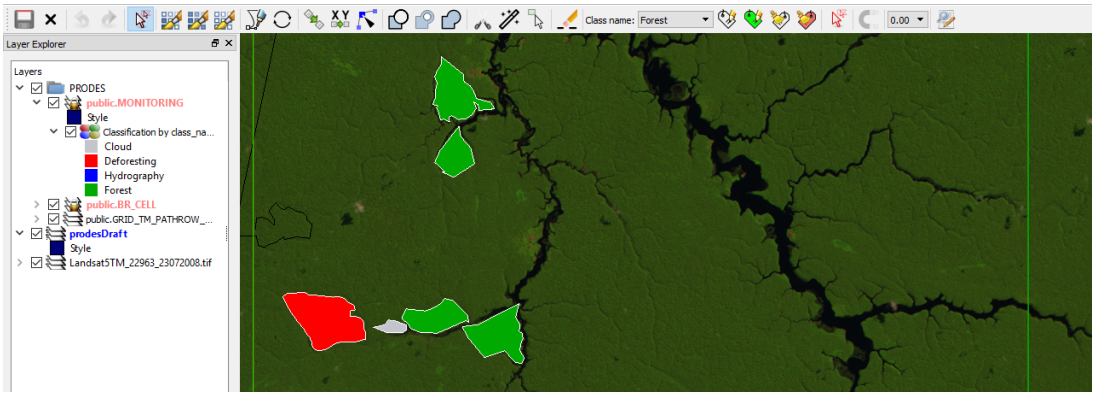


Figure 92: Two polygons have been reclassified

It is also possible to clear a polygon's class entirely by selecting it with the tool. In figure figure 93 a **Forest** and a **Deforesting** polygon have been selected for the

clearing operation.

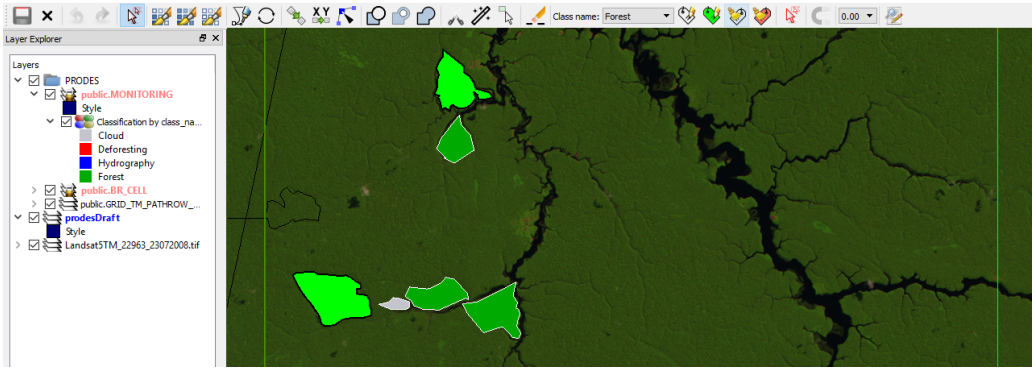


Figure 93: Forest and Deforesting polygons selected to have their classifications cleared

With the polygons selected, click on the  tool and both of them will be cleared. This removes them from the output layer, so their styles match the draft layer once again, as shown in figure 94.

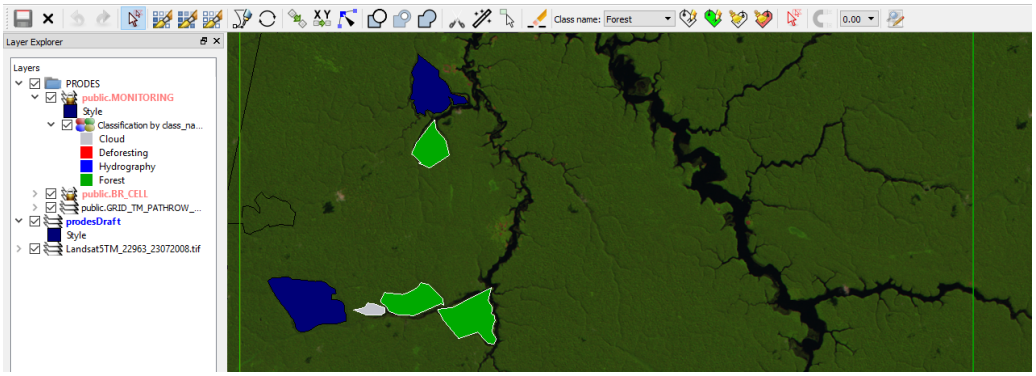


Figure 94: Two polygons have been cleared

There is another option to clear the classification, which only clears the classification of polygons of a specific class regardless of how many different classes are selected. In the example shown at figure 95 every polygon have been selected using the  tool.

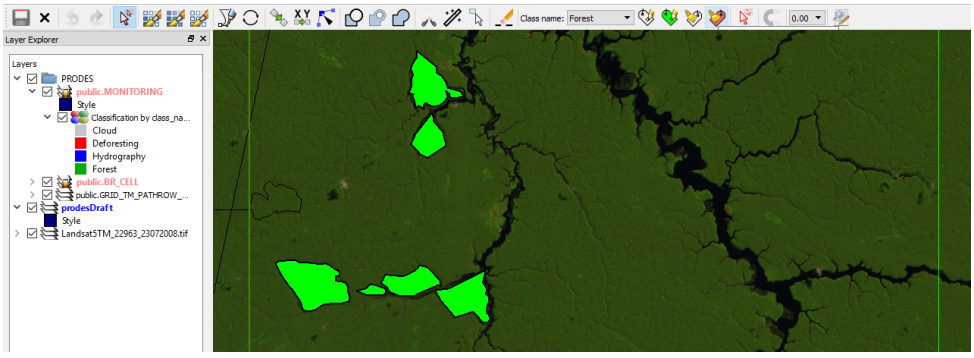


Figure 95: Every available polygon is selected to be cleared based on a class

With the polygons selected, you can choose which class you wish to clear and click the  tool to clear all polygons with the class you have selected at the class list. In the example shown at figure 96 the **Forest** was cleaned, leaving only a single **Cloud** polygon intact.

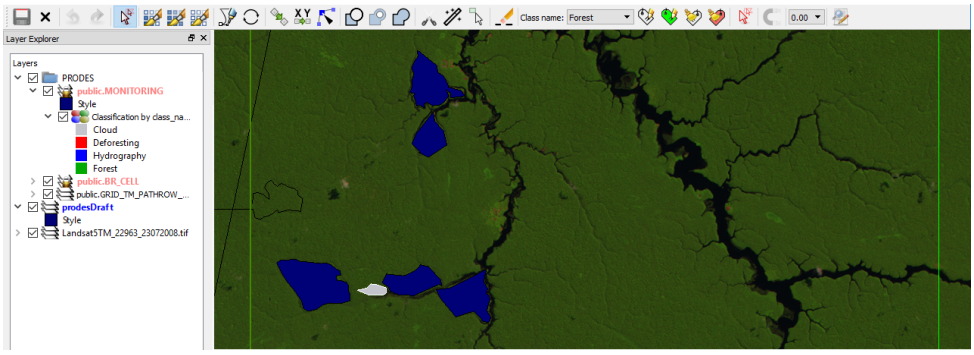


Figure 96: Every polygon with the Forest class was cleared

4.3.7 Assisted classification

The assisted classification is a function that can speed up the classification process of large similar areas. Before accessing it, you must first select a raster in the layer explorer, like shown in figure 97.

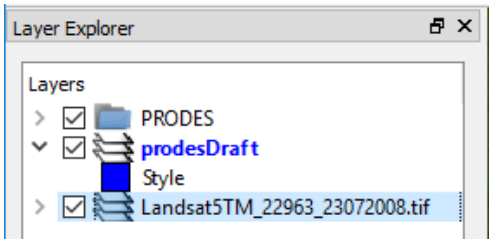


Figure 97: The raster that will serve as the base for the classification is selected

With the raster that will be used as a base for the assisted classification selected, click the  . With the tool activated, a new item is added to the edition toolbar that allows you to customize the pixel value tolerance, as shown in figure 98.

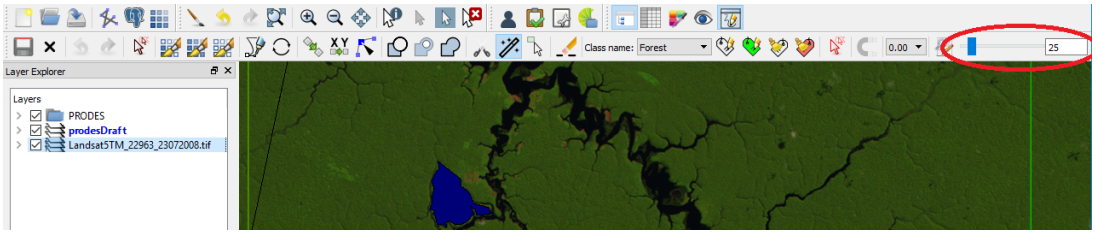


Figure 98: The slider used to adjust the tolerance for the assisted classification

For the purposes of this tutorial, you do not need to change the tolerance value. Now you can click on the area you wish to classify. Once you do, a preview of the result is shown, highlighting the area that will be classified as shown in figure 99.

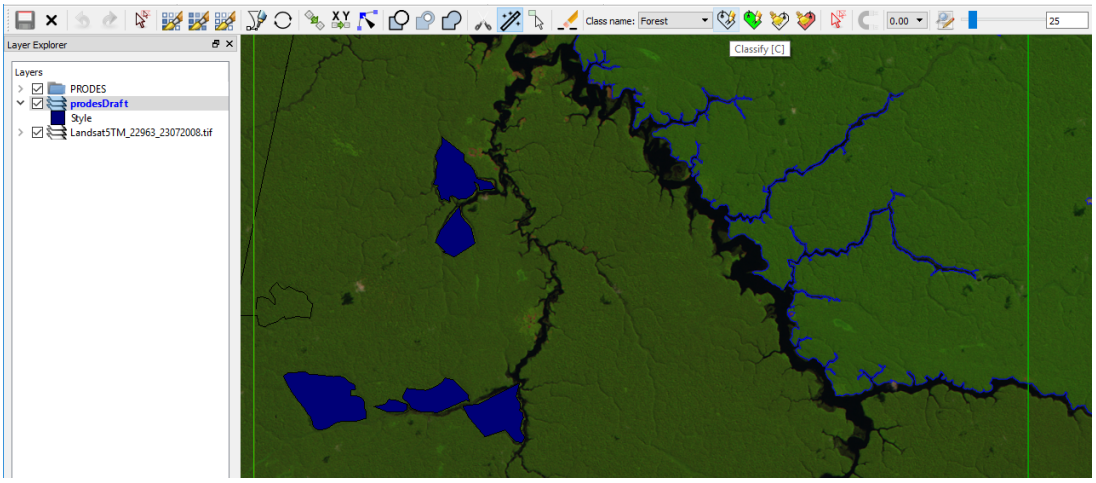


Figure 99: The preview of the polygon to be created by the assisted classification tool

The preview is actually the polygon that will be created. Now you can either save the polygon in the draft layer by clicking on the button (which would allow you to edit and refine the polygon) or classify it by clicking on the button. The result of the classification in this example should look like figure 100.

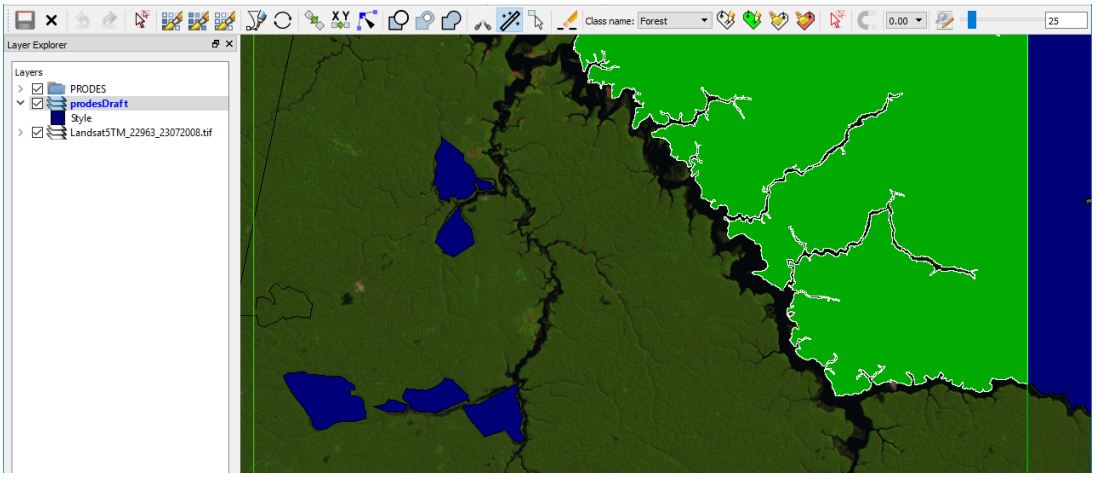


Figure 100: The result of the assisted classification

Notice that, since part of the polygon was outside the selected cell, that area was not classified. That is due to the fact that only polygons inside an activated cell can be classified.

5 Finalizing a project

Once all the classification work is done, there are some steps that can be taken before publishing the results. Moreover, sometimes the result of one project can be used as the starting point for another, such as when monitoring the progression of deforestation rates in any specific region over the years. This process must be done by an Administrator, since it requires special privileges in the database, refer to section 3.6 for how to log-in the system (note that for this section it will be necessary to log-in using the option).

5.1 Finalizing and exporting the output

In section 3.2.5, four classes were created: *Forest*, *Hydrography*, *Cloud* and *Deforesting*. Among those, *Forest*, *Hydrography* and *Deforesting* are classifications that can be transfered on to the next project, but *Clouds* should be disregarded since they prevented proper classifications of areas under them. So for this tutorial, the mask that will be generated should not contain any Cloud polygon. The basis for the mask is the classified polygon shown in figure 101.

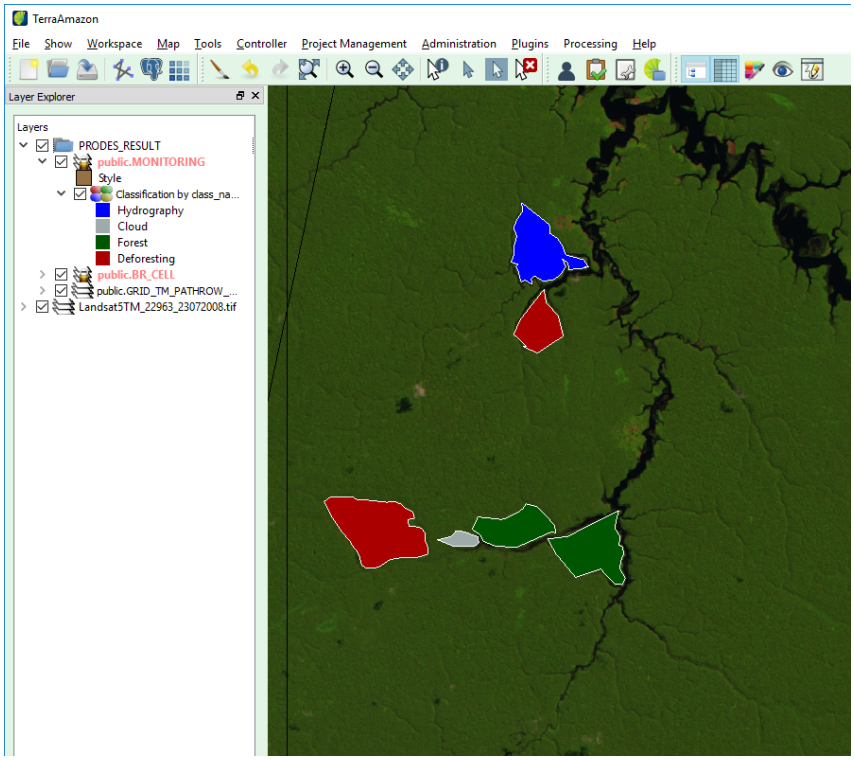


Figure 101: Example of an output layer with all the classified data

The first step is to create the layer that will contain all the relevant data for the next project, to do that, start by accessing, as shown in figure 102 the *Query Dataset* function through:

Add Layer -> Query Dataset

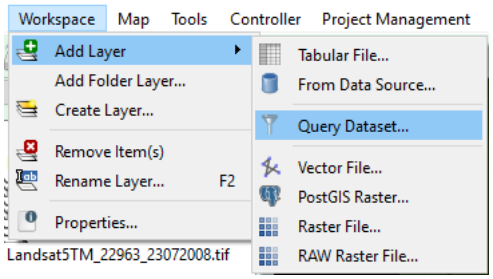


Figure 102: Accessing the query data set function

The screen that shows up, displayed in figure 103, allows you to choose the data you are going to query, choose the *PostGIS* option and you will see the server listed, choose that and click the *Next* button.

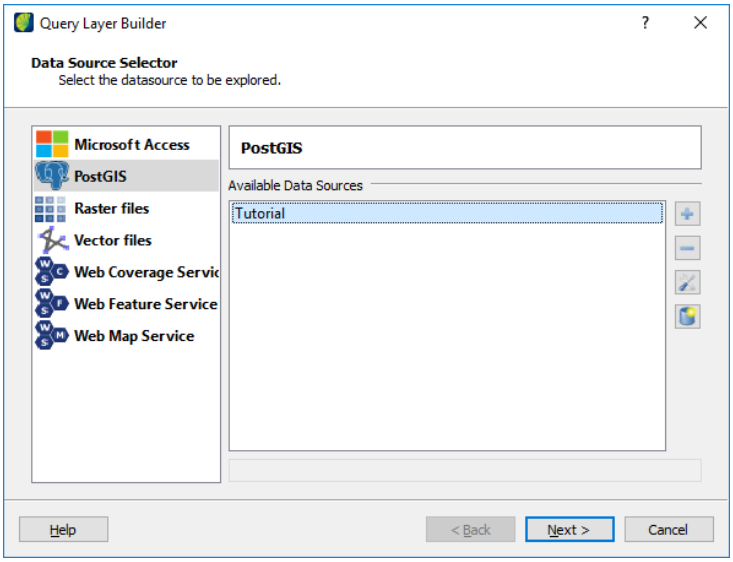


Figure 103: Choosing the data source to be filtered

This interface shown at figure 104 will show up, it allows you to choose which data set will be filtered. Choose the *public.monitoring* data set since this is the output layer defined in section 3.2.2 and click the , that will add it to the list. Click *Next*, this screen allows you to choose which attributes will be exported to the output layer that will be generated at the end of this process. For the purposes of this tutorial, all the attributes can be exported, so click the and the result will look like figure 105.

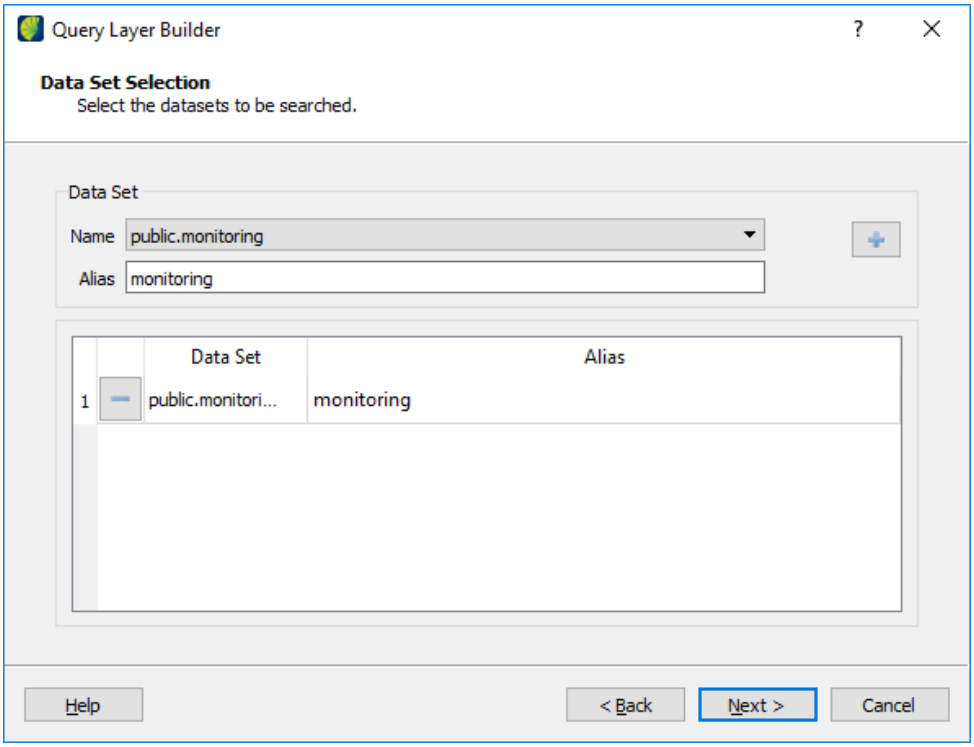


Figure 104: Choosing the data set that will be filtered

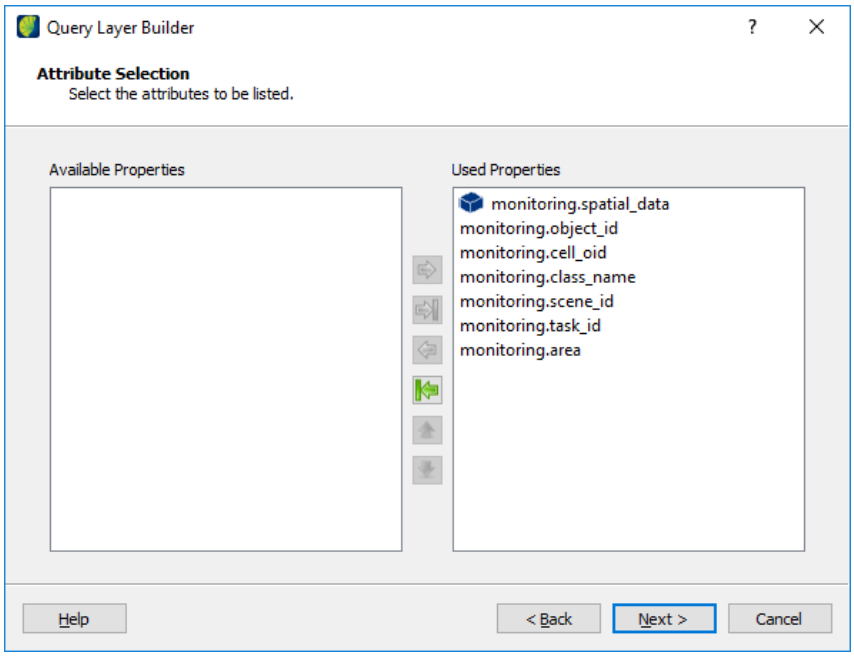


Figure 105: Choosing the properties that will be exported

Click *Next*, and the screen that allows you to build the query that will be used to filter the data shows up, fill the screen so that it looks like the example shown in figure 106. This restriction will filter out polygons with the *Cloud* classification.

The following two screens, the *Group by Definition* and *Order by Definition* screens,

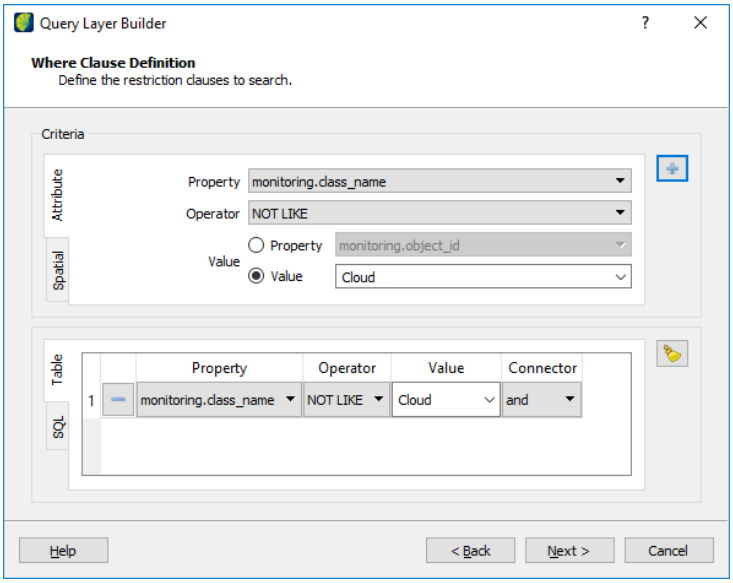


Figure 106: Building the query that will filter out the Cloud polygons

allow you to customize optional elements that are not required for the purposes of this tutorial, so keep clicking *Next* until the last screen, where you can set the name of the layer that will be generated. Type in **Mask** and click *Finish* to generate the layer. The result will look like figure 107.

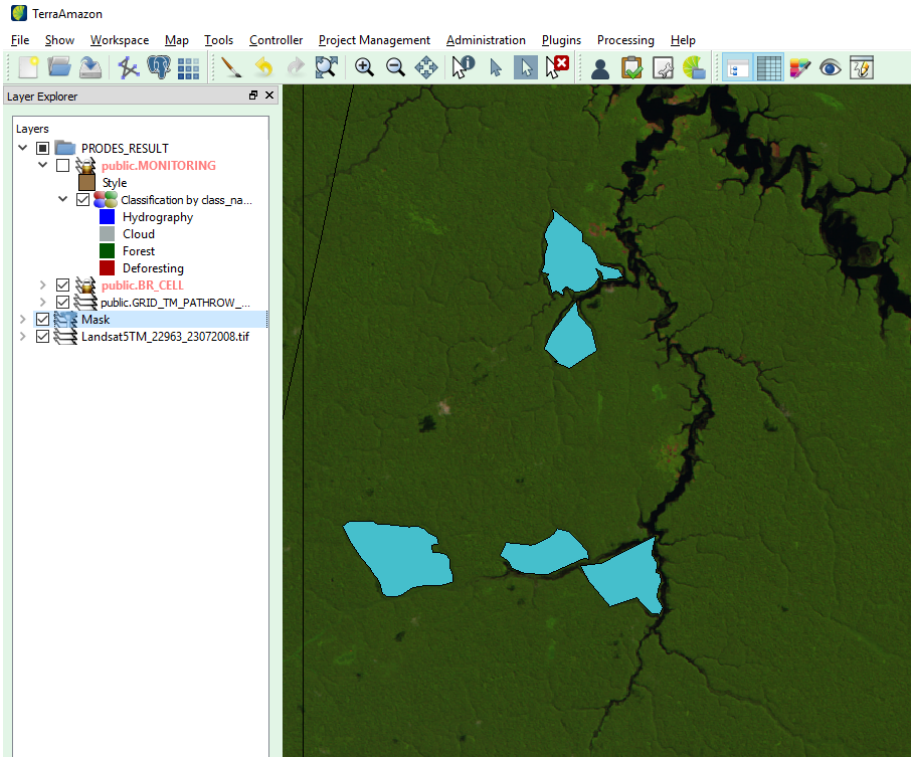


Figure 107: The mask has been generated without the *Cloud* polygon

The **Mask** layer that was created must be exported in order to save it. Right-click

on the **Mask** layer and select the *Exchange* function, as shown in figure 108.

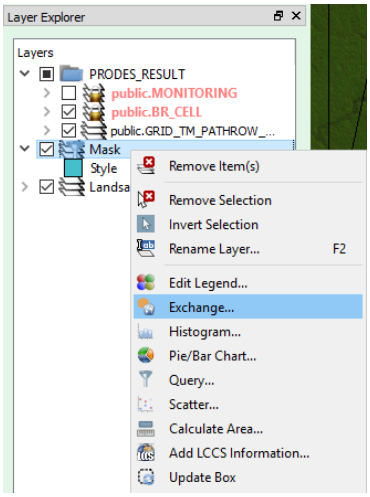


Figure 108: Accessing the data exchange function

Using this function, it is possible to export the data to a shapefile to be used freely later. Fill the screen like the example shown in figure 109, by selecting *Vector Files* in the *Output Data Source type* list, and then choose the location and name of the file in the *output Data Source* section. Once you are done, click *OK* and a new shapefile will be generated.

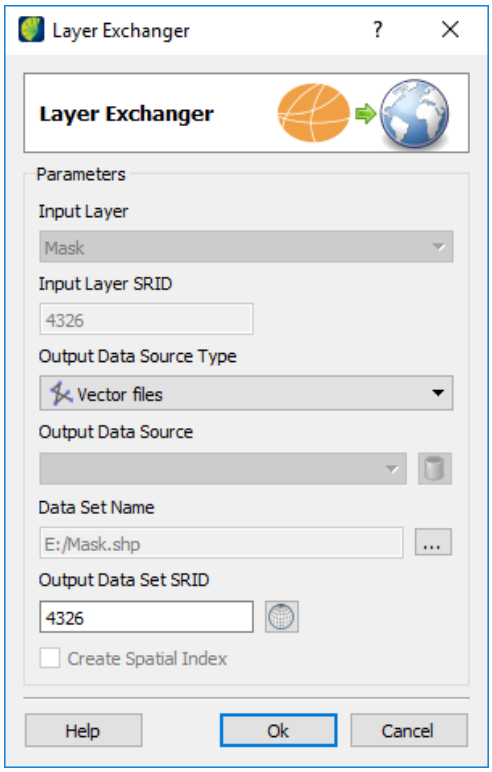


Figure 109: The information required to generate a new shapefile

5.2 Clearing output data

Once the processed data has been successfully exported, it is safe to clear the output layer so that it can be reused for the next project, preserving the topological rules associated with it. In the **Layer Explorer** click in the **Monitoring** layer to select it, then, the function used to clear the data can be accessed through:

Administration -> Delete objects from layer

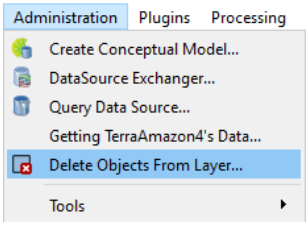


Figure 110: Accessing the data clearing function

The next screen is shown in figure 111, it enables you fine tune the data that will be deleted. For this tutorial all data can be cleared. To do that, click on the *Delete All* button. A dialog will pop-up, asking you to confirm the action, click *Ok* and the output data will be cleared, leaving the **Monitoring** layer ready to be used for the next project.

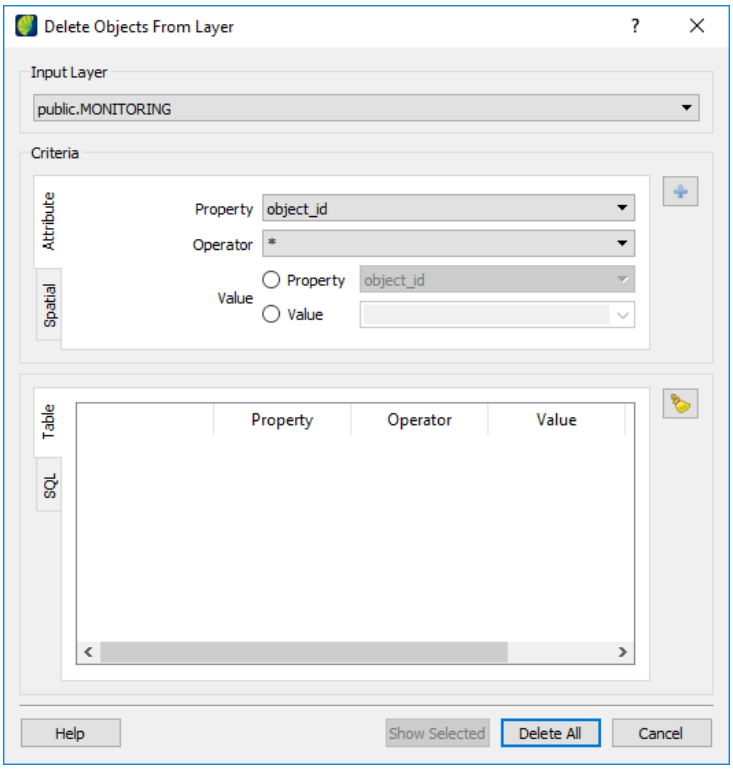


Figure 111: The data clearing screen

5.3 Preparing the next project

In order to begin working on the next project, the data from the previous project must be imported and additional rules must be inserted. The first step is to include the mask generated in section 5.1 in the **Catalog** of project layers. Start by adding the **Mask** shapefile by dragging and dropping it in the **Layer Explorer**, then access the **Catalog Manager** through:

Project Management -> Catalog

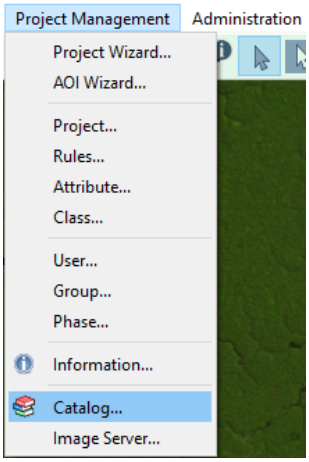


Figure 112: Accessing the Catalog Manager

Refer to section 3.3.3 for how to insert data in the **Catalog**. Once the **Mask** layer is in the **Catalog**, it must be configured to prevent editions. To do that, change the *Locked* column to TRUE and then click the button to confirm the change, like the example shown in figure 113.

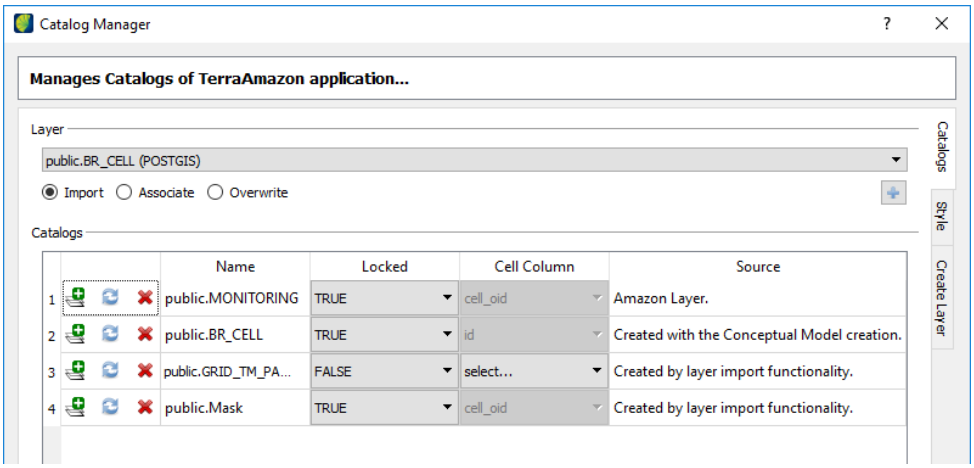


Figure 113: Locking a layer to prevent editions

It is time to customize a new rule that defines how the classification process will work in conjunction with it, since new polygons must not overlap with the mask. Start by accessing the **Rules Control** screen through:

Project Management -> Rules

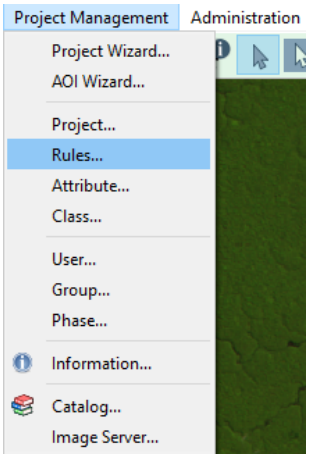


Figure 114: Accessing the Rules Control screen

In this screen, create a new difference rule related to the **Mask** layer. Start by filling the screen details as shown in the example at figure 115.

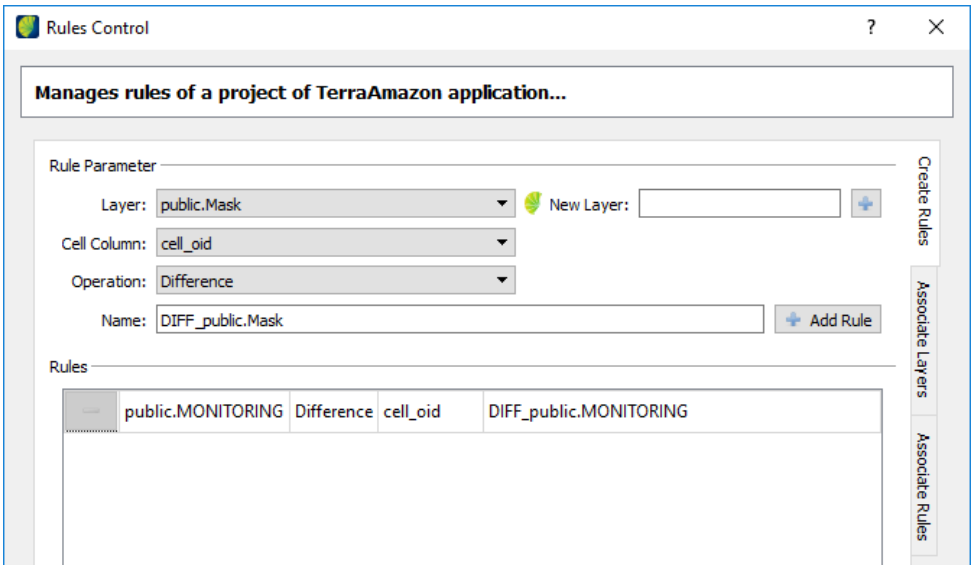


Figure 115: Creating the new difference rule

Once the details are filled out, click the *Add Rule* button, which will add a new rule in the server, like shown in figure 116.

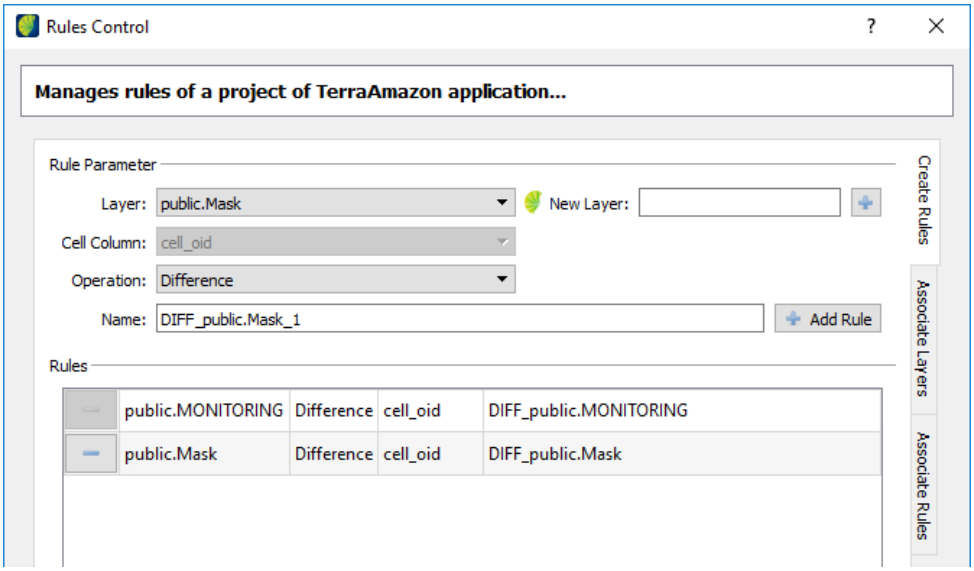


Figure 116: Creating the new difference rule

With the new rule created, you must associate it with the project, so that it has effect during the classification process. Click on the *Associate Rules* tab and you will the screen shown at figure 117.

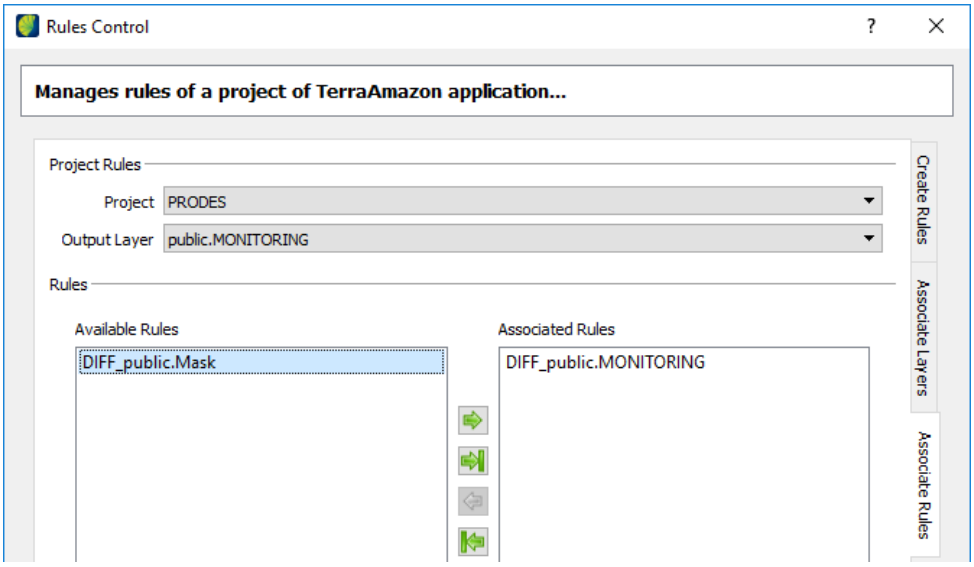


Figure 117: The rule association screen

The last step is to click the  button to associate the new rule with the existing project, the result should like the example shown in figure 118.

To begin working on the updated project, delete the previously created project folder and create a new one, following the steps detailed in section 4.1.2. The new project will contain that **Mask** layer as one of the official layers on the project, as shown in figure 119.

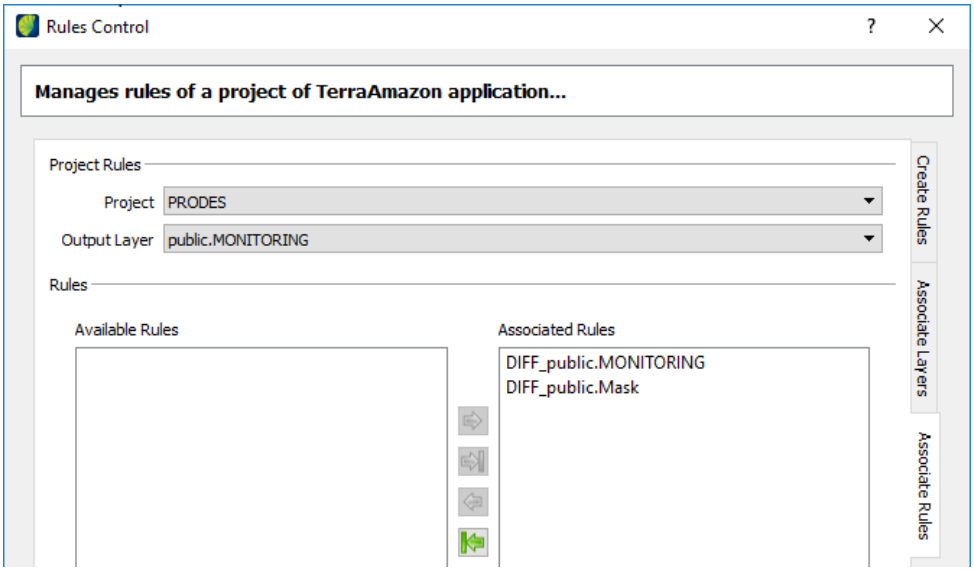


Figure 118: The new rule associated with the project

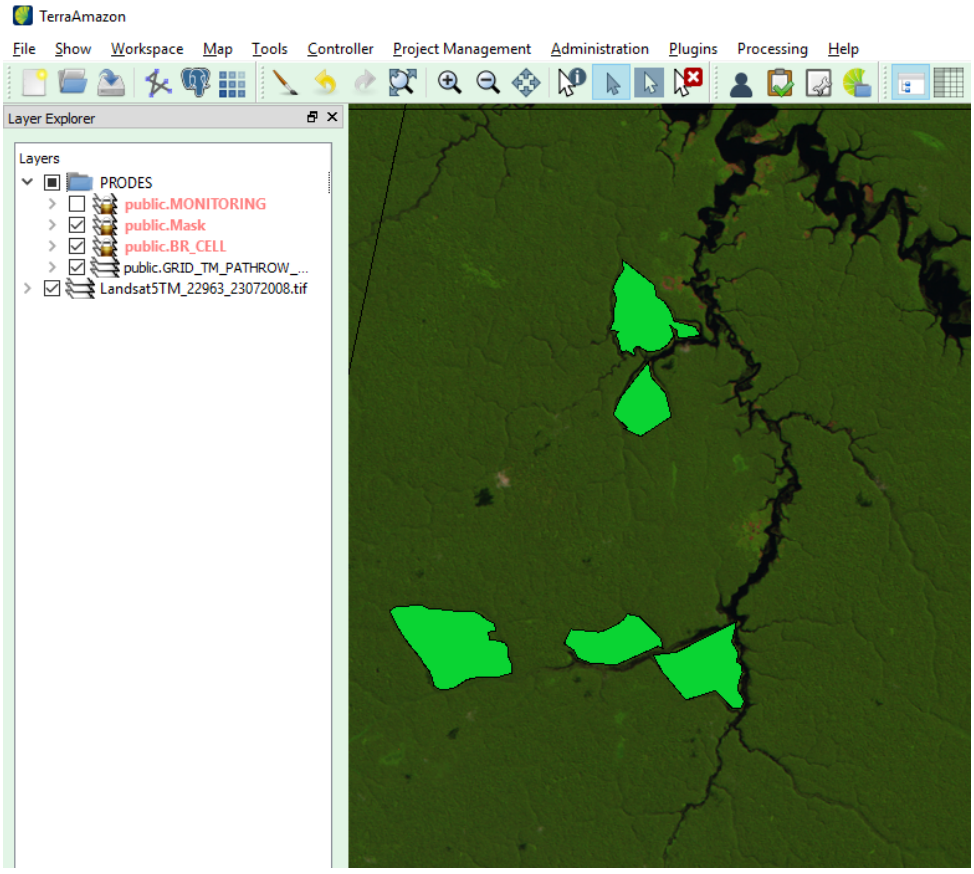


Figure 119: The updated project

Now that the project has been updated the classification process can begin again, following the same instructions detailed at chapter 4. And the new rule will take effect.

6 GIS Section

The GIS option is for users that want to use TerraAmazon as a normal geographic information system. In this mode, the user have access to the general tools and the data processing tools described in sections below.

6.1 General operations

General Tools	
Icon	Description
	New work space
	Open work space
	Save work space
	Add a new vector file as a layer
	Add new Postgis raster as a layer
	Add a new raster file as a layer
	Draw the visible layers
	Previous extent
	Next Extent
	Zoom Extent
	Zoom In
	Zoom out
	Pan
	Info
	Selection
	Invert selection

	Remove selection
	Layer Explorer. Show or hide the layer explorer
	Data Table. Show or hide the data table
	Style Explorer. Show or hide the style explorer
	Connect Layer. Show or hide e connection layers

Table 2: General Tools Description

6.2 Raster Processing

The Raster processing plug-ins  contain several processing algorithms applied to raster data shown in table 3.

Raster Processing Tools	
Icon	Description
	The Arithmetic Operations allows the user to perform operations on one or more images. In addition to the operations that can be made between the bands of the images, it is also possible to apply gain and offset to the images.
	The Classifier module implements methods to detect patterns in image regions. Commonly, classification algorithms are divided by the level of classification (pixel or region), and by the interaction of the user (supervised or unsupervised).
	The Clipping operation is used to crop one or more region of interest and create a new layer.
	Cloud Detection is a tool that speeds up the cloud and shadow detection process by means of image processing specific techniques applied together and following pre-defined pattern resulting in a vectorial data representing analyzed objects.
	The Color Transform operation is used to change the color system of a image.
	The Compose and Decompose Bands operations allows the user to compose a single raster with bands from different raster and also decompose a raster in separate bands.

	The Contrast operation is used to enhance the visual quality of the image represented by a raster file.
	The concept of filtering involves neighborhood operations work with the values of the image pixels in the neighborhood and the corresponding values of a sub image that has the same dimensions as the neighborhood. The Filter operation can be classified as: Edge, Smoothing Spatial and Morphological Filters.
	The Fusion operation allow combination of images with different spectral and spatial resolution keeping the radiometric information.
	The Mixture Model is a component that implements a raster decomposition using the mixture model strategy. The mixture model algorithms can decompose the raster into fraction images, where the value of the resultant pixels indicate the fraction of each target inside the pixel.
	The Mosaic operation is used to create a mosaic from a set of rasters. Image mosaic refer to multi images, which are shot in the same or different shooting condition and have overlapped regions, are stitched and combined to a image to enlarge the field of vision that a image can cover.
	The Post Classification should eliminate isolated points classified differently from their neighborhood. This results in a classified image with a less noisy appearance.
	The Post Classification eliminates isolated points classified differently from their neighborhood. This results in a classified image with a less noisy appearance.
	The concept of raster slicing consists of assigning a pseudo color to each portion of an sliced image histogram. The principal use of image slicing is for human visualization and interpretation of gray-scale events in an image of sequence of images.
	Rasterization
	Image registration is a process of aligning two images acquired by the same/different sensors, at different times or from different viewpoint. Many image processing applications like remote sensing for change detection, estimation of wind speed and direction for weather forecasting, fusion of medical images need image registration.

	Image segmentation covers techniques for splitting one image in several homogeneous regions. The Segmenter interface implements methods to segment a raster.
	The Vectorization operation allows the user the conversion of a raster into vector.

Table 3: Raster Processing Tools Description

6.3 Vector Processing

The Vector processing plug-ins  contain several processing algorithms applied to vector data shown in table 4.

Vector Processing Tools	
Icon	Description
	The Buffer is a spatial operation that can be applied to a single layer. The buffer zone may be defined as an area generated around an object with a predetermined distance.
	The Difference is spatial operation and needs two layers. This operation creates a new layer composed of the difference between geometries of two layers.
	The Dissolve operation is applied to a single layer with a chosen group of attributes that can be summarized. The geometries of each group are dissolved through the UNION spatial operation and the attributes can be summarized using a statistical parameter such as: sum, count, maximum, etc.
	The Geometric Operations available are Centroid, Convex Hull and Minimum Bounding Rectangle. These operations return a new geometry as a result. In addition there is also basic operations such as Perimeter, Area and Length, returning only a numeric value for each geometry.
	The Identity is spatial operation and it needs two layers. This operation creates a new layer composed of the difference and the intersection between geometries of the two layers.

	The Intersection is spatial operation and needs two layers. The first one containing polygons that form a clipping mask, and the second one (with any kind of representation ex. polygons, lines, points) that will be clipped. The result is a new layer formed by the objects of the second layer in the intersection with the clipping mask.
	The Line to Polygon operation is applied to a single layer composed of lines. This operation creates a new layer where all closed lines are transformed in polygons.
	The Merge is spatial operation and needs two layers. This operation makes the insertion of a layer data in another layer.
	The Multipart to Singlepart operation split multipart geometries to singlepart geometry.
	The Polygon to Line operation is applied to a single layer composed of polygons. This operation creates a new layer where all polygons are transformed in closed lines.
	The Union is a spatial operation and needs two layers. This operation makes an union between two layer considering the intersection.
	It is used to identify/visualize invalid geometries, and fix them.

Table 4: Vector Processing Tools Description

6.4 Layer Explorer - Connected Layers

While working with TerraAmazon, it is sometimes necessary to overlay images from different timestamps, like different years for example, in order to compare data and see how it changes with the passage of time. TerraAmazon provides a tool that facilitates that process, the connected layers explorer. It can be accessed either by clicking on the  in the toolbar or in the menu:

Show -> Connect Layers

In order to exemplify how to use this function, you can add all 5 satellite images, provided with the tutorial data, in the layer explorer. Figure 120 shows what the layer

explorer looks like with all layers added and figure 121 shows how it changes once the function is active.

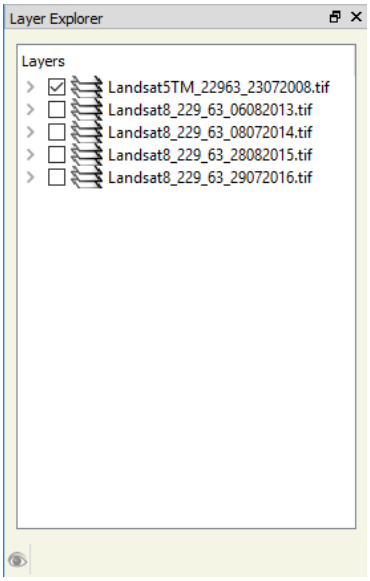


Figure 120: The layer explorer before activating the Connect Layers function

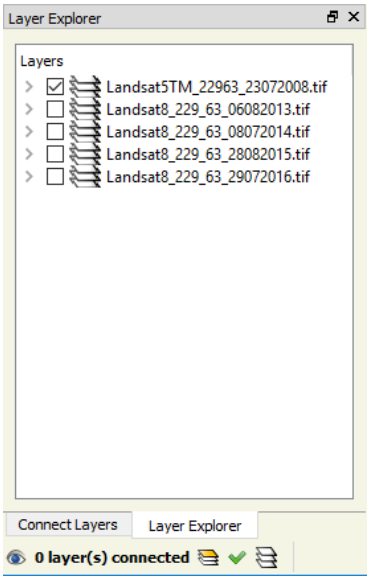


Figure 121: The layer explorer after activating the Connect Layers function

Notice that the *Connect Layers* tab has appeared in the bottom of the explorer, along with some additional information about how many and which layers are currently connected. The layer selected in the regular *Layer Explorer* tab will be drawn in the background and the layers in the *Connect Layers* tab will be drawn in the foreground. Click on the connect *Connect Layers* tab to begin using this function, figure 122 shows what the interface looks like, note that only the background layer is being drawn, since no layer has been connected yet.

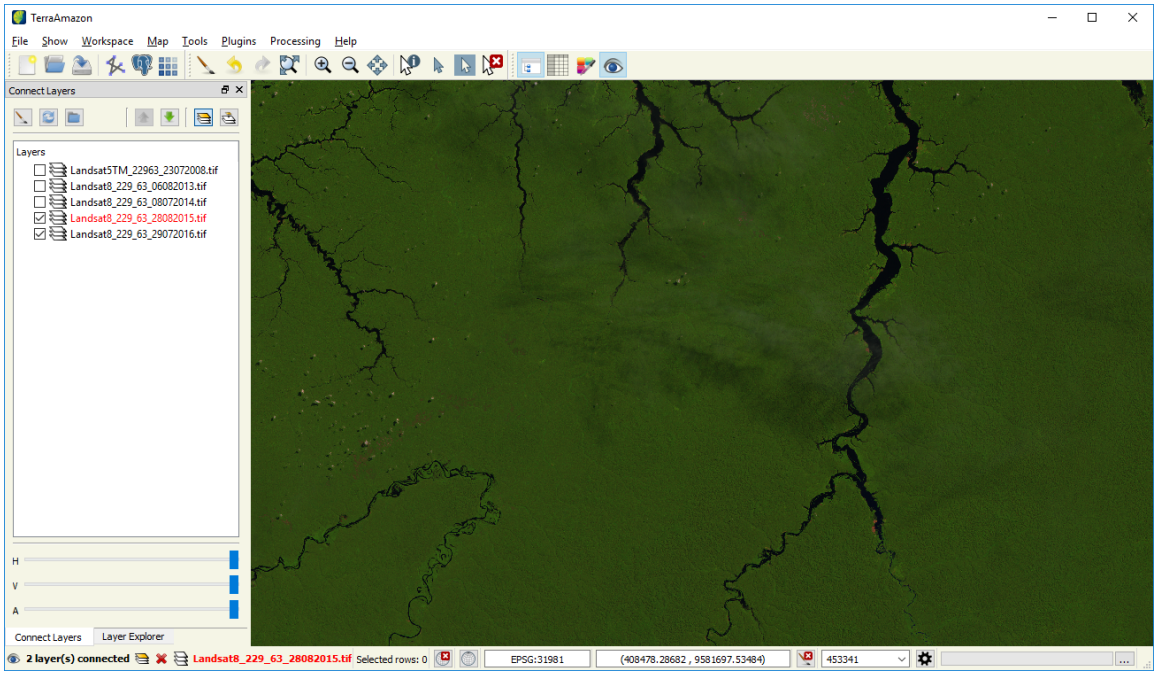


Figure 122: The Connect Layers tab, without any layer connected yet

In the *Connect Layers* tab, check a few layers in the list and click on the  button. That will start the connection among the selected layers, with the layer highlighted in blue, and with the name shown in the status bar, being the one currently drawn in the foreground as shown in figure 123.

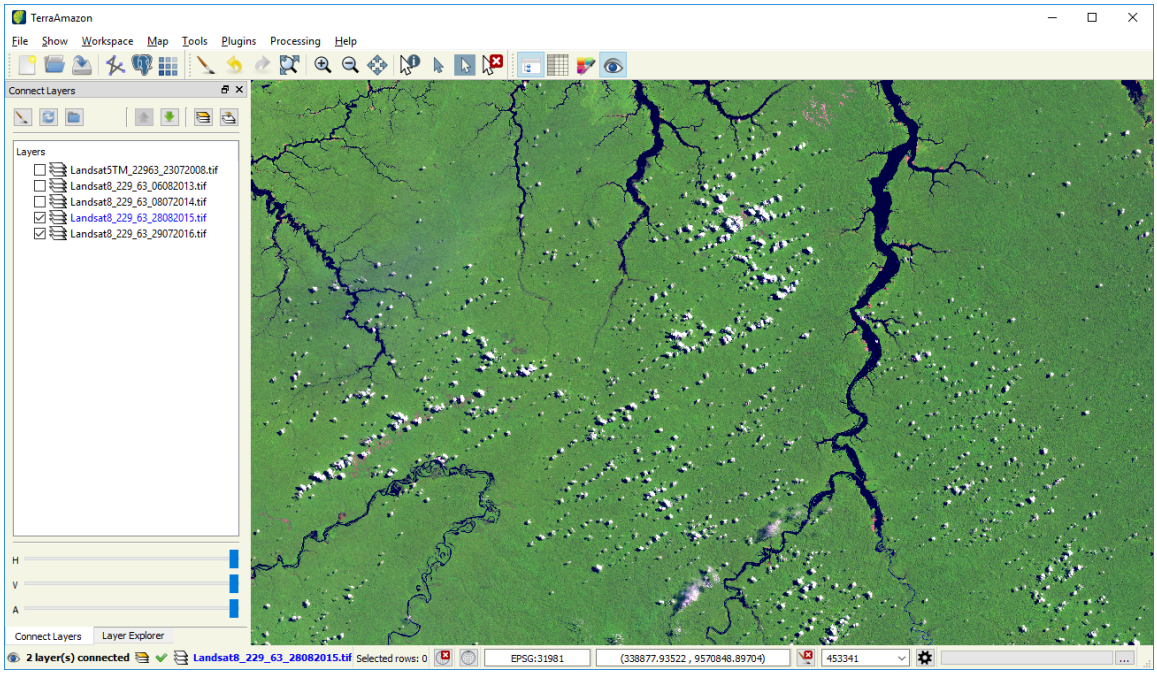


Figure 123: The Connect Layers tab, with the image from 2015 being drawn

When more than one layer are selected, you can change which one is drawn buy

clicking either the  or the  buttons, like shown in figure 124.

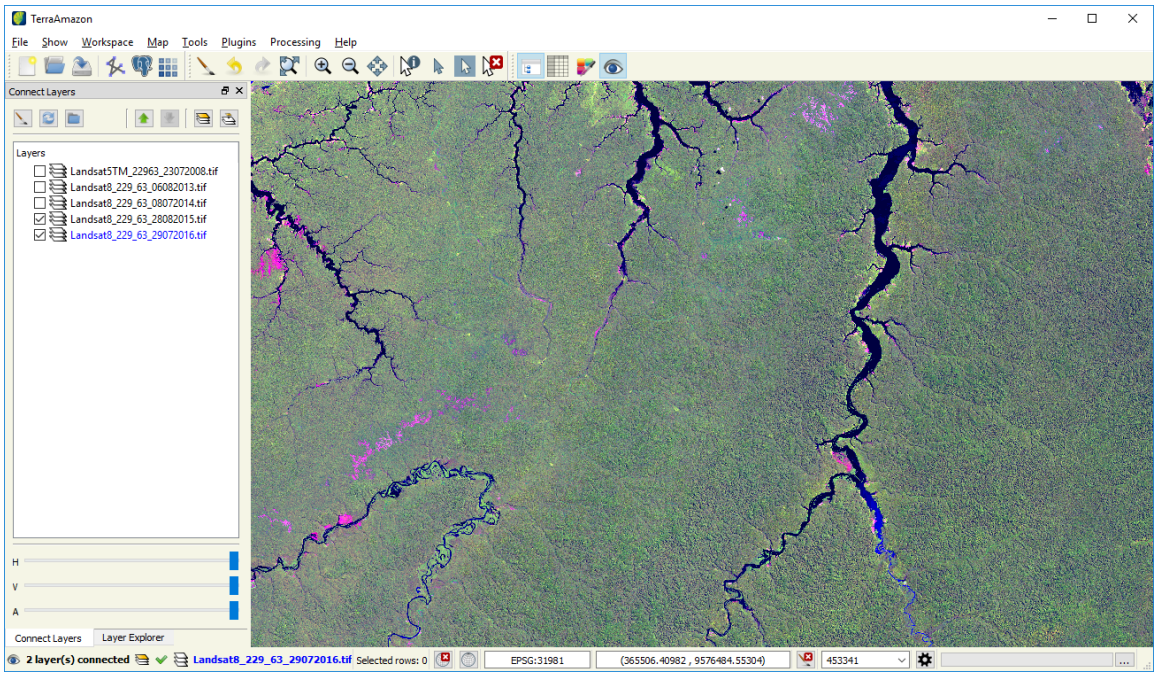


Figure 124: The Connect Layers tab, with the image from 2016 being drawn

The bottom of the *Connect Layers* tab has three sliders that provide customization options for how the layer in foreground will be drawn. The top two sliders are horizontal and vertical adjustment tools, they determine the percentage of the foreground layer that will be drawn on top of the background layers, as exemplified in figure 125.

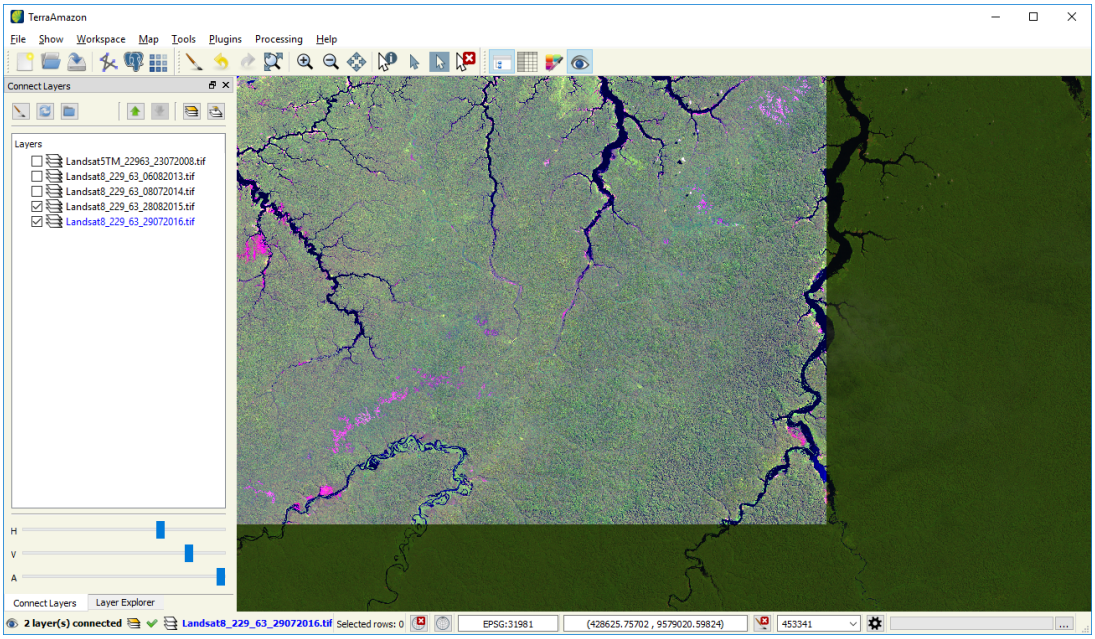


Figure 125: The horizontal and vertical size of the foreground image is reduced according to the sliders

The third slider controls the transparency of the layer drawn in the foreground, which helps to compare data between then, an example is shown in figure 126.

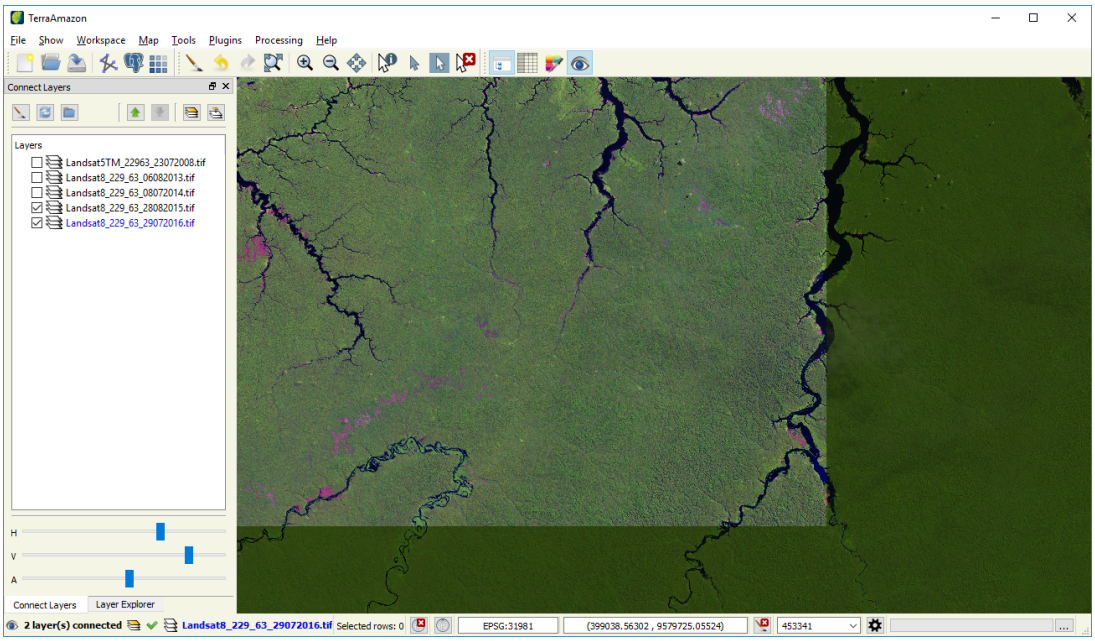


Figure 126: Applying transparency to the image in the foreground

One more tool worth noting is the  tool, once it is active, you can draw a box in the canvas and the foreground layer will only be drawn in that box, allowing for a more specific comparison like shown in figure 127.

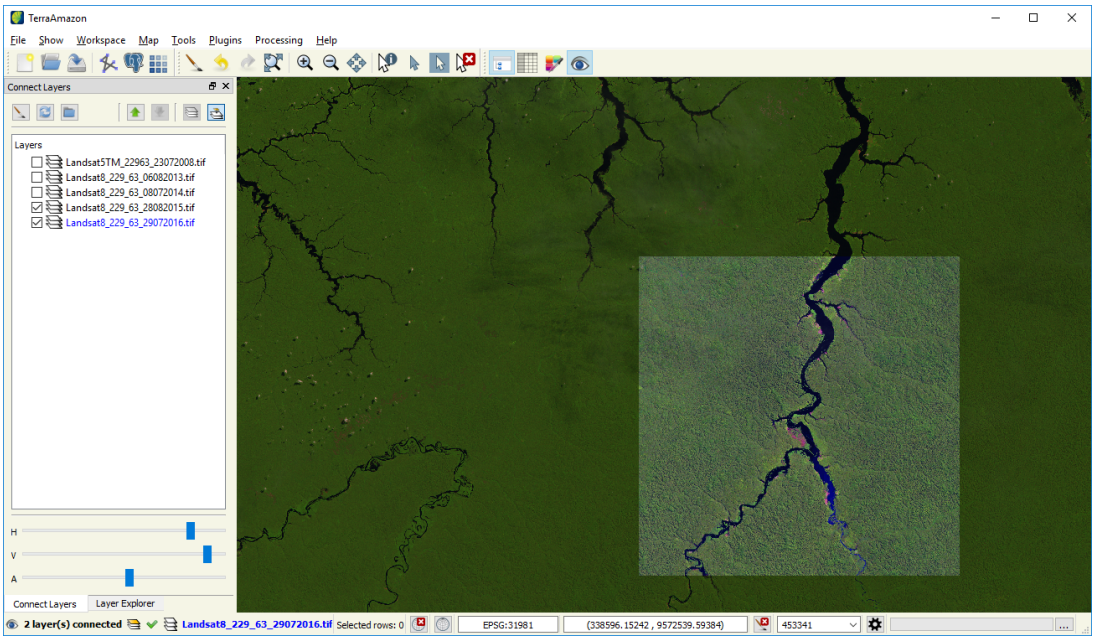


Figure 127: Drawing the foreground layer in a box

Additionally, it is possible to work with folders since and that can make it easier to compare multiple layers at once. The connection with folders has two different modes,

which can be alternated by clicking the  tool. By default, each layer inside a folder will be treated individually (like layers outside the folder) like shown in figure 128. Alternatively, the folder itself can be treated as single layer so that layers in it are all drawn and the result is the foreground layer, like shown in figure 129.

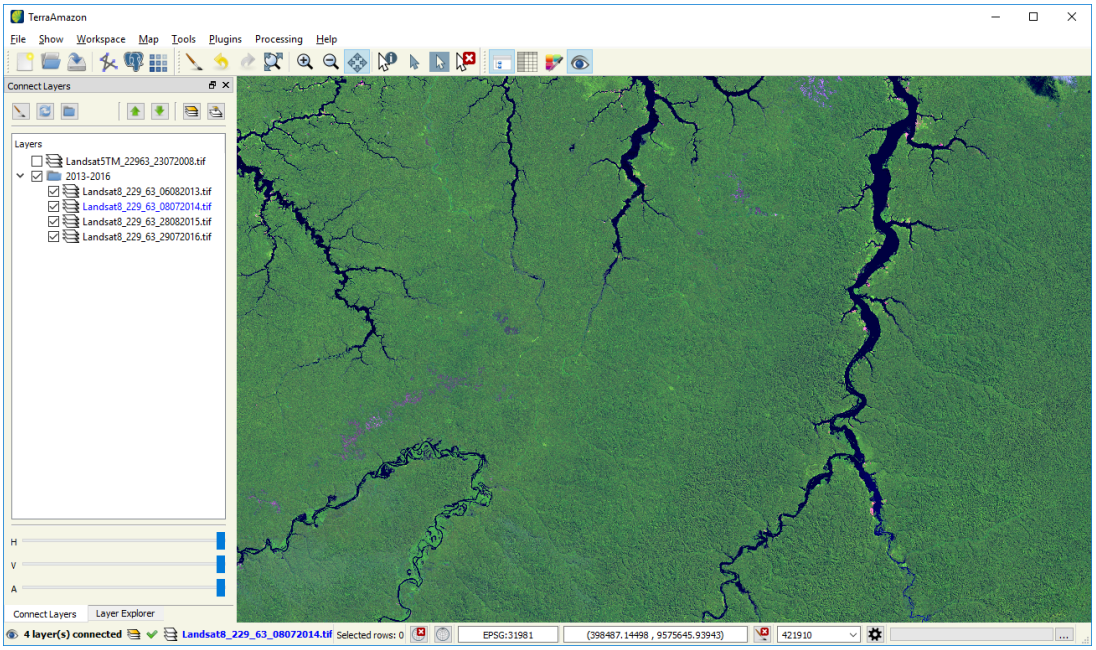


Figure 128: Layer are being treated individually, and it is possible to alternate among them as usual

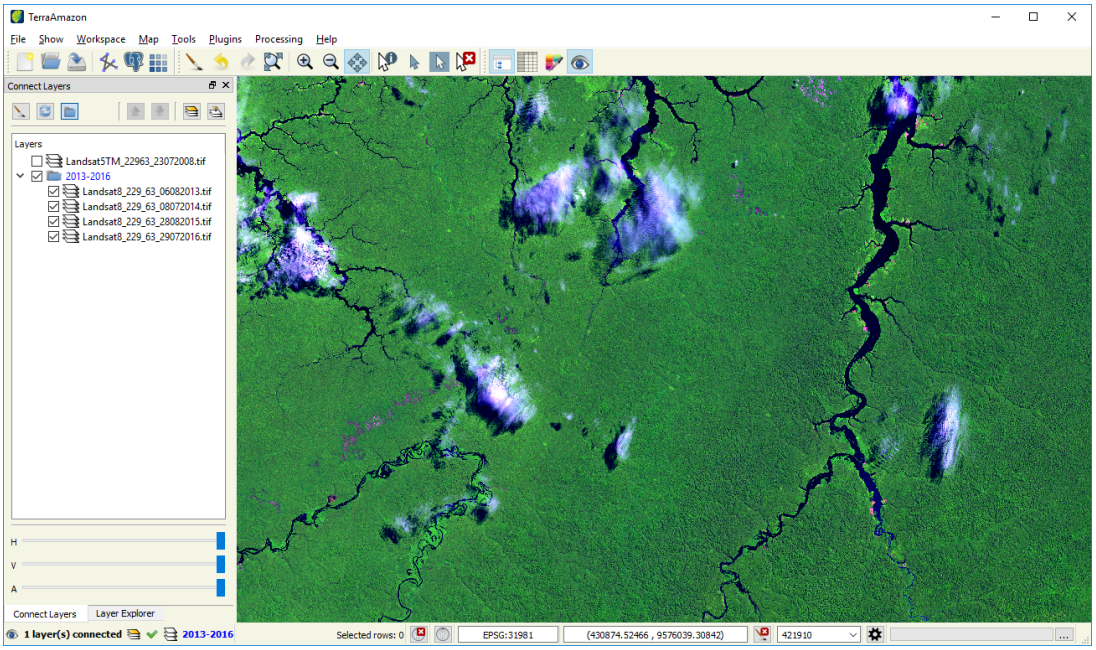


Figure 129: The folder is treated as a layer, so the layer at the top of the folder is drawn

Annex

ANNEX A – Complete Urls

- **Terralib Wiki:** http://www.dpi.inpe.br/terralib5/wiki/doku.php
- **TerraAmazon Wiki:** http://wiki.funcate.org.br/terraamazon/index.php/TerraAmazon
- **PostgreSQL:** https://www.postgresql.org
- **PostGIS:** https://postgis.net
- **TerraAmazon Wiki Download:** http://wiki.funcate.org.br/terraamazon

ANNEX B – Types of Rules

TerraAmazon defines the output of the classification process by applying topological rules to the input polygons. A rule defines the spatial operation that input polygons will be submitted to during the classification and the layer that will be used for such operation. A rule requires three layers to work:

- Edition or Input Layer: The draft used for vectorial edition;
- Rule layer: identified by the rule;
- Destination or Output Layer: Receives the result from the set of rules.

There are three spatial operations that can be selected to compose a rule:

- Difference;
- Intersection;
- Clean.

The following images to exemplify the result of each of the three operations listed:

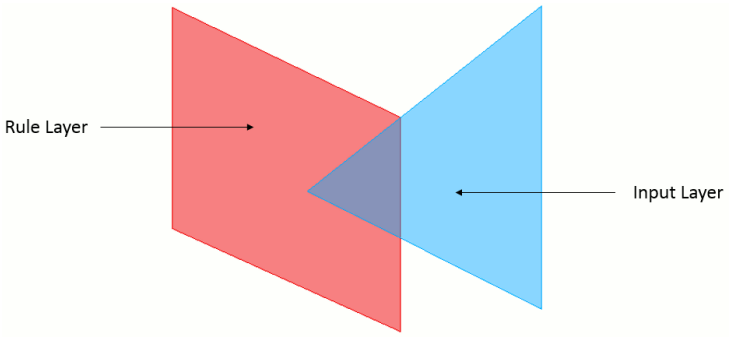


Figure 130: Polygons used to exemplify the rules operations

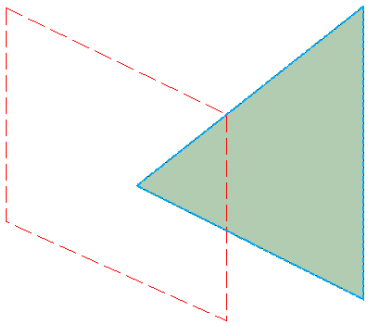


Figure 131: What the result would be without any rules applied

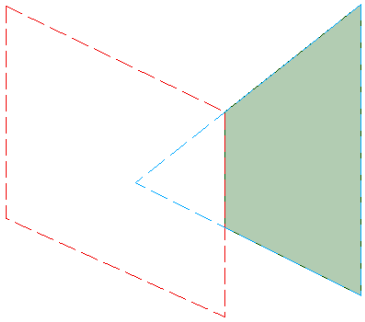


Figure 132: The green polygon is the result when the difference rule is applied

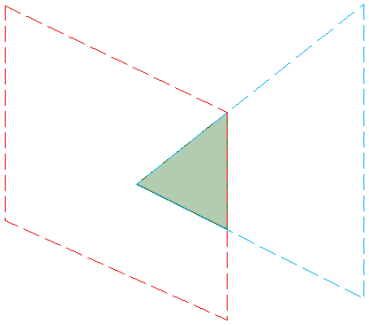


Figure 133: The green polygon is the result when the intersection rule is applied

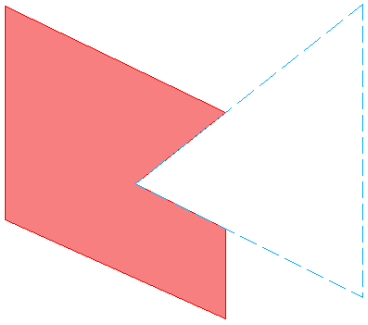


Figure 134: The red polygon is the result when the clean rule is applied

Terra Amazon

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