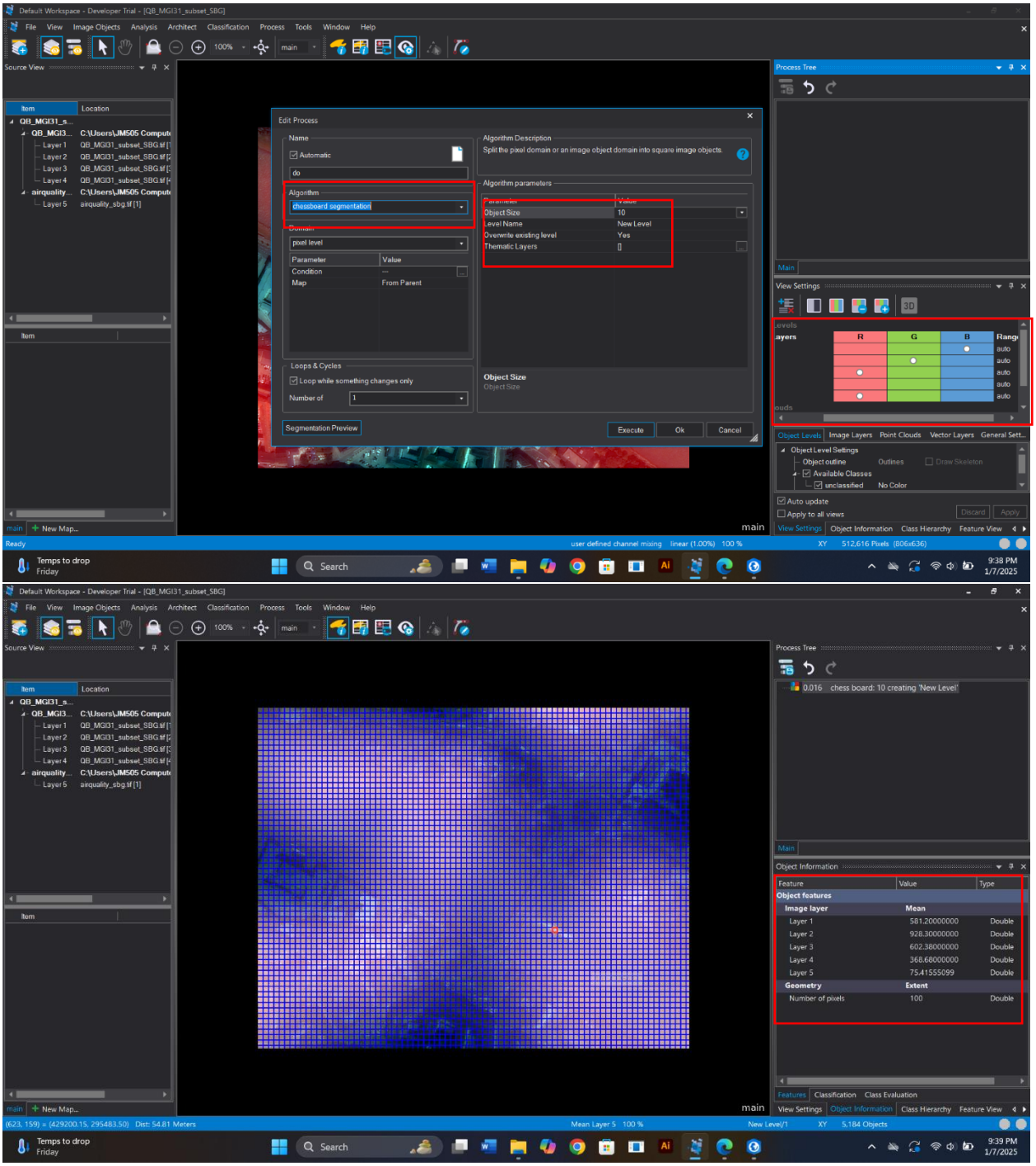
Classifier Part 2

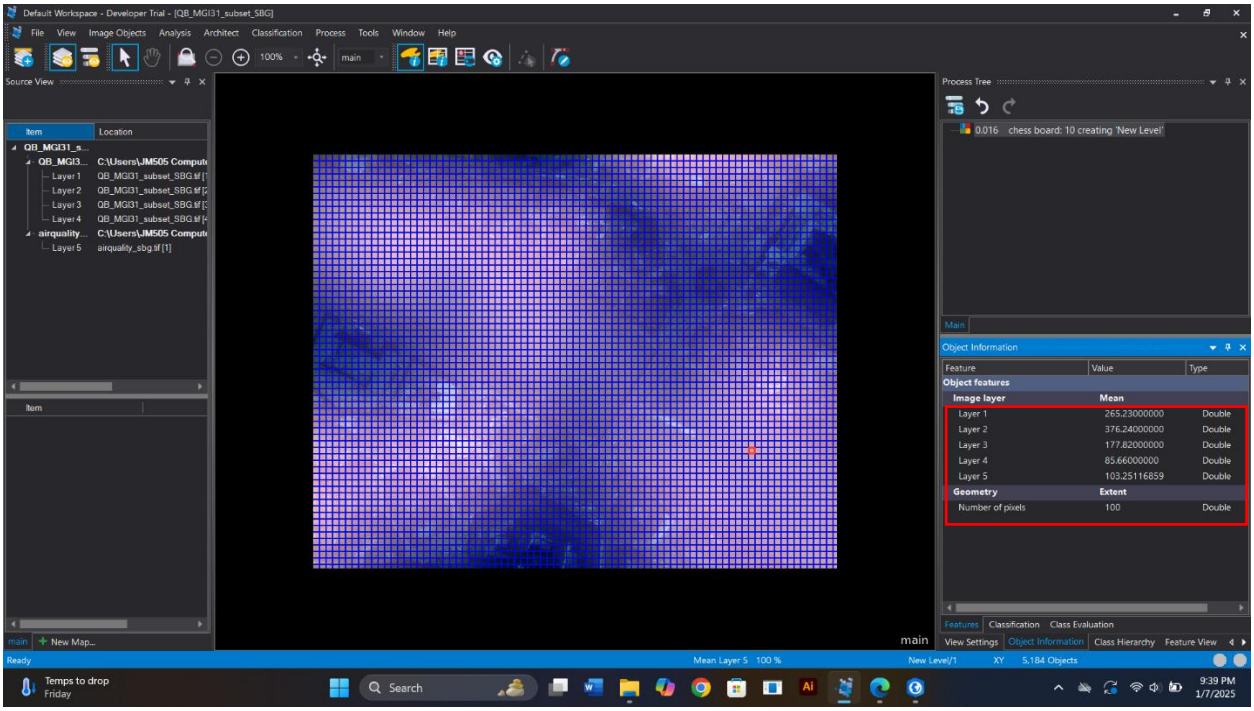
Task 1: Object features

Loading the quickbird data of Salzburg in an ecognition project and air quality data set. Layer 1- 4 can be seen in the Screenshot below, that are the 4 image bands (Layer 1 = blue, Layer 2 = green, Layer 3 = red and Layer 4 = nir bands) and Layer 5 is the air quality raster.

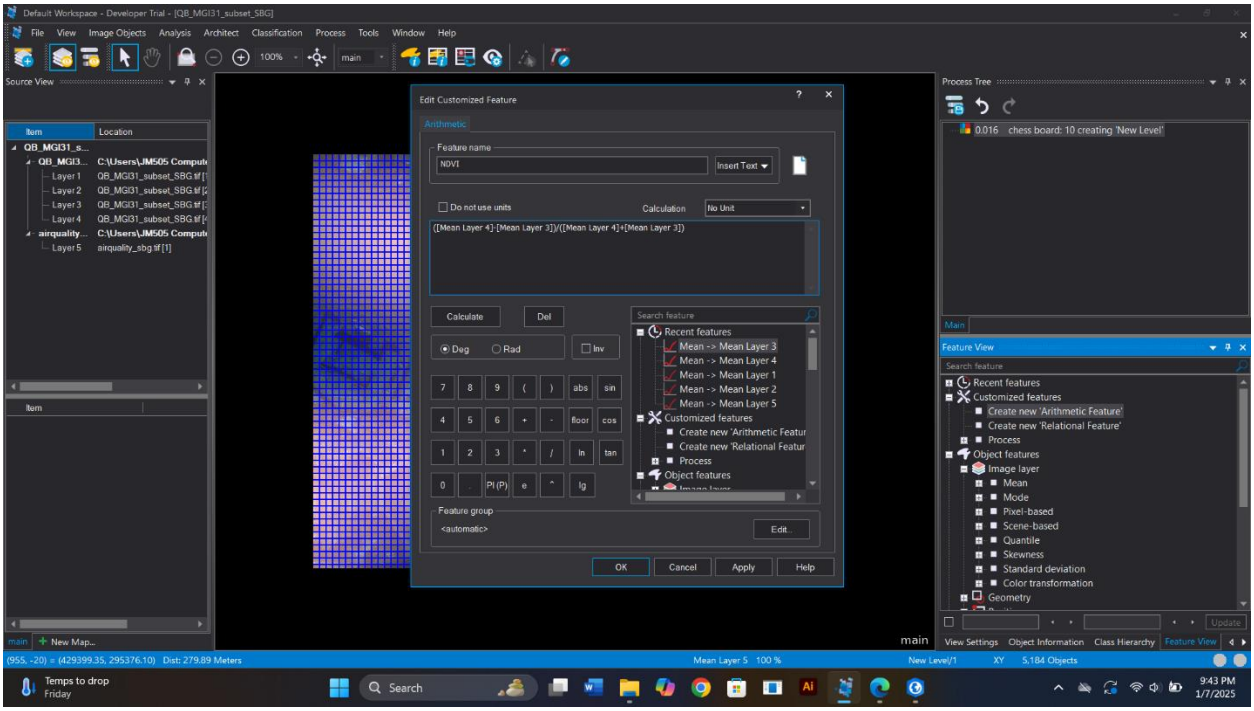
Added New process to the "Process Tree" window and selected the "chessboard segmentation“ algorithm and executed the segmentation with an "object size" of 10.

Boat and Water are selected for looking at “Object Information”


Edit Process
Name
Automatic
do
Algorithm
chessboard segmentation
pixel level
Parameter
Value
Condition
Map
From Parent
Loops & Cycles
Loop while something changes only
Number of
1
Segmentation Preview
Algorithm Description
Split the pixel domain or an image object domain into square image objects.
Algorithm parameters
Object Size
10
Level Name
New Level
Overwrite existing level
Yes
Thematic Layers
Object Size
Execute
Ok
Cancel
Process Tree
View Settings
Object Information
Feature
Value
Type
Object features
Image layer
Mean
Layer 1
581.20000000
Double
Layer 2
928.30000000
Double
Layer 3
602.38000000
Double
Layer 4
368.68000000
Double
Layer 5
75.41555099
Double
Geometry
Extent
Number of pixels
100
Double
main



Creating a new "customized feature" representing the NDVI (Normalized Difference Vegetation Index) ➔Feature view window > customized features > double-click on "create new arithmetic feature"



Question 1: What becomes obvious if you compare the values for the two objects of the chessboard segmentation?

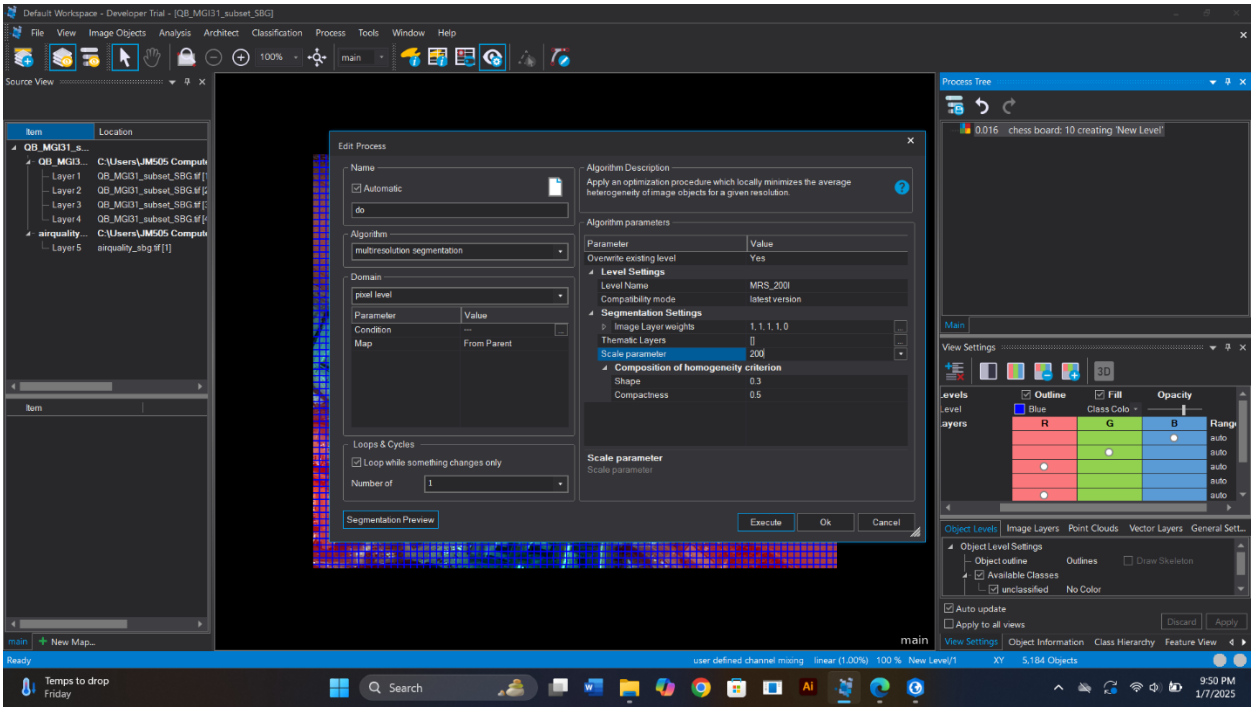
A. The mean values for different classes are different. For example, the mean values for Water and the road are different for each layer.

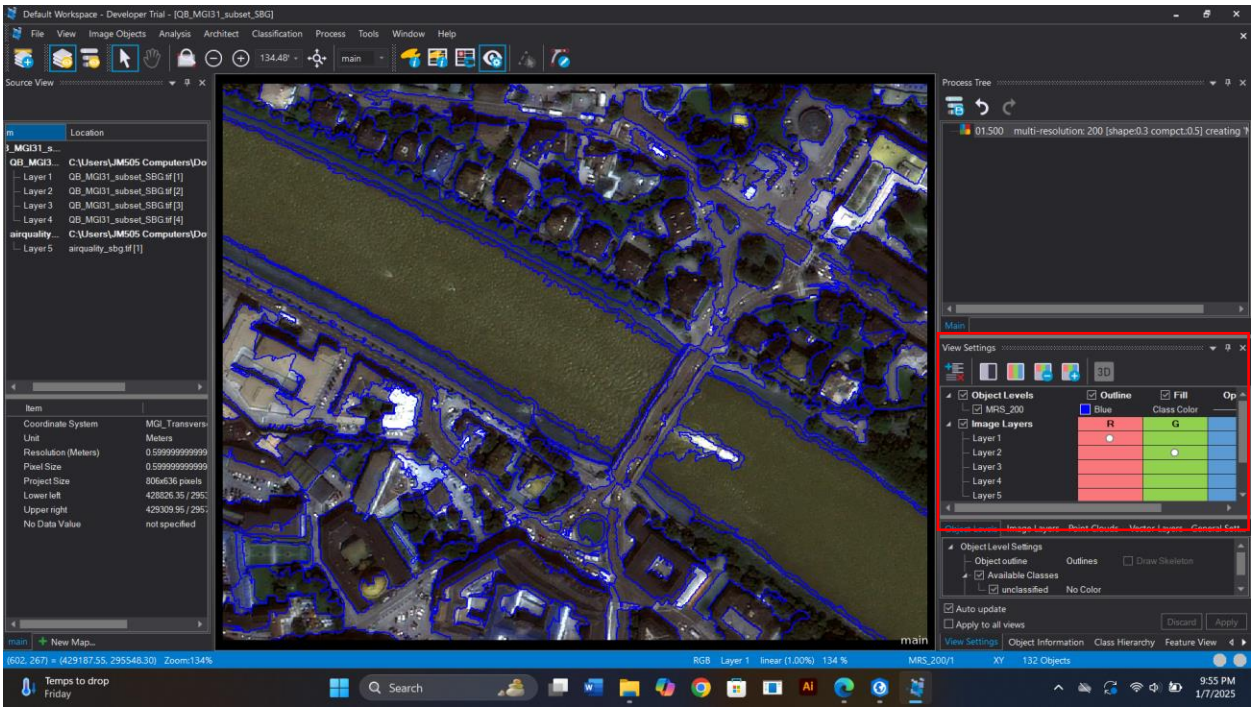
Question 2: Which features don‘t make that much sense in this case?

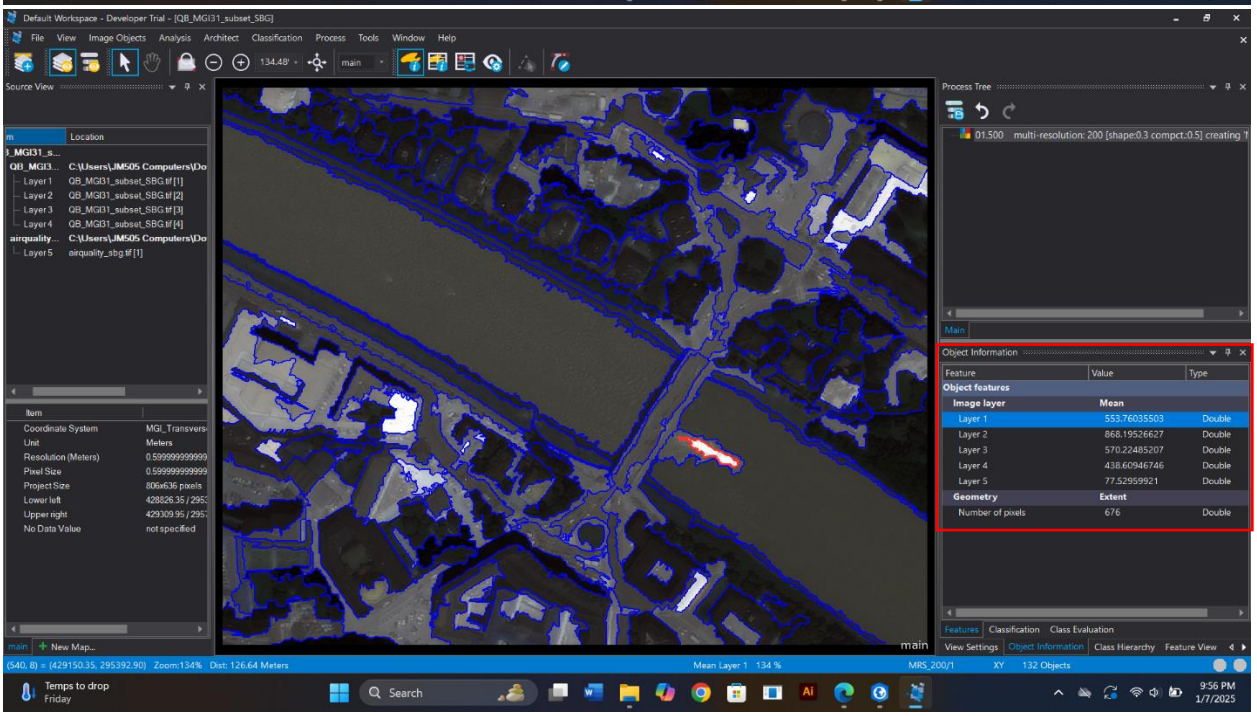
A. Excessive Outlining in Non-Feature Areas **e.g** somewhere overlay detailed boundaries or small patches doesnot make sense.
Also, the certain outlines near roads or river doesnot make that much sense.
Also, it seems that shape doesnot make sense. Value of number of pixel doesnot make sense because in chessboard segmentation all the segments consist of same same number (100).

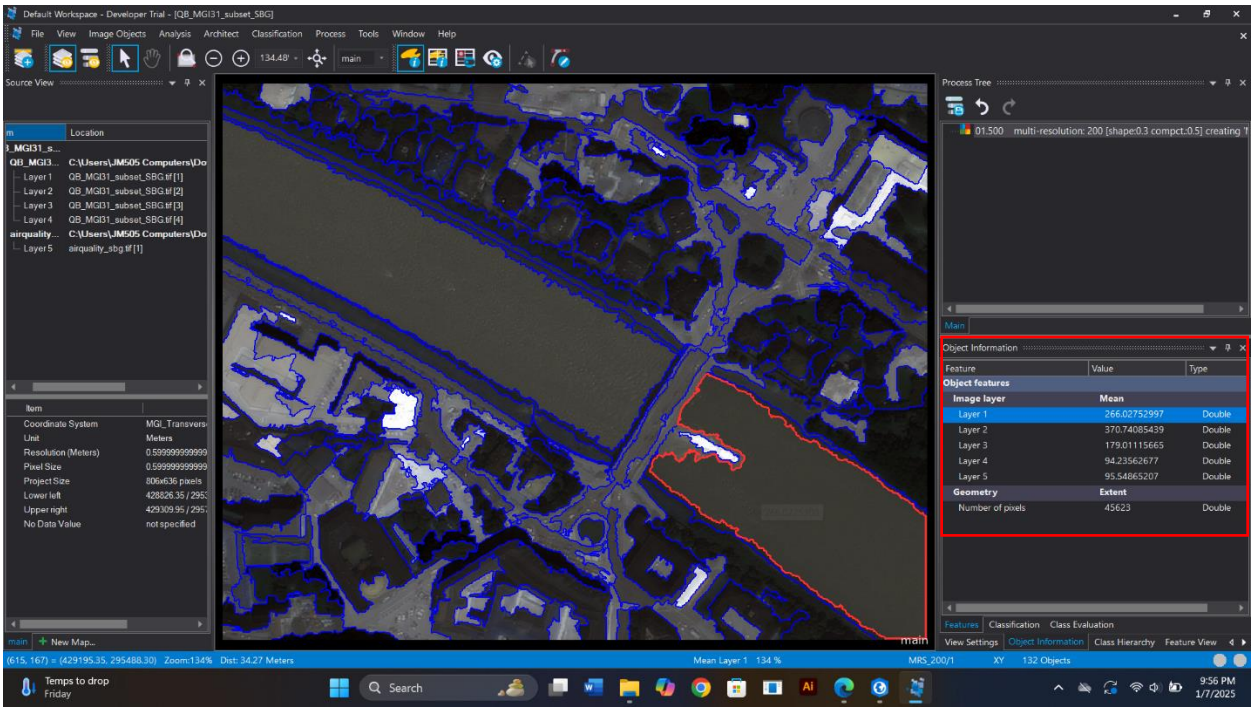
Task 2:

Creating a new one, using the multiresolution segmentation algorithm. Two objects were selected as shown in the SS below.



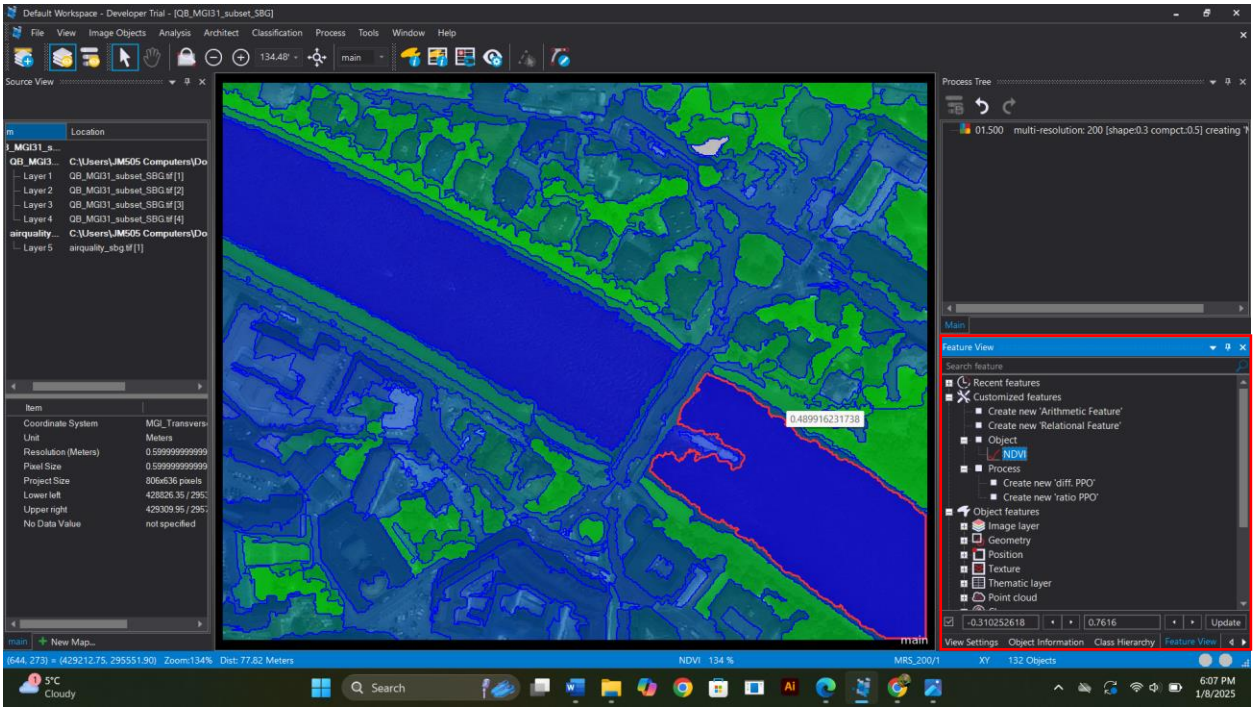

Default Workspace - Developer Trial - [QB_MGI31_subset_SBG]
File View Image Objects Analysis Architect Classification Process Tools Window Help
Source View
Process Tree
01.500 multi-resolution: 200 [shape:0.3 compct:0.5] creating
View Settings
Object Levels
Outline
Fill
MRS_200
Blue
Class Color
Image Layers
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Object Level Settings
Object outline
Outlines
Available Classes
unclassified
No Color
Auto update
Apply to all views
Discard
Apply
View Settings
Object Information
Class Hierarchy
Feature View
main
Temps to drop
Friday
Search
9:55 PM
1/7/2025


Default Workspace - Developer Trial - [QB_MGI31_subset_SBG]
File View Image Objects Analysis Architect Classification Process Tools Window Help
Source View
Process Tree
01.500 multi-resolution: 200 [shape:0.3 compct:0.5] creating
Object Information
Feature
Value
Type
Object features
Image layer
Mean
Layer 1 553.76035503 Double
Layer 2 868.19526627 Double
Layer 3 570.22485207 Double
Layer 4 438.60946746 Double
Layer 5 77.5295921 Double
Geometry
Extent
Number of pixels 676 Double
Features
Classification
Class Evaluation
View Settings
Object Information
Class Hierarchy
Feature View
main
Temps to drop
Friday
Search
9:56 PM
1/7/2025



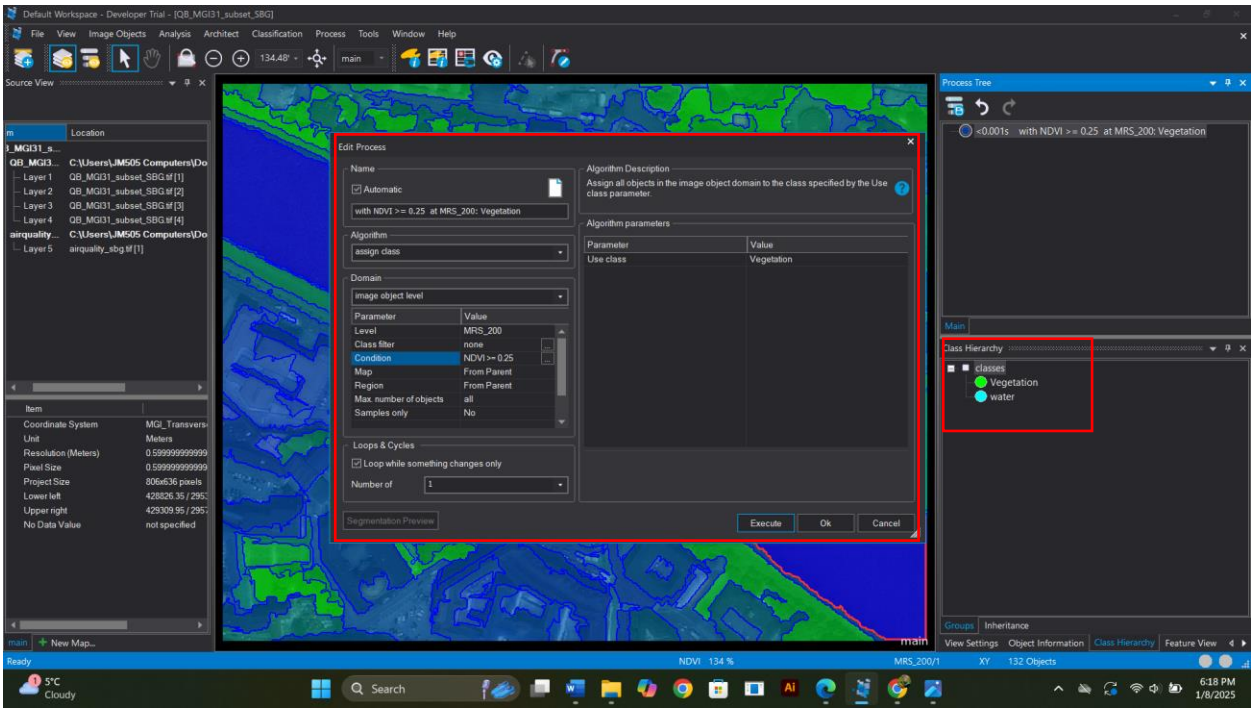
Task 3:

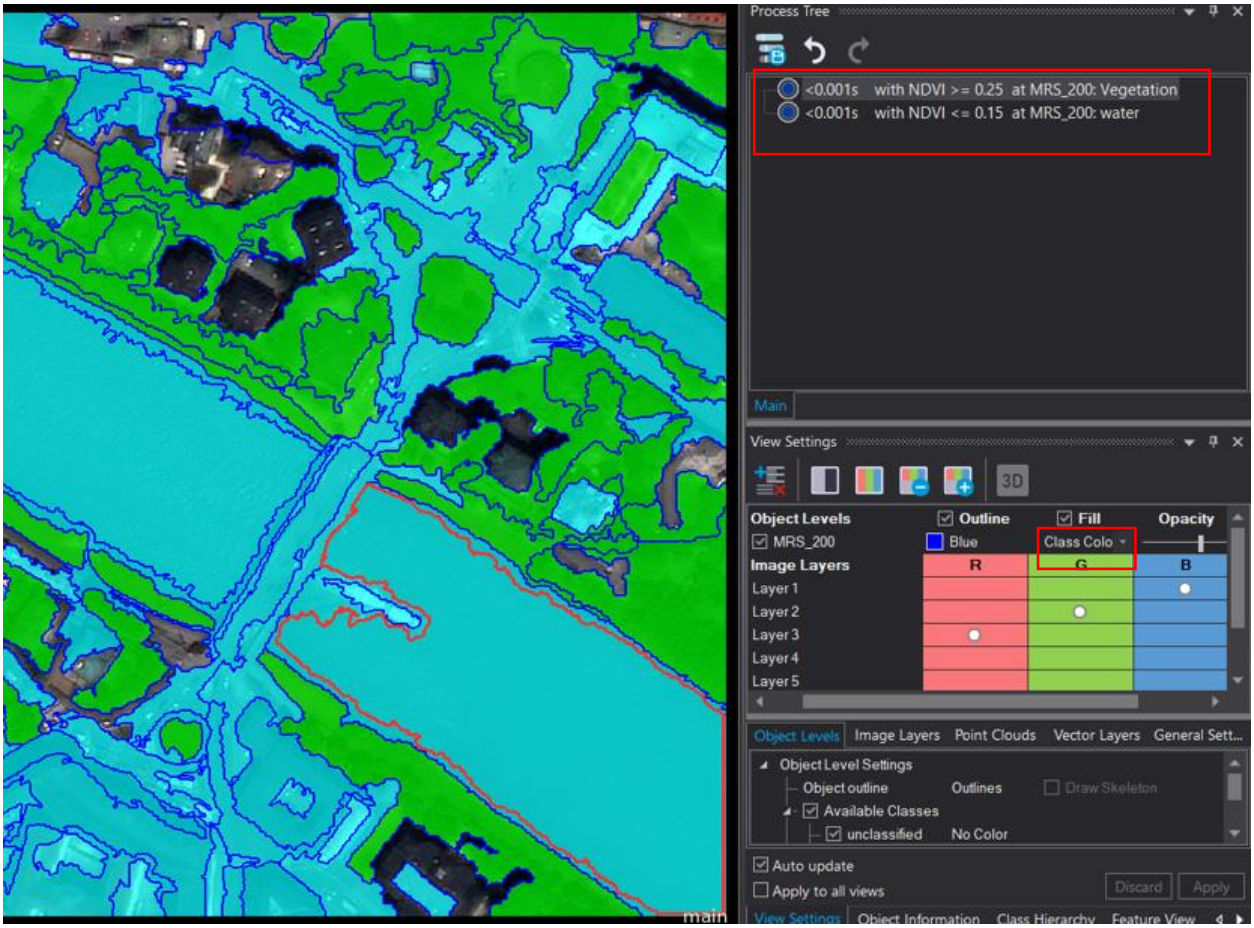
After finding a threshold for the new NDVI feature, to distinguish between vegetation and non-vegetation areas and a threshold to extract water bodies, here are the results.



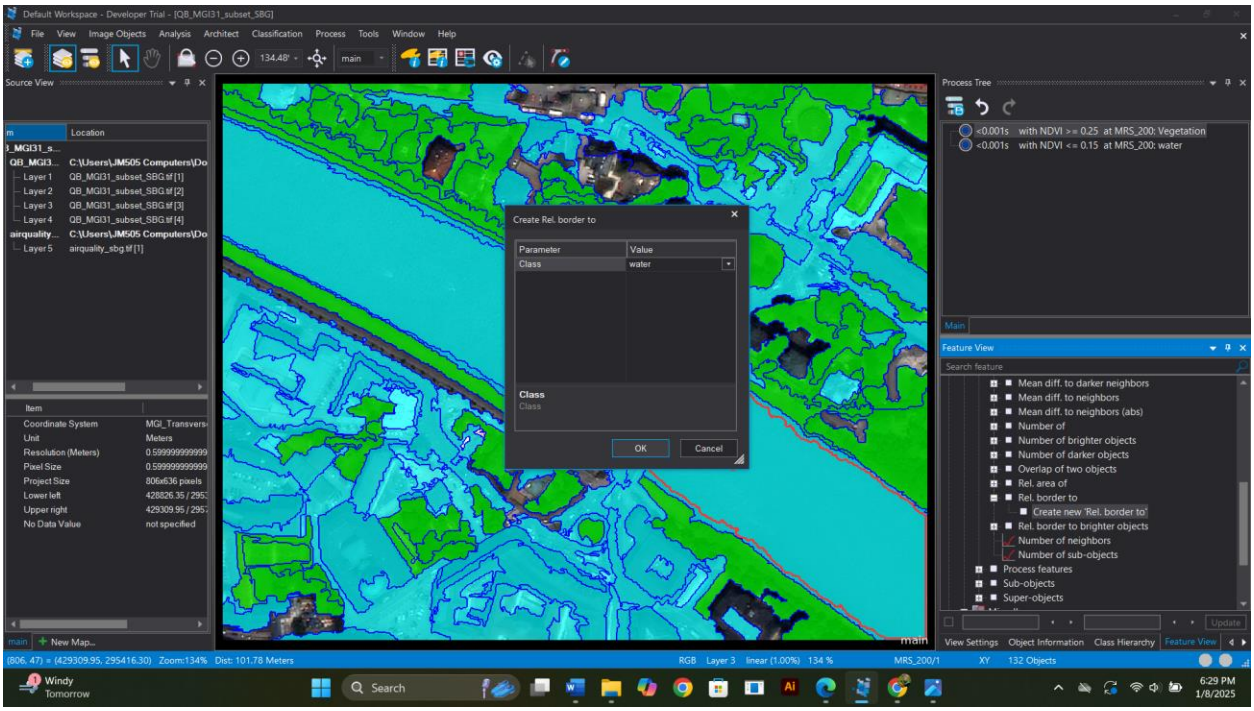
Task 4:

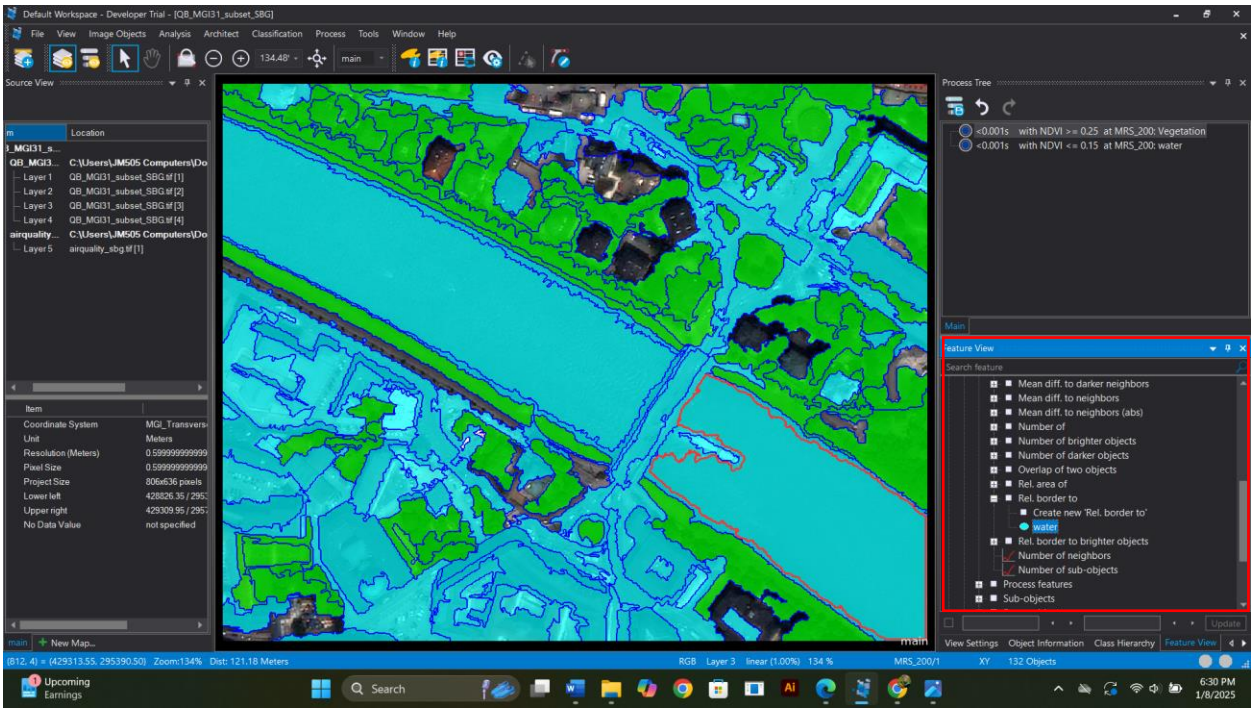
Two new classes were created that are Vegetation and Water as seen in the SS and a new single process for each class using the "assign class" algorithm in the process tree and classified the objects according to the corresponding NDVI values >= 0.25 for vegetation and <=-0.15 for water.

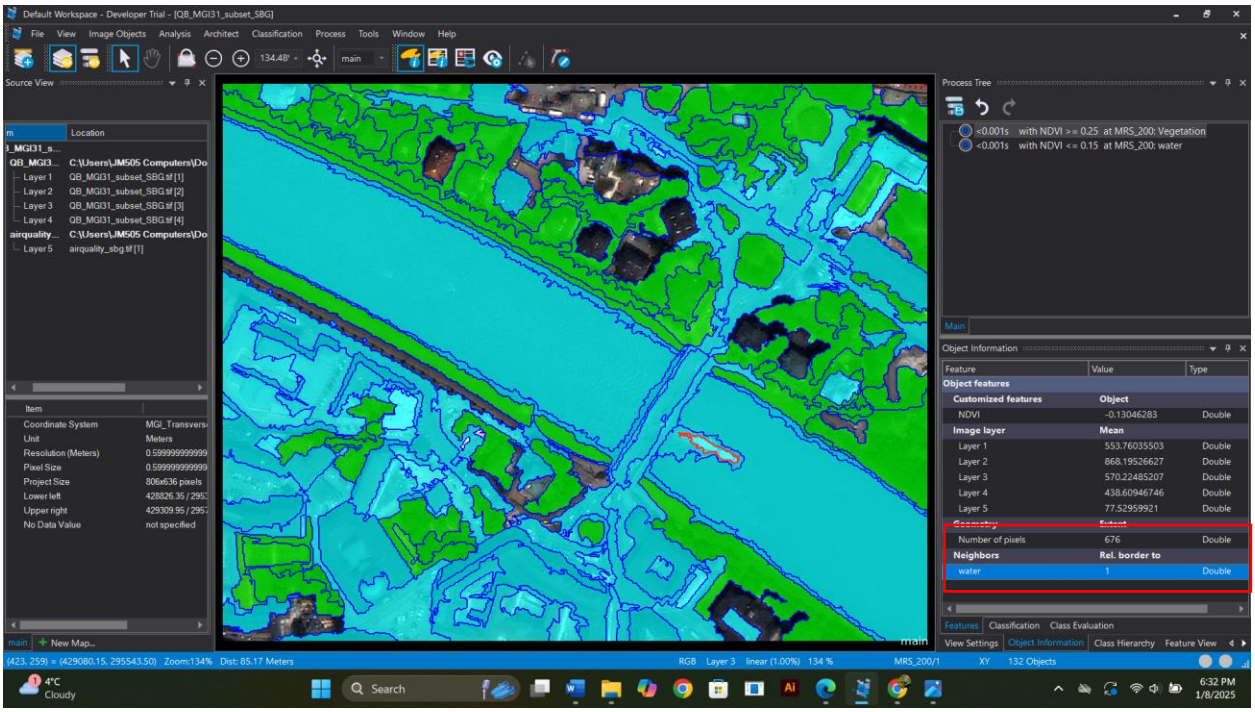


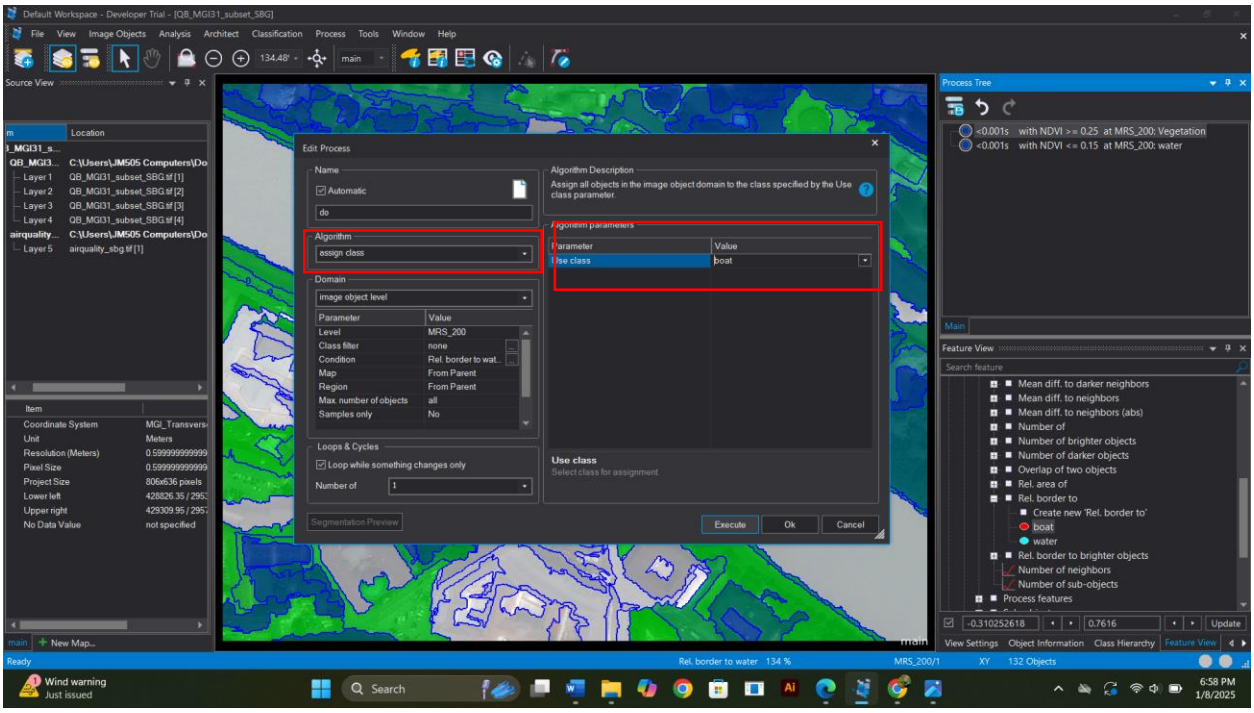


Now we make use of the class relation feature: For this purpose, we selected the feature „Relative border to" (object features> relations to objects >-Neighbors > Rel. Border to > double clicked and create new rel. border to" and selected the class that defines the objects to which a relation should be calculated. Then class water (relative border to water) was selected, and the feature was created. (see below)


Create Rel. border to
Parameter
Value
Class
water
Class
Class
OK
Cancel
Process Tree
<0.001s with NDVI >= 0.25 at MRS_200: Vegetation
<0.001s with NDVI <= 0.15 at MRS_200: water
Feature View
Mean diff. to darker neighbors
Mean diff. to neighbors
Mean diff. to neighbors (abs)
Number of
Number of brighter objects
Number of darker objects
Overlap of two objects
Rel. area of
Rel. border to
Create new 'Rel. border to'
Rel. border to brighter objects
Number of neighbors
Number of sub-objects
Process features
Sub-objects
Super-objects


Process Tree
<0.001s with NDVI >= 0.25 at MRS_200: Vegetation
<0.001s with NDVI <= 0.15 at MRS_200: water
Feature View
Mean diff. to darker neighbors
Mean diff. to neighbors
Mean diff. to neighbors (abs)
Number of
Number of brighter objects
Number of darker objects
Overlap of two objects
Rel. area of
Rel. border to
Create new 'Rel. border to'
water
Rel. border to brighter objects
Number of neighbors
Number of sub-objects
Process features
Sub-objects

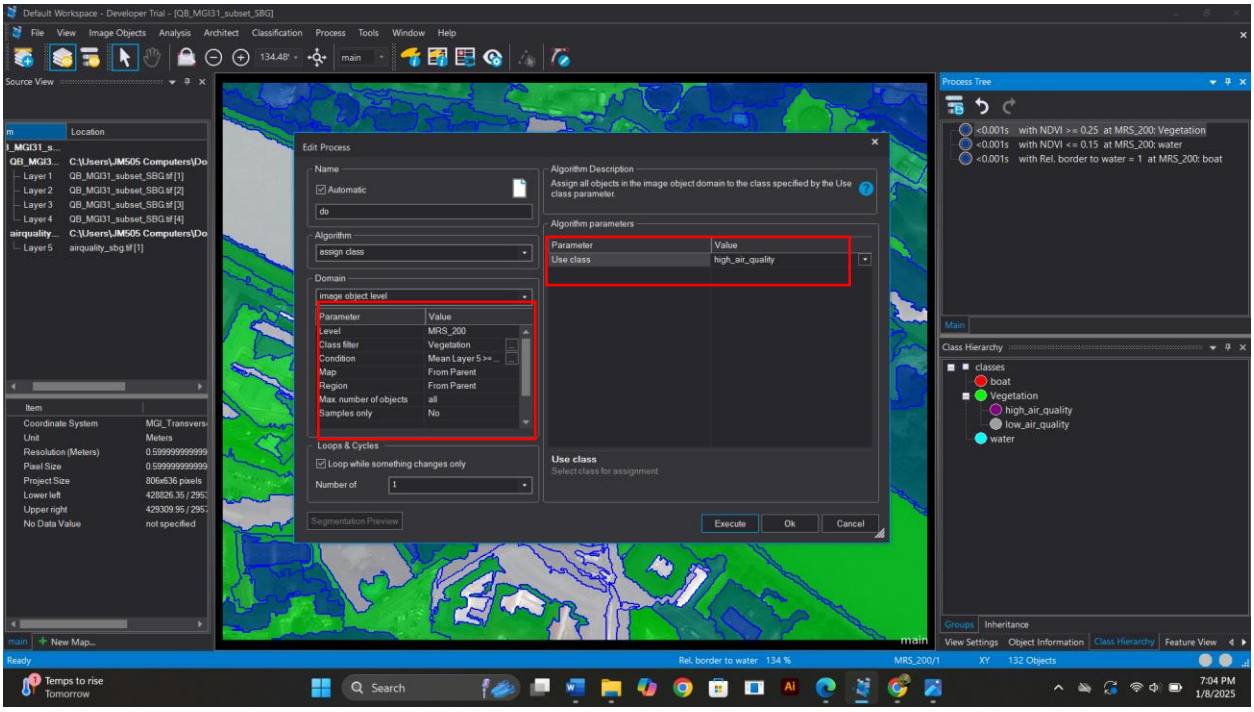


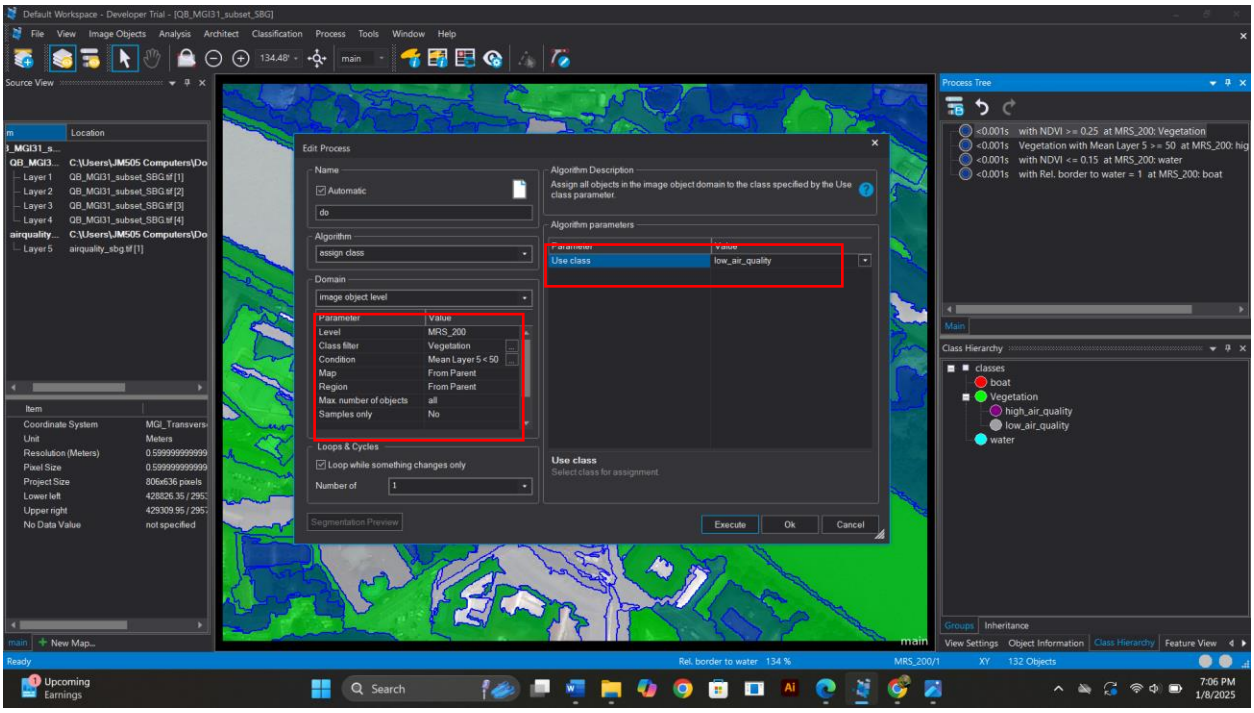


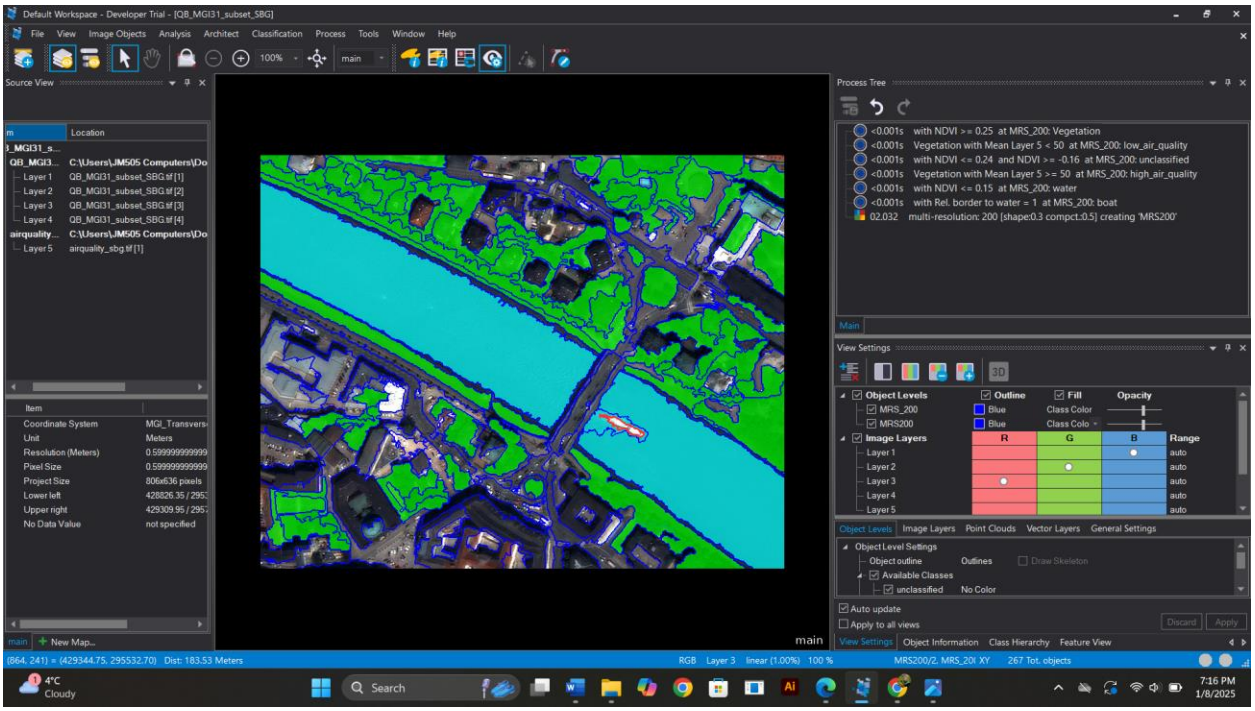
Air quality layer a priori information to refine our classification.

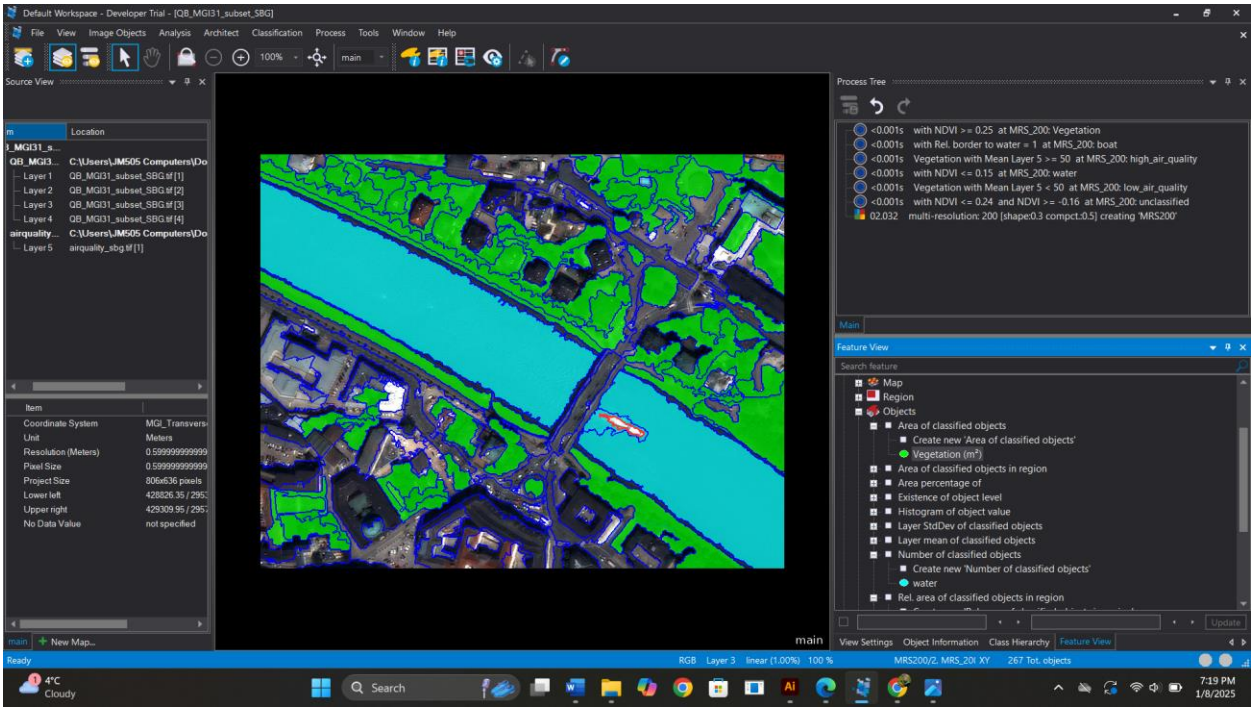
The goal was to create sub-classes of the class vegetation to divide the class into areas with high/low air quality. So, two new classes were created (high_air_quality, low_air_quality). Two additional "assign

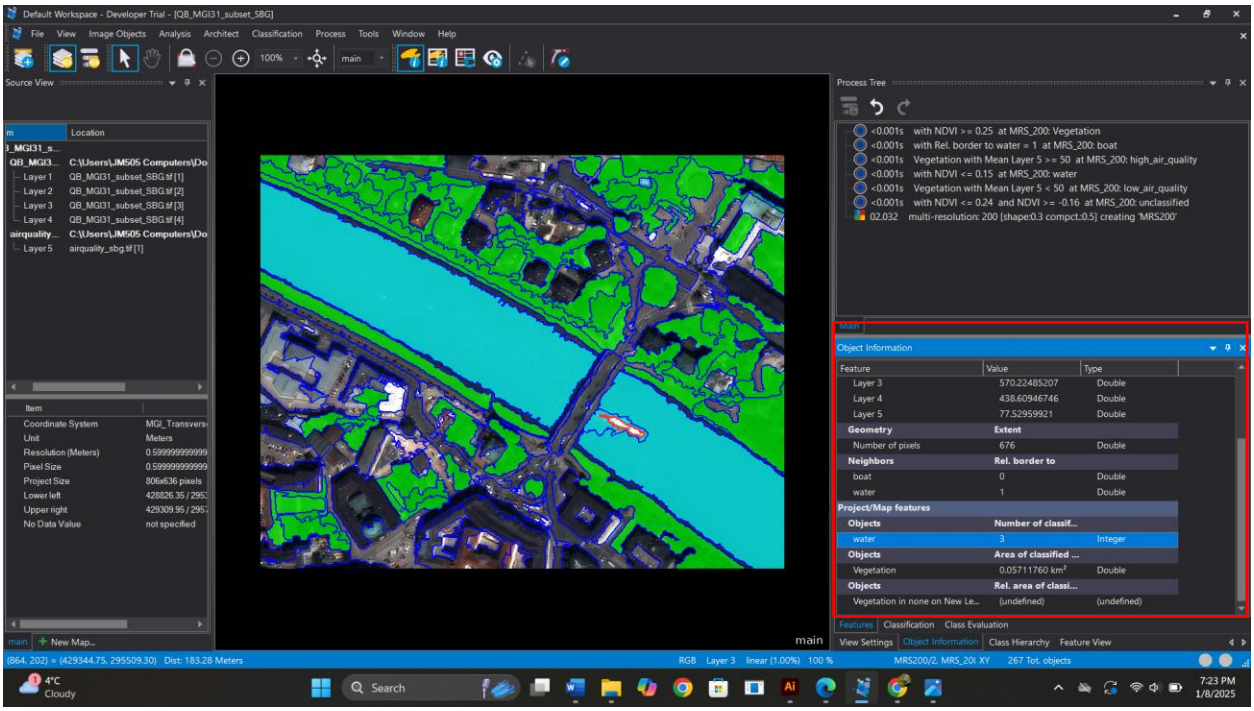
class" algorithms were added to split the vegetation classes in different air quality classes (Air quality layer is in our project "layer 5"). (See below SS)






Default Workspace - Developer Trial - [QB_MGI31_subset_SBG]
File View Image Objects Analysis Architect Classification Process Tools Window Help
Source View
Process Tree
<0.001s with NDVI >= 0.25 at MRS_200: Vegetation
<0.001s Vegetation with Mean Layer 5 < 50 at MRS_200: low_air_quality
<0.001s with NDVI <= 0.24 and NDVI >= -0.16 at MRS_200: unclassified
<0.001s Vegetation with Mean Layer 5 >= 50 at MRS_200: high_air_quality
<0.001s with NDVI <= 0.15 at MRS_200: water
<0.001s with Rel. border to water = 1 at MRS_200: boat
02.032 multi-resolution: 200 [shape:0.3 compct.:0.5] creating 'MRS200'
View Settings
Object Levels
Image Layers
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Object Level Settings
Available Classes
unclassified
Auto update
Apply to all views
main
4°C Cloudy
Search
7:16 PM 1/8/2025


Default Workspace - Developer Trial - [QB_MGI31_subset_SBG]
File View Image Objects Analysis Architect Classification Process Tools Window Help
Source View
Process Tree
<0.001s with NDVI >= 0.25 at MRS_200: Vegetation
<0.001s with Rel. border to water = 1 at MRS_200: boat
<0.001s Vegetation with Mean Layer 5 >= 50 at MRS_200: high_air_quality
<0.001s with NDVI <= 0.15 at MRS_200: water
<0.001s Vegetation with Mean Layer 5 < 50 at MRS_200: low_air_quality
<0.001s with NDVI <= 0.24 and NDVI >= -0.16 at MRS_200: unclassified
02.032 multi-resolution: 200 [shape:0.3 compct.:0.5] creating 'MRS200'
Feature View
Search feature
Map
Region
Objects
Area of classified objects
Create new 'Area of classified objects'
Vegetation (m²)
Area of classified objects in region
Area percentage of
Existence of object level
Histogram of object value
Layer StdDev of classified objects
Layer mean of classified objects
Number of classified objects
Create new 'Number of classified objects'
water
Rel. area of classified objects in region
main
Ready
4°C Cloudy
Search
7:19 PM 1/8/2025



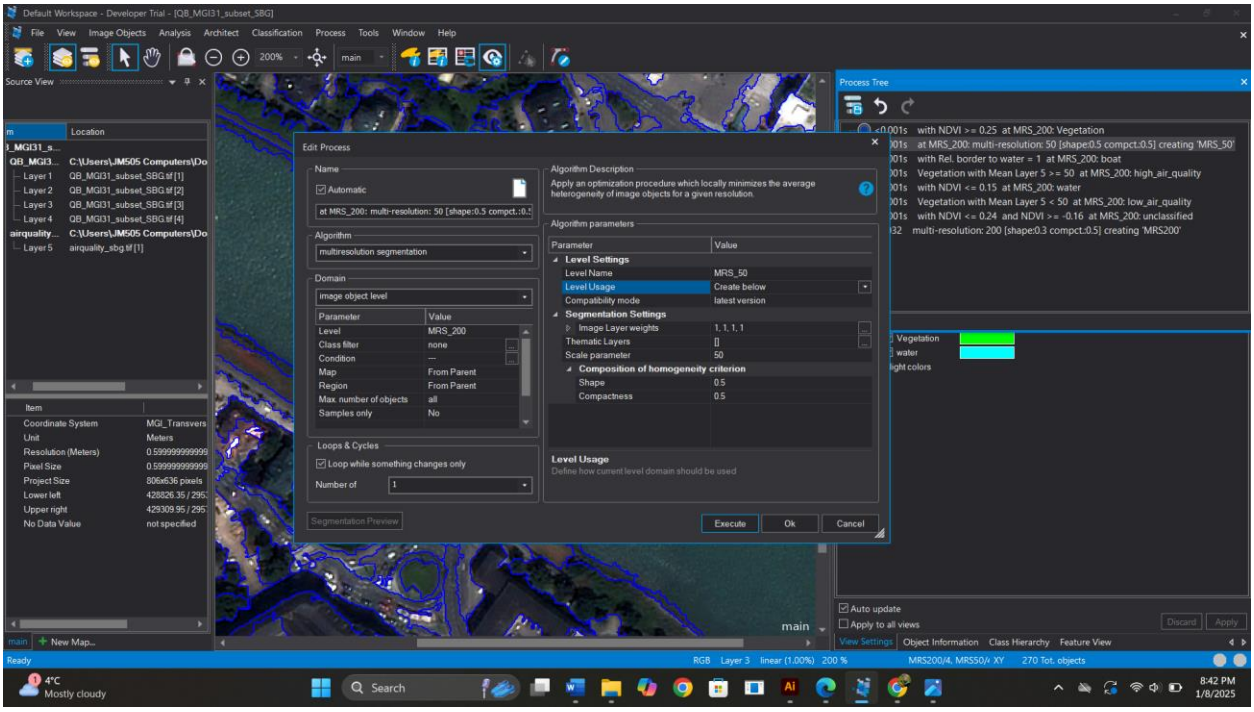
Q 3. How many objects were classified as „water"?

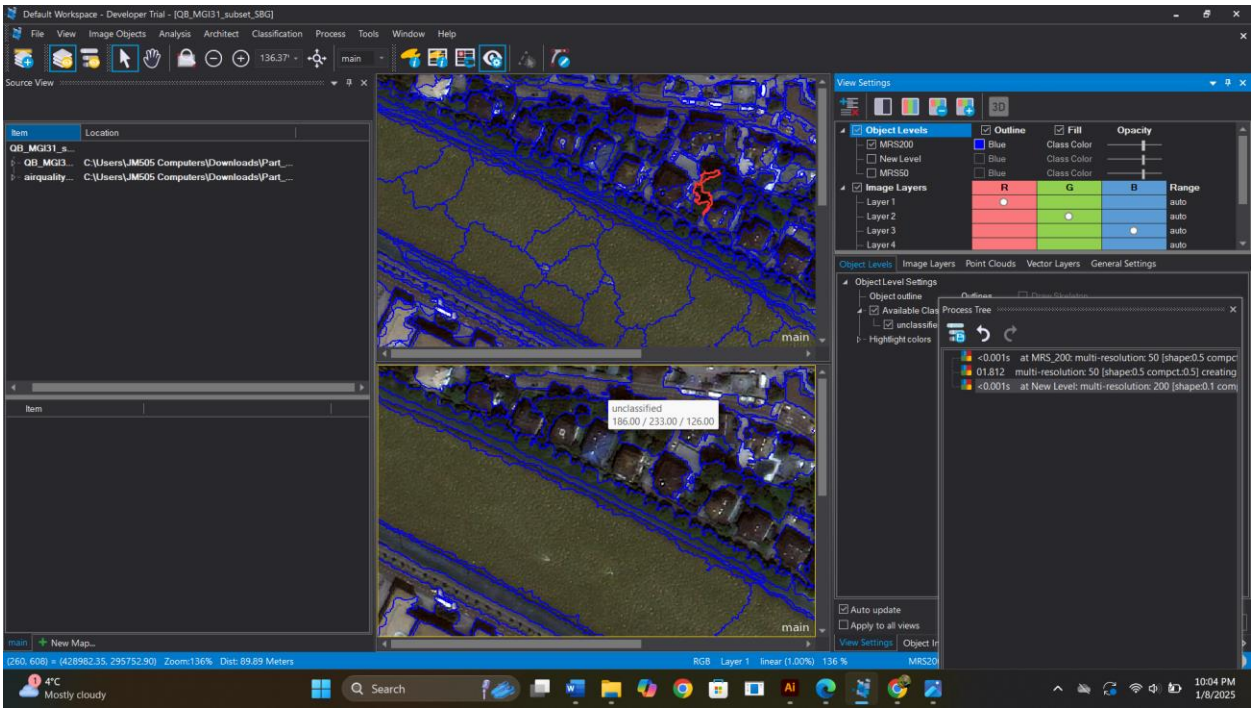
A. Three objects were classified as Water as can be seen in the screenshot under the object section.

Q 4. What is the area of the whole vegetation class (if you select the vegetation class to generate the feature, it will summarize the values from the grouped sub-classes)?

A. The area of the whole vegetation class is 0.05711760 square km.

Task 5: Creating a new level





Scale Parameter 50

Output:

Resulted in smaller segments with more details but in this case it's also segmenting one water body in to smaller segments and leading to over-segmentation. That may not make a sense. It seems it is suitable for detailed features such as building, roads and small vegetation patches.

Scale Parameter 200

Output:

It produced larger segments, it seems that it is better suitable for larger homogenous features such as forest, water bodies as seen in the screenshot. It reduced noise by merging small objects.

Question 5: What is the meaning of the distance value when you create the feature?

When constructing relationships between objects, the distance value is utilized as a parameter, particularly for the feature "Existence of super-objects."
To determine if a "super-object" such as vegetation or another higher-level object in the hierarchy is seen as being related to the object in question, the distance value establishes a threshold or spatial closeness. In this instance, a distance value of 1 means that the relationship is assessed within a unit's distance from the object.