

# Segmentation

## Introduction

The aim of the analysis is to compare different segmentation algorithms through different platforms.

The following section is a comparison between the segmentation from eCognition and the segmentation from ArcGis Pro.

eCognition Multiresolution Segmentation parameters are divided in homogeneity criteria “Shape”, corresponding to values of shape and color, and “Compactness”, related to the smoothness of the segment.

- Higher values in “Shape” , 0.9, more importance on the pixel shape and less importance on the pixel color.
- Higher values in “Compactness” equals more smoothness.

ArcGis Pro Segmentation has two main parameters: “Spectral detail”, related to the similarities of the spectrum or color, and “Spatial detail”, proximity between the features. The third parameter is “Minimum segment size” related to the minimum mapping unit, the smaller segment size is merged with the best fitting neighbor.

- Higher values in “Spectral detail” as 20.0 define more spectral separability between similar spectrums. Lower values 1.0 merge more range of spectrums.
- Higher values in “Spatial detail” as 20.0 makes the features smaller and clustered together. Low values as 1.0 allow big segmentation polygons.
- Higher values “Minimum segment size” merge segments to the best fitting neighbor.

## Methodology

The procedure consists of two segmentations in eCognition and three segmentations from ArcGis Pro.

1. eCognition Multiresolution Segmentation 1 parameters:
  - “Shape” 0.3
  - “Compactness” 0.9

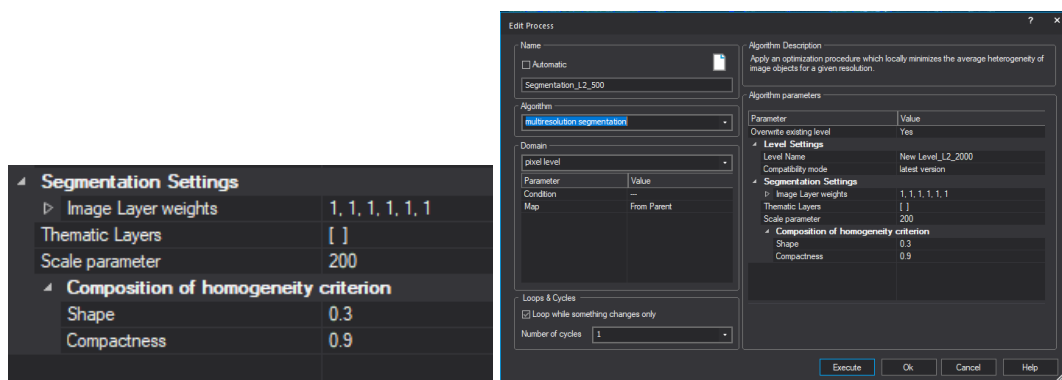


Figure 1. Parameter eCognition segmentation 1.

2. eCognition Multiresolution Segmentation 2 parameters:

- “Shape” 0.9
- “Compactness” 0.5

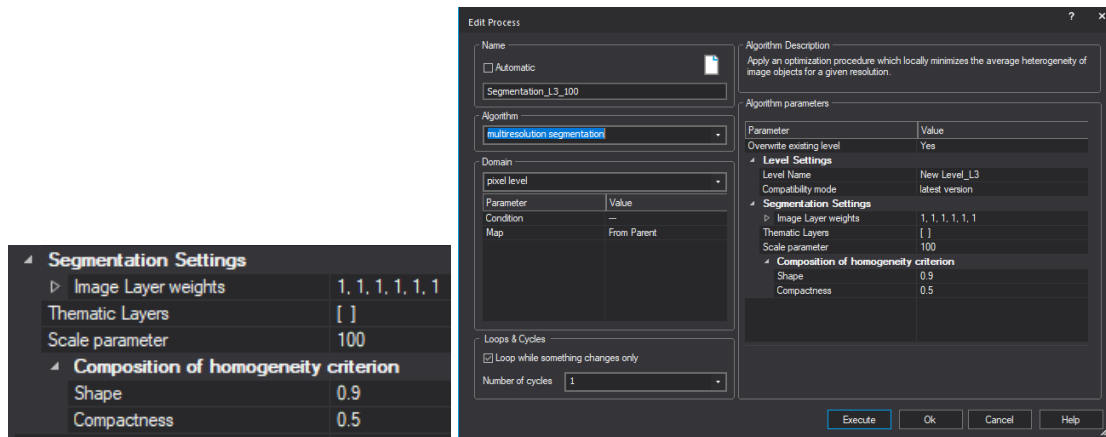


Figure 2. Parameter eCognition segmentation 2.

3. ArcGIS Pro Segment Mean Shift 1 parameters:

- “Spectral detail” 15
- “Spatial detail” 5
- “Minimum segment size” 20

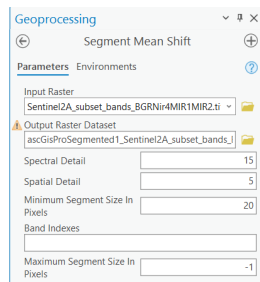


Figure 3. Parameter ArcGIS Pro Segment Mean Shift 1.

4. ArcGIS Pro Segment Mean Shift 1 parameters:

- “Spectral detail” 19
- “Spatial detail” 17
- “Minimum segment size” 5

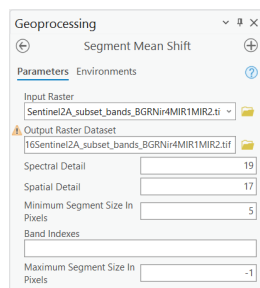


Figure 4. Parameter ArcGIS Pro Segment Mean Shift 2.

5. ArcGIS Pro Segment Mean Shift 1 parameters:

- “Spectral detail” 19
- “Spatial detail” 17

- “Minimum segment size” 15

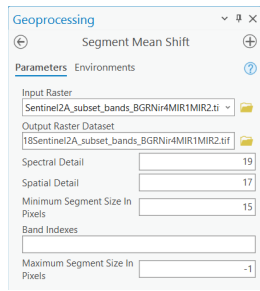


Figure 5. Parameter ArcGis Pro Segment Mean Shift 3.

eCognition parameters	Scale (max-min)	Segmentation 1	Segmentation 2	ArcGis Pro parameters	Scale (max-min)	Segmentation 1	Segmentation 2	Segmentation 3
Shape (spatial)	0.9 - 0.1	0.3	0.9	Spectral	20.0 - 1.0	15	19	19
Shape (color/spectral)	0.9 - 0.1	0.7	0.1	Spatial	20.0 - 1.0	5	17	17
Compactness	0.9 - 0.1	0.9	0.3	Minimum segment	20.0 - 1.0	20	5	15

Table 1. Table of segmentation parameters.

## Results

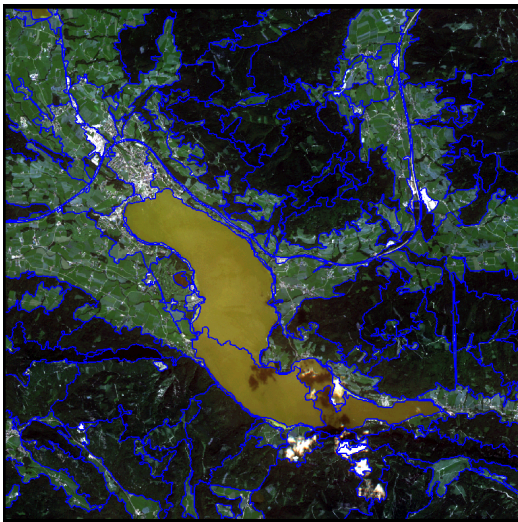


Figure 6. Segmentation 1 eCognition.

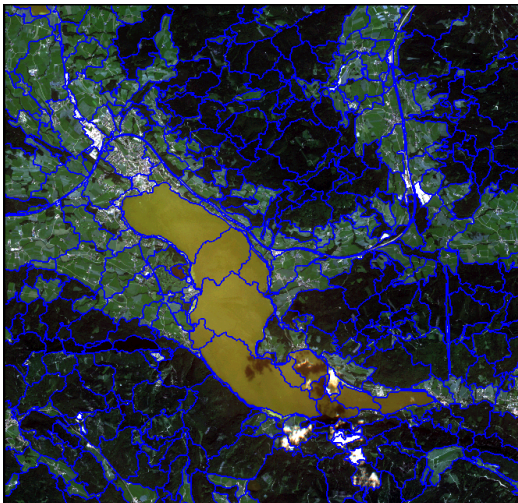


Figure 7. Segmentation 2 eCognition.



Figure 8. Segmentation 1 ArcGis Pro.

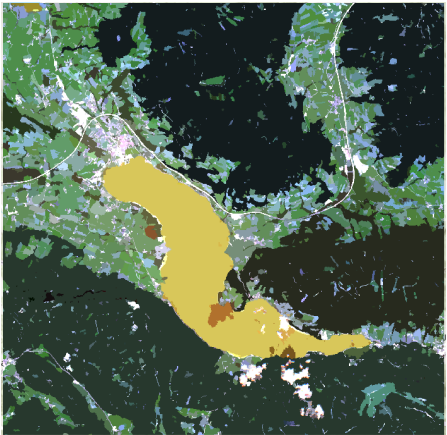


Figure 9. Segmentation 2 ArcGis Pro.

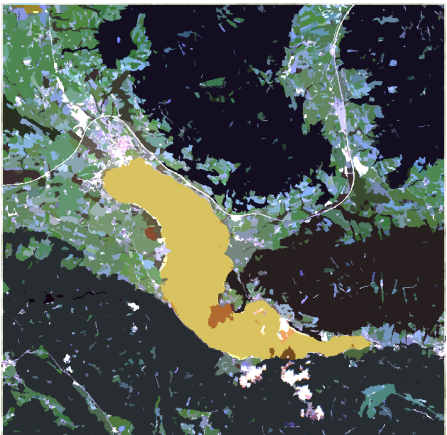


Figure 10. Segmentation 3 ArcGis Pro.

## Discussion

The results between the ArcGis Pro and eCognition are different even though the parameters of the algorithms take into account similar properties as it is explained in the introduction and compared on the table1. The parameters of Spatial and Spectral detail would be similar to the Shape parameter, and the Minimum Segment similar compared to the Compactness. But it hasn't been that way.

The first segmentation form eCognition fig.6 and the first segmentation of ArcGis Pro fig.8 have similar parameters in proportion, but the results are completely different.

In order to compare results visually the parameters of analysis had been changed (table 1.). The fig1 to the fig2 can be compared with the fig4 and fig5. Analyzing the results we can say that the ArcGis Pro segmentation (fig4 and fig5) have a major influence on the parameter color, as it makes a big segment polygon of all the forest together. On the other hand the segmentation of eCognition ( fig1 and fig2) makes more differences between the same element, there are more forest segments. The eCognition seems to have a higher dependency on the compactness for the segment polygons, as in the case the forest generates more segments.

To summarize, the different algorithms and the parameters can not be directly compared as the result of the two algorithms are different.