Evaluation of habitat sites by applied remote sensing

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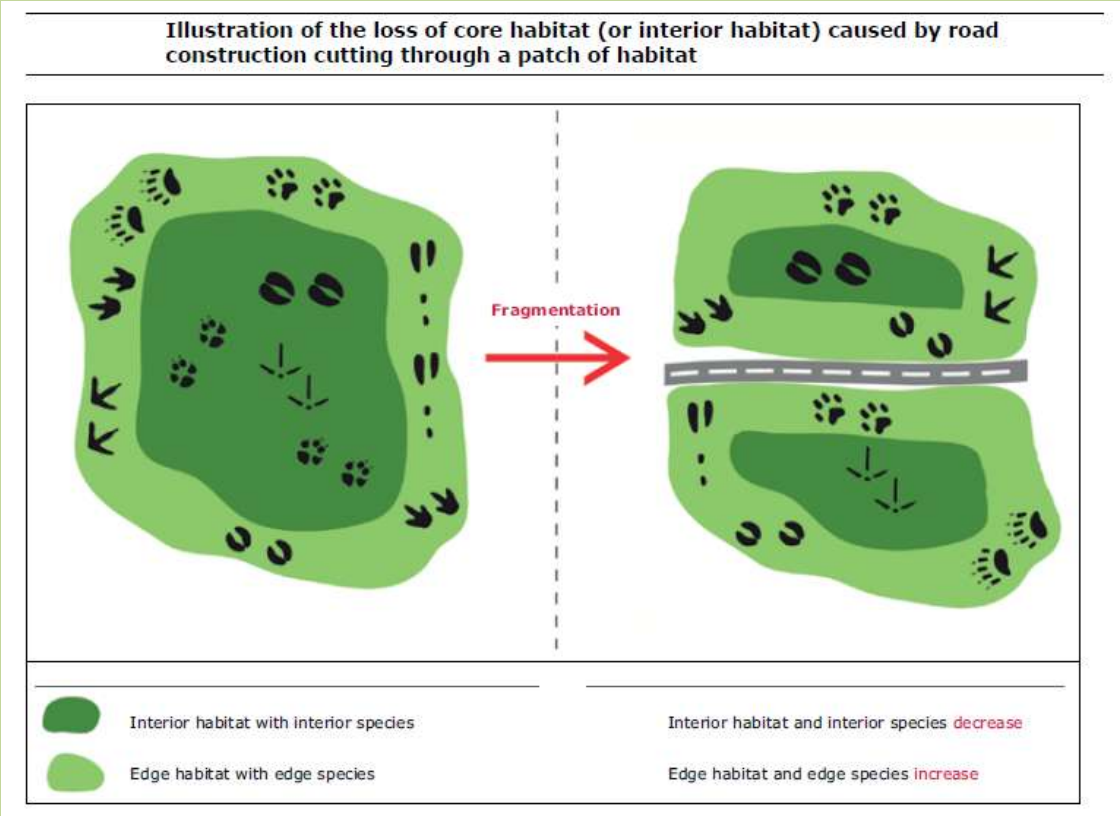
ChangeHabitats2

Network for Habitat Monitoring by Airborne-supported Field work

– an innovative and effective process in implementation of the Habitat Directive

Landscape ecology



EEA Report No 2/ 2011;

Land scape fragmentation in Europe

Geoinformatical methods

- Monitoring

- State-evaluation

Study Area

-Preserved in 1939

The total connected area is 1092 ha today.

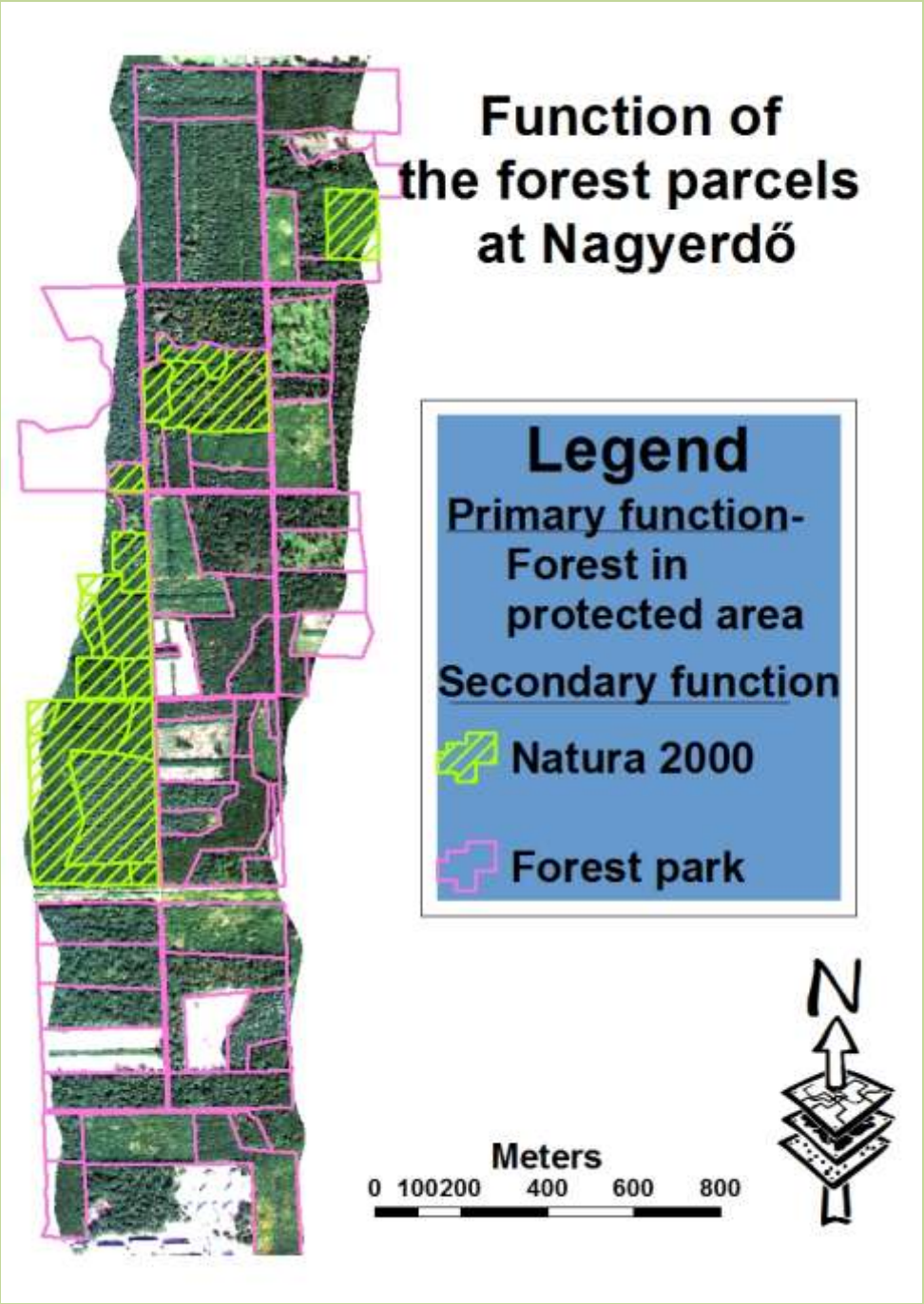
Study Area

- Planted trees are mainly young
- The largest problem:
  - Aridness
  - Degradation of the old oak trees
  - Presence of invasive species

- 2 highly protected

49 protected vertebrate

- 39 protected invertabrate animal



Function of forest parcels

-Primary function

- Each parcel is a Natura 2000 site

-Secondary function

-Natura 2000

- Forest park

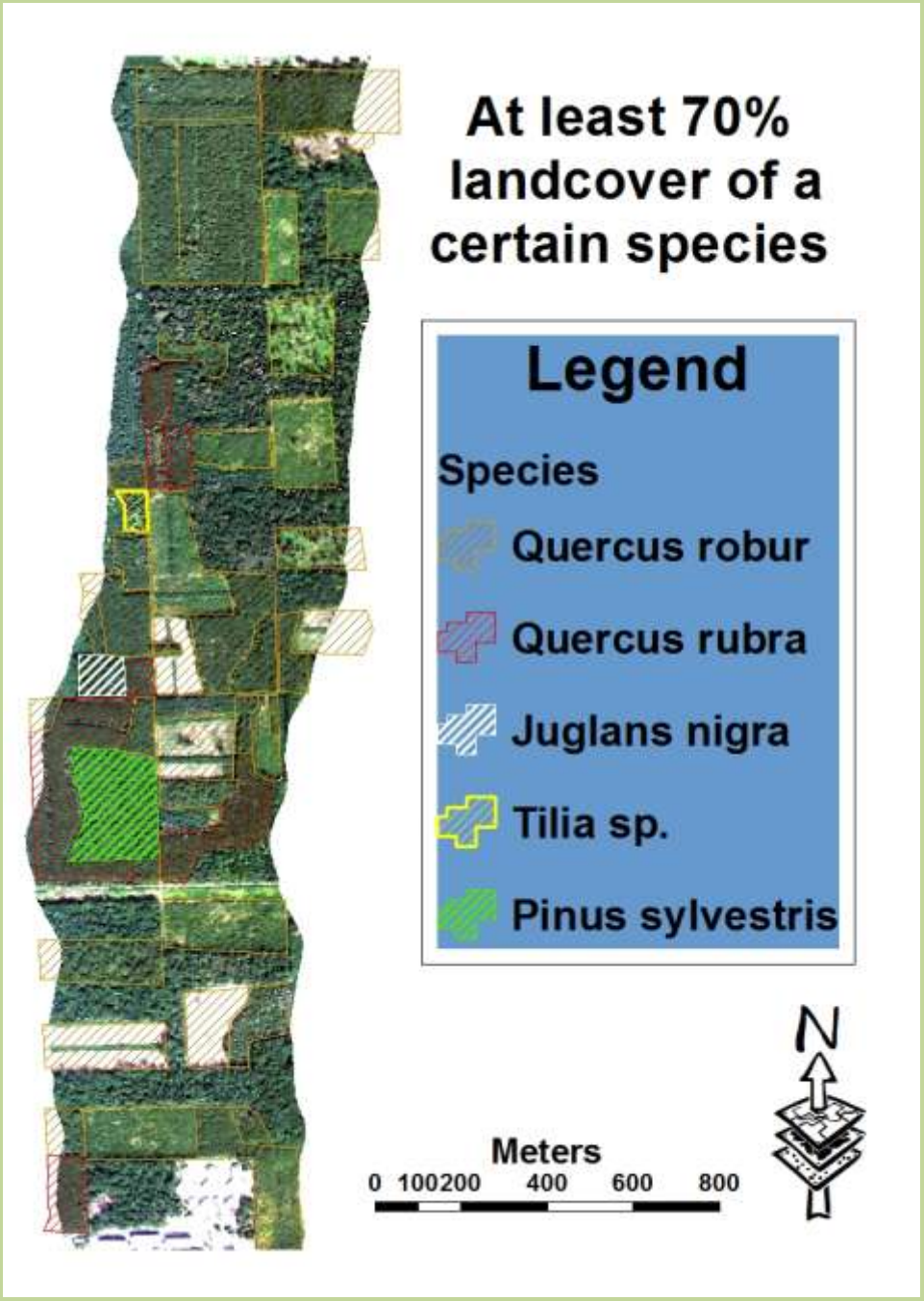
- Tertiary function

-Natura 2000 function of forest parks

Hyperspectral image:

-1.5 m spatial resolution

-359 spectral bands



Landcover

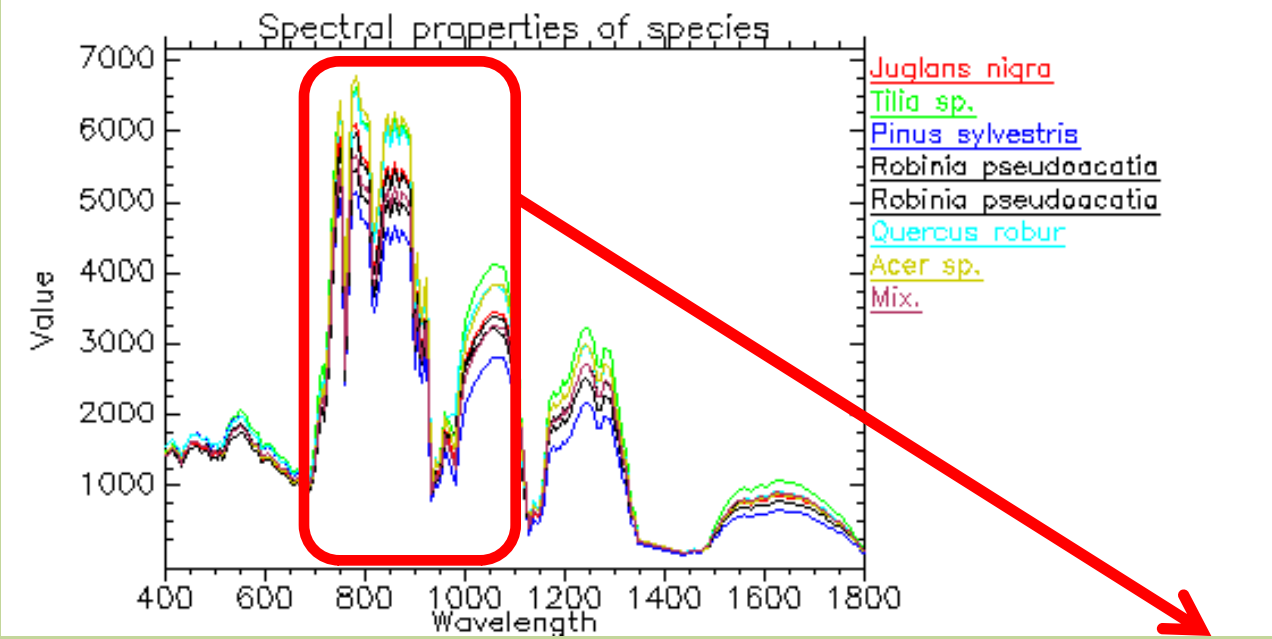
- Largest rate of the area
- Highest natural degree
- Species reach 70% coverage

Reference data

- Mixed oak (Quercus robur)
- Mixed maple
- Tilia sp.
- Black walnut (Juglans nigra)
- Pine (Pinus sylvestris)
- Oak (Quercus robur)
- Mixed acacia

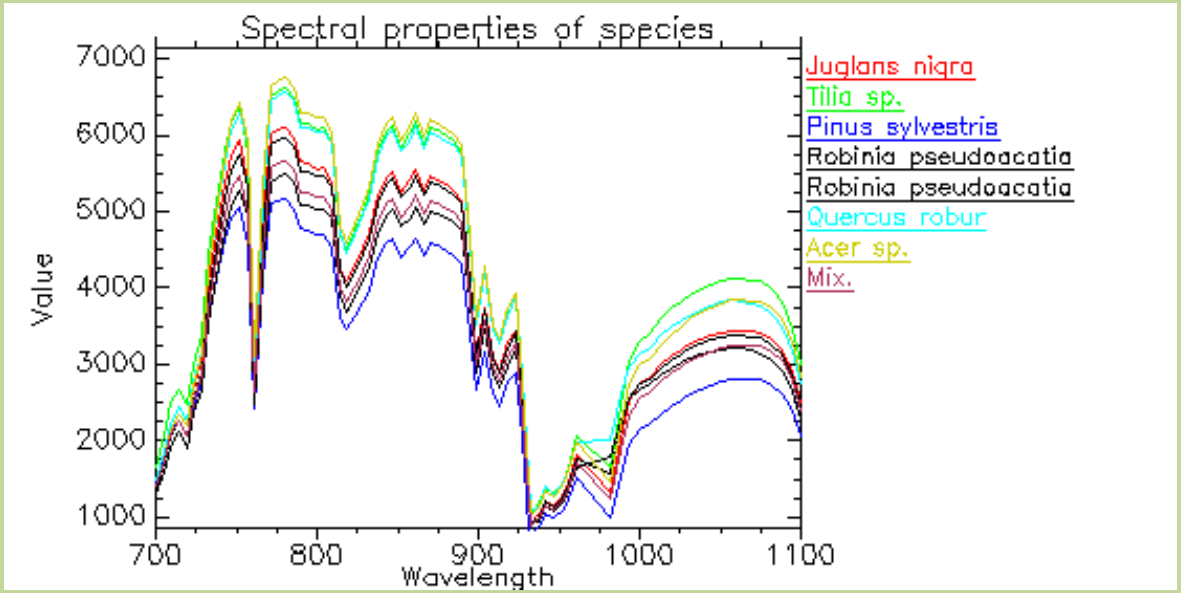
- Study areas
- Field identification points

Spectral profiles



-Spectral characteristics of the tree species

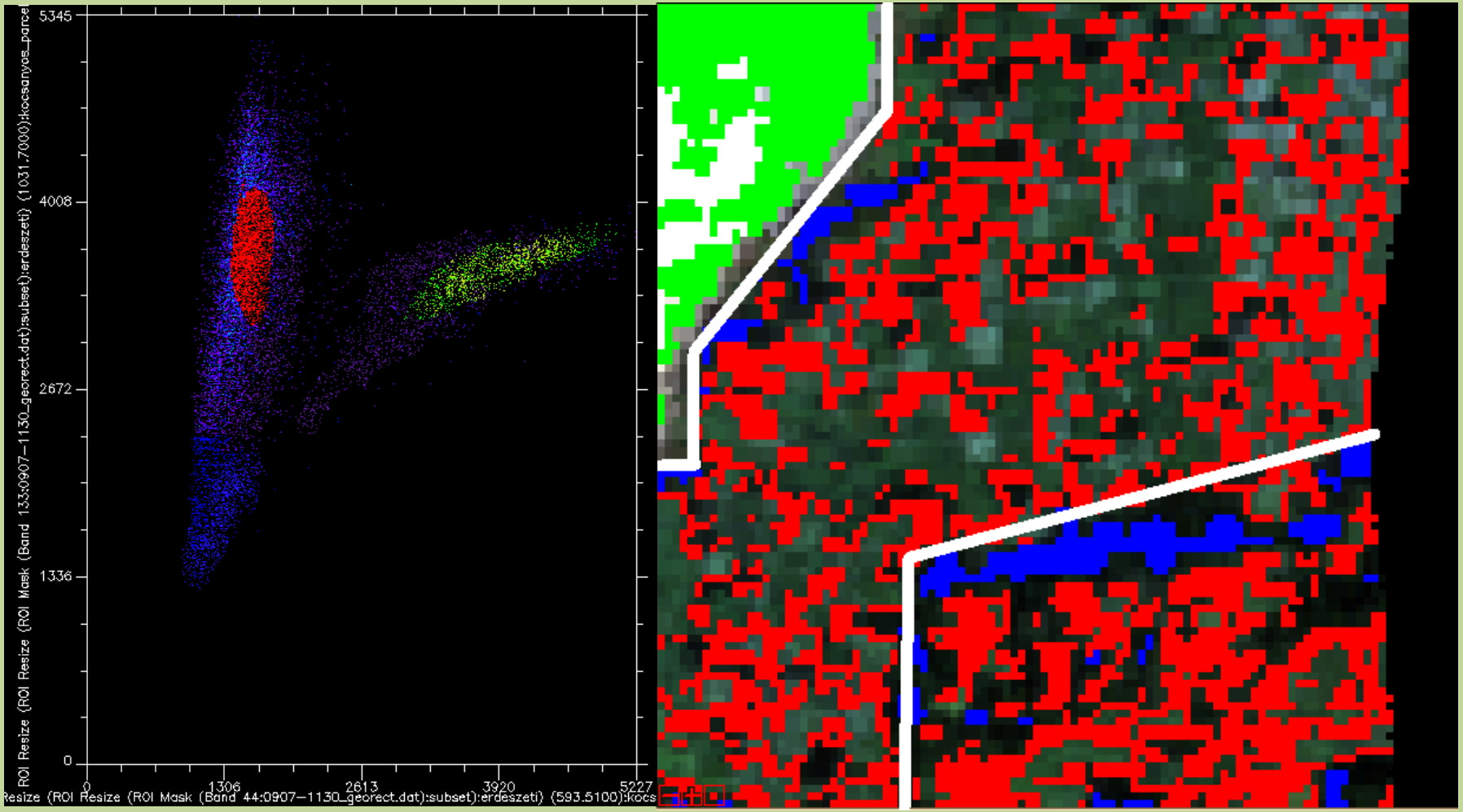
- Wave-length interval



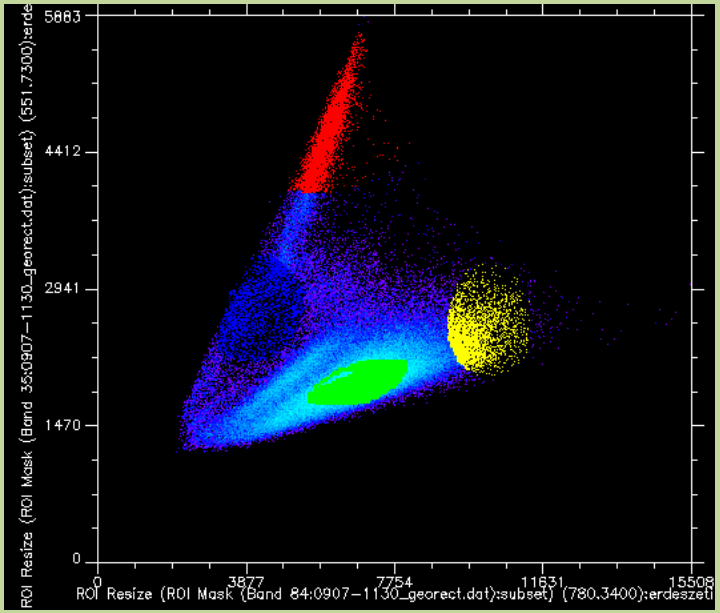
- Determine 2 wave-lengths where the difference was the highest

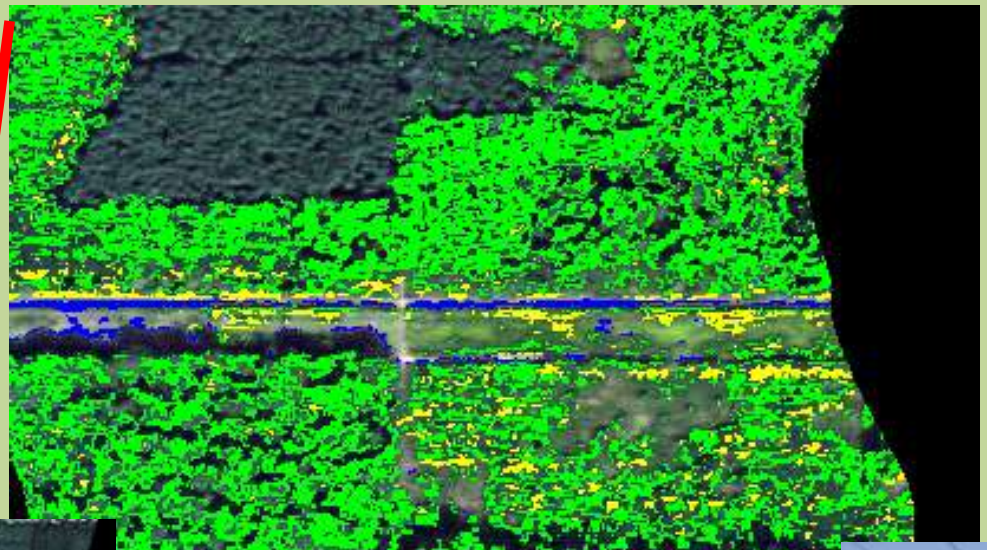
2D scatter plot

For the classification we chose a parcel where the 70% of the area is covered with well-fitting oak trees



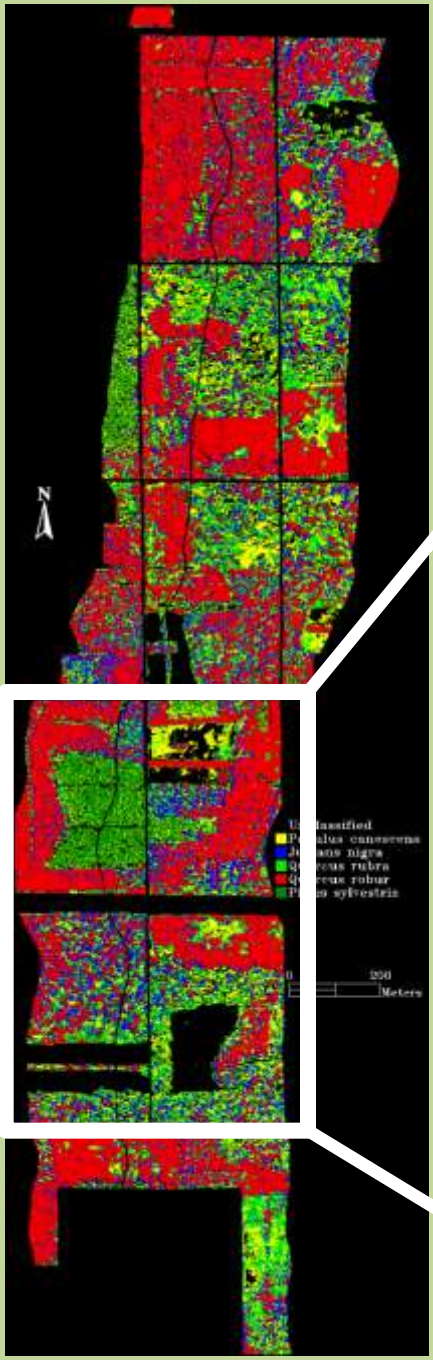
2D Scatter Plot

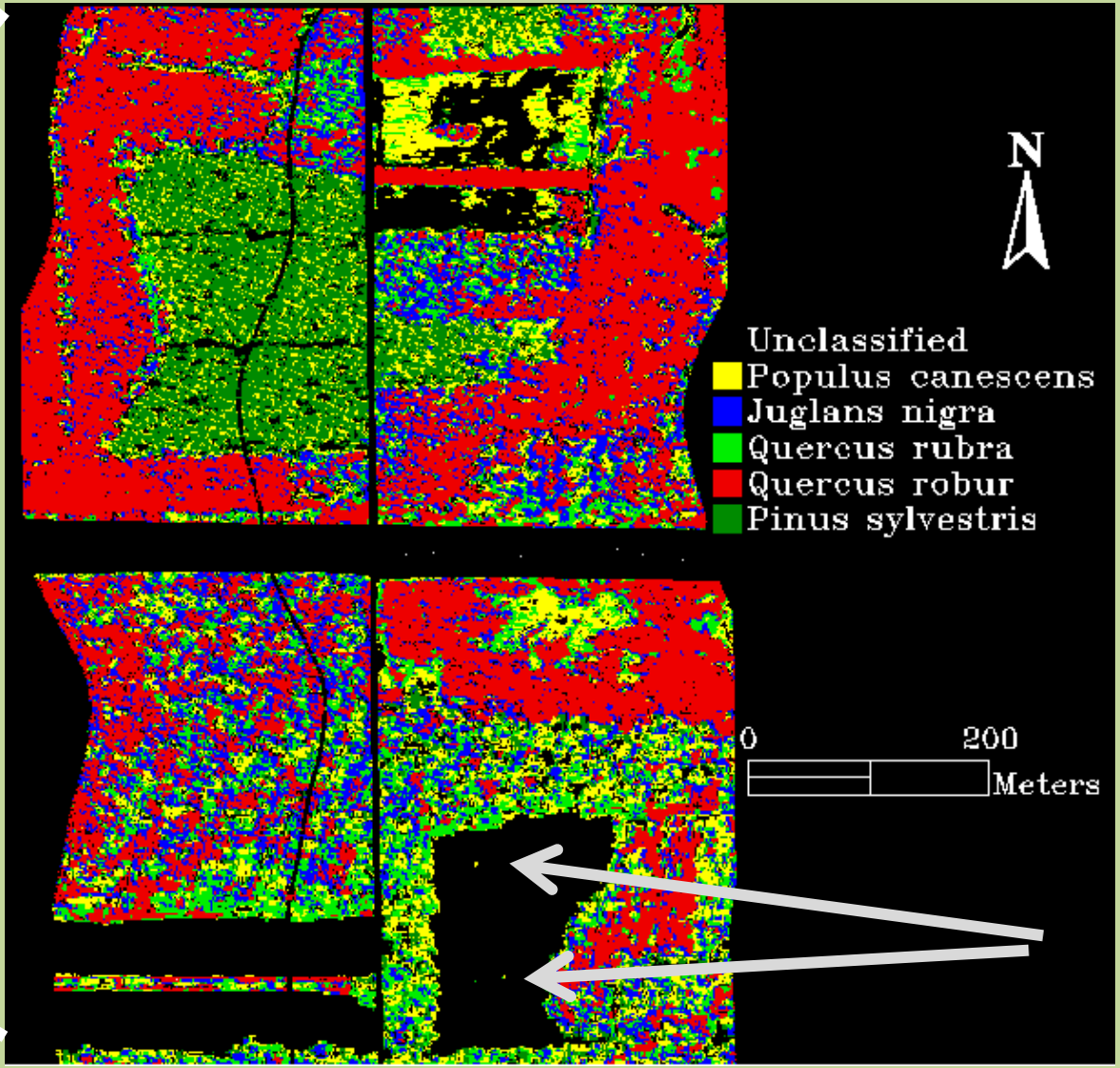




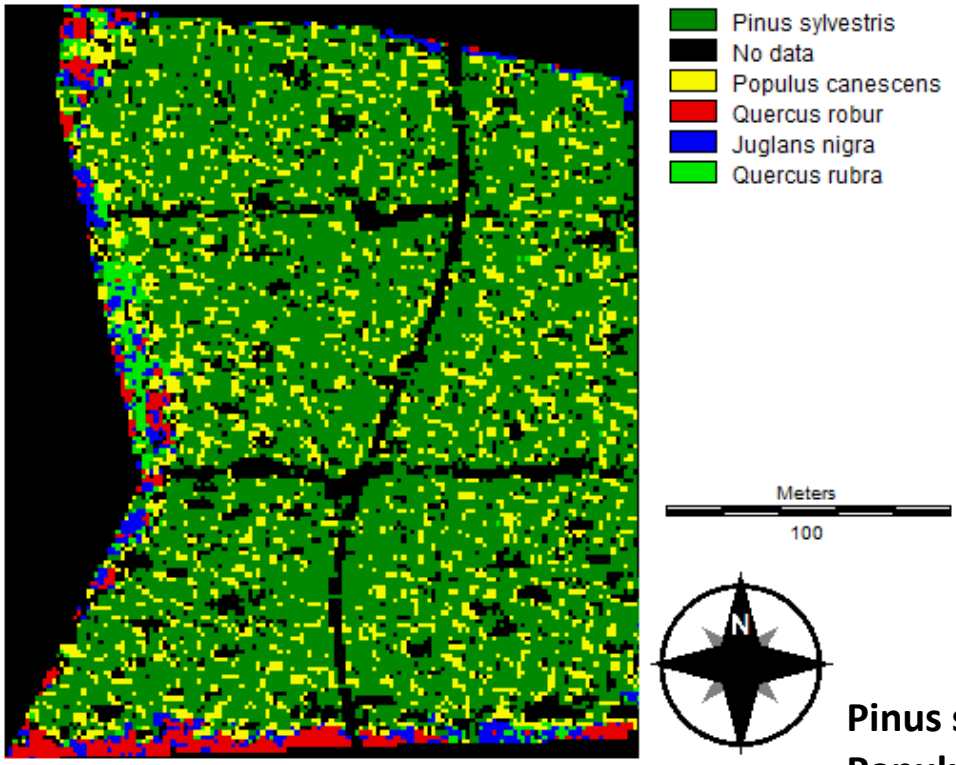
- run of the railway
- encircling alianthus trees

Applying Spectral Angle Mapper Classification





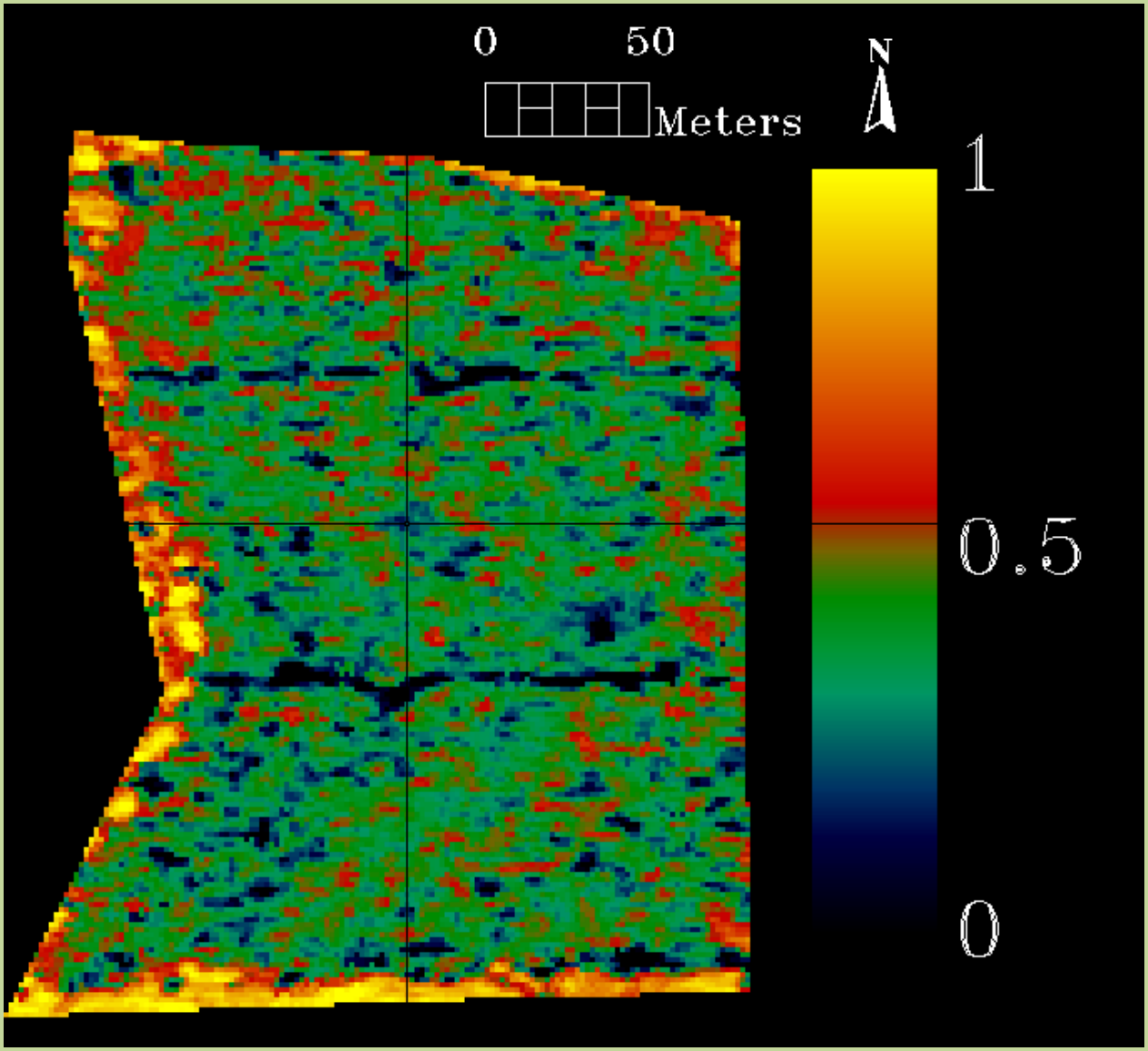
Data controlling



Mixed tree species:
Robinia pseudoacacia
Acer negundo
Padus serotina

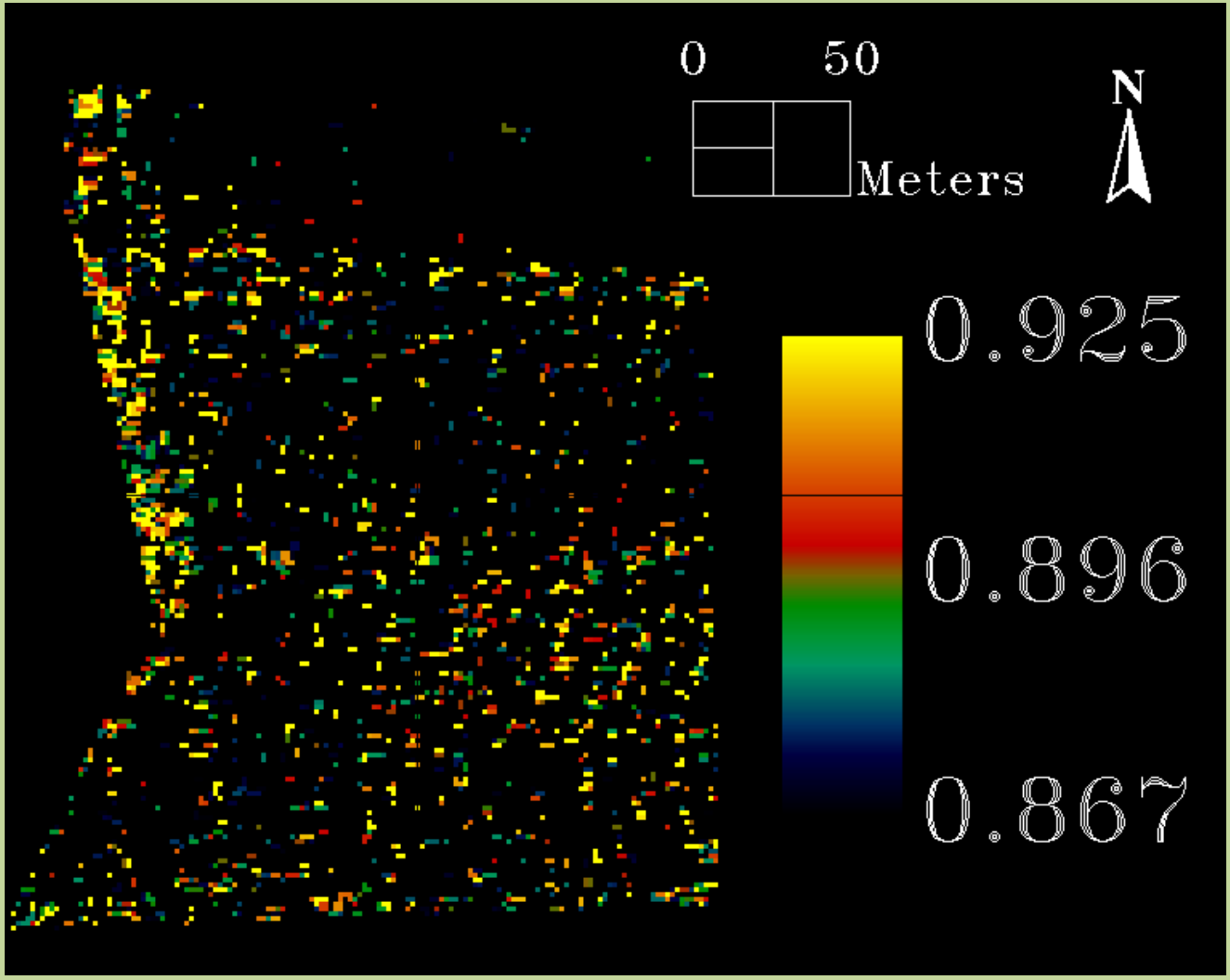
	Results coverage (%)	Registry of the forestry
Pinus sylvestris	**74,45**	**Above 70%**
Populus canescens	**17,36**	**n.a**
Quercus robur	**3,18**	**n.a**
Juglans nigra	**2,82**	**n.a.**
Quercus rubra	**2,19**	**n.a.**
	100	

Normalized Difference Vegetation Index



NDVI values indicate the amount of green vegetation present in the pixel.

Histogram based segmentation



With the use of higher NDVI values we can separate the pixels of coniferous and deciduous species.

Efficiency of hyperpectral classification methods

- Most sharply and easily the pine plantation can be isolated
- regrowth,
- grassland,
- bushy areas,
- deciduous trees (oak and beech)

- More accurate classification is possible, which needs more research.
- With the use of the available data spectrum characterizing each species cannot be classified precisely.
- The tree-spectrums of the spectral library only characterize one phenological phase → cannot be used in every cases.
- In the case of deciduous trees it seems the spectral differences not just only determined by characterization of the species but there are other conditions which are more deterministic than the species-feature.
- The classification of the species is the most successful if they are evaluated on the bands where the isolated categories have the sharpest differences.

Thank you for attention!