



Standwise Delineation based on 3-D Information from LIDAR

By
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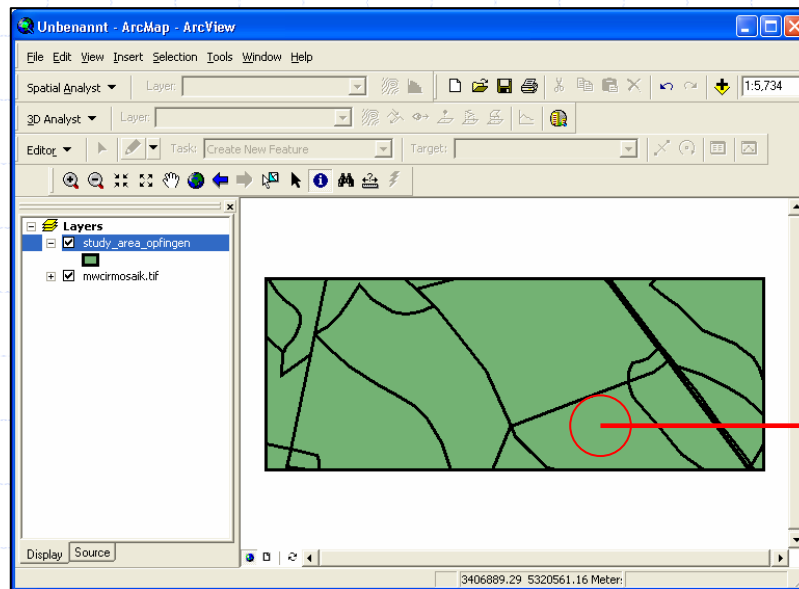
Overview



- 1. Introduction**
- 2. Study Areas / Data Sets**
- 3. Methodology**
- 4. Results**
- 5. Conclusion**

1. Introduction

Digital Forest Stand Maps



Size

Average Stand Height

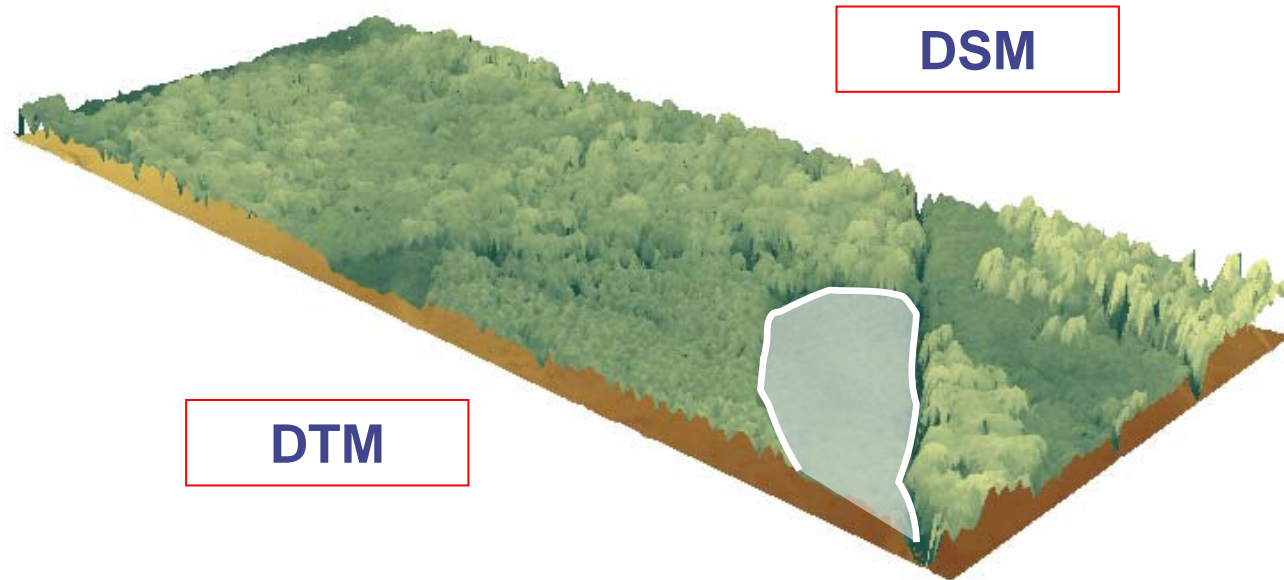
Growing Stock

...

→ No automated method to derive forest stand boundaries!

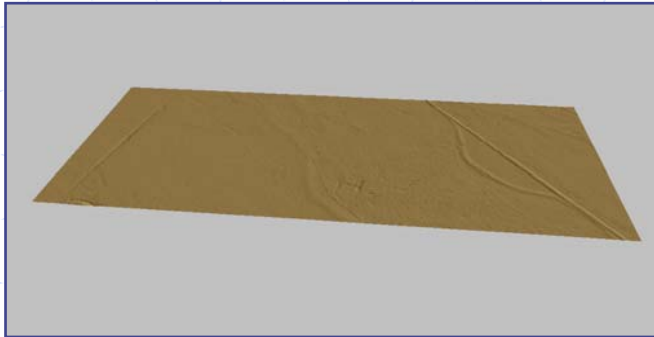
1. Introduction

Determination of forest stands boundaries:

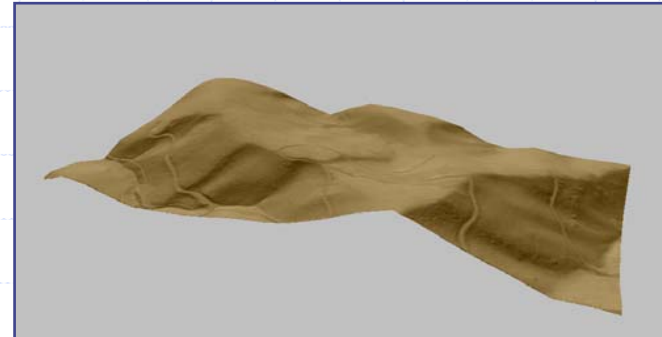


2. Study Areas / Datasets

Study Area 1:



Study Area 2:

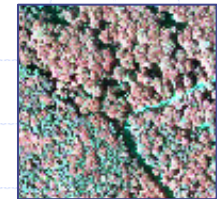
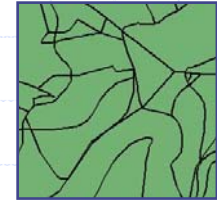


- **Rich in structure**
- **Deciduous and coniferous forest stands**
- **Different age classes**

2. Study Areas / Datasets

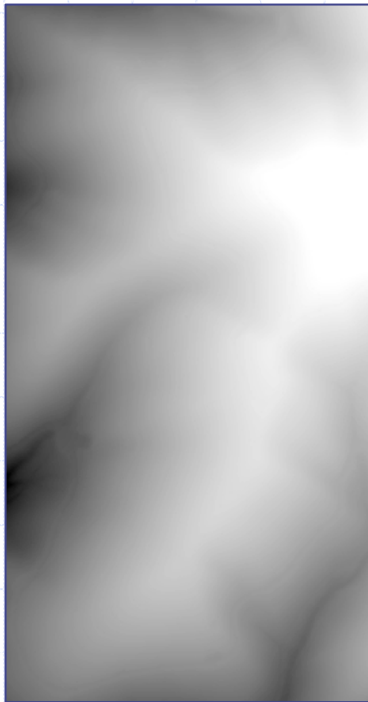
Reference data:

- Digital Forest Stand Map of the Forestry Department
- Multispectral information (RGB, CIR)



3. Methodology

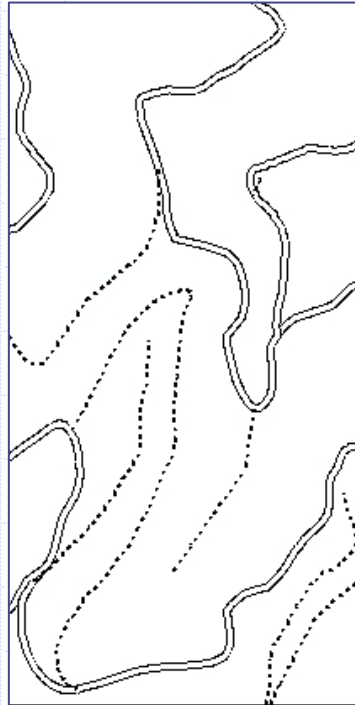
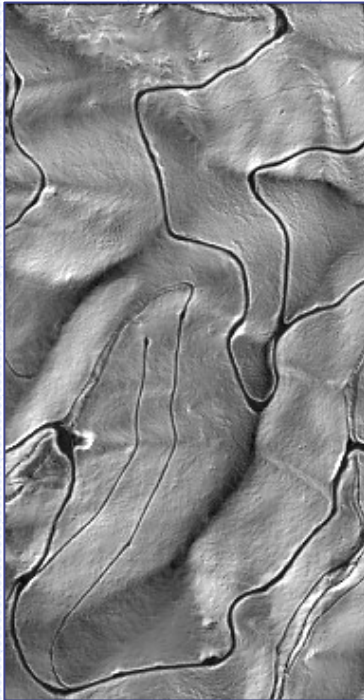
1. Extraction of forest roads based on **DTM**:



DTM

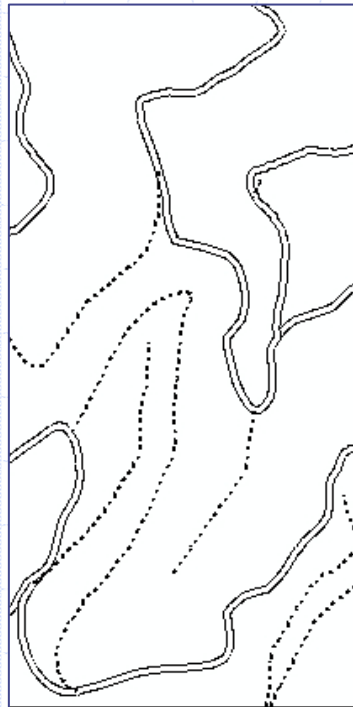
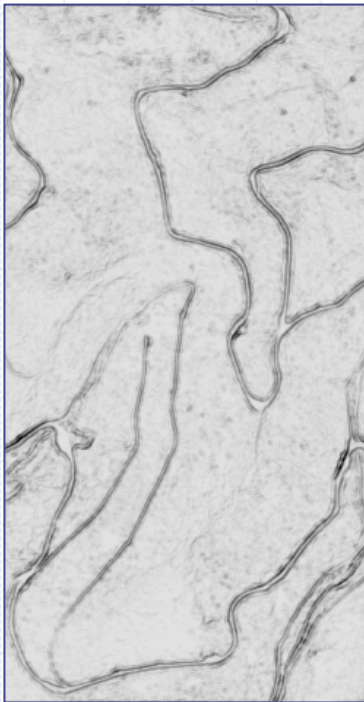
3. Methodology

1. Extraction of forest roads based on **DTM**:



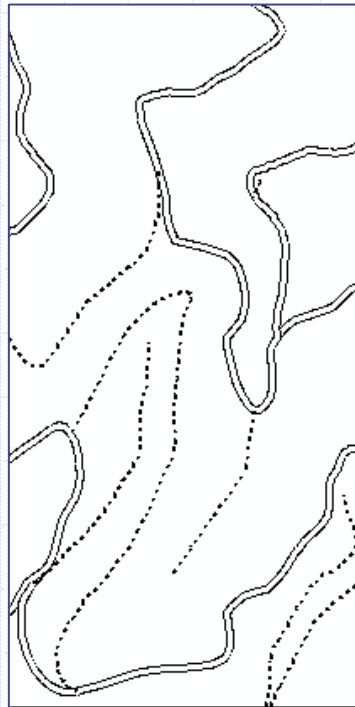
3. Methodology

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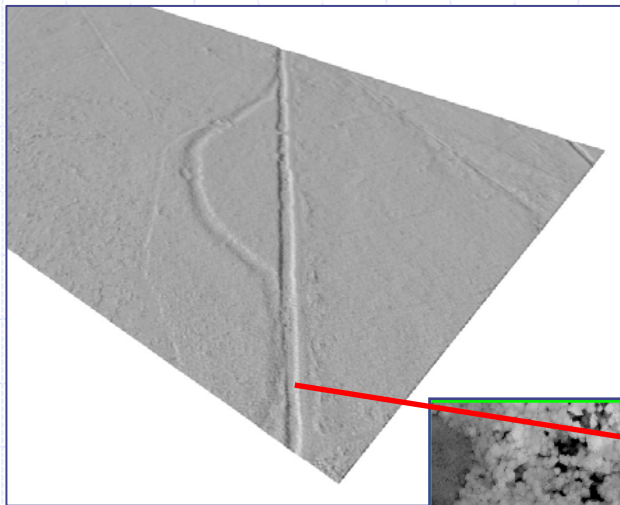
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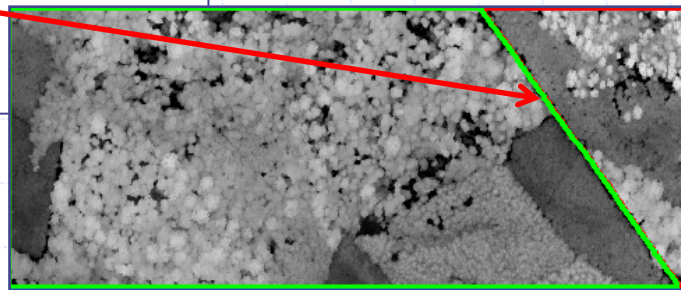


3. Methodology

1. Extraction of forest roads based on **DTM**:



Draining channel:

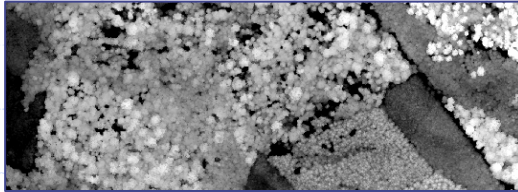


3. Methodology

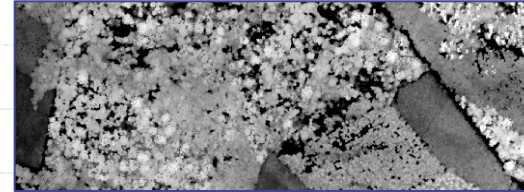
2. Differentiation of coniferous and deciduous forest stands based on **DSMs**:

Summer:

First Echo:



Last Echo:

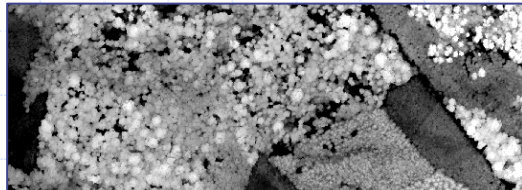


3. Methodology

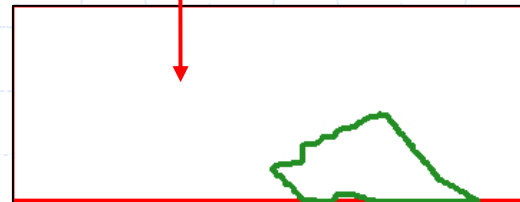
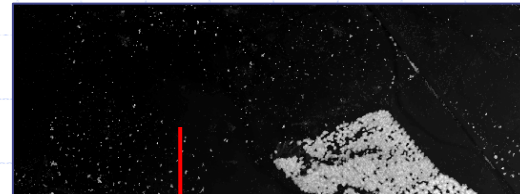
2. Differentiation of coniferous and deciduous forest stands based on **DSMs**:

Winter:

First Echo:



Last Echo:



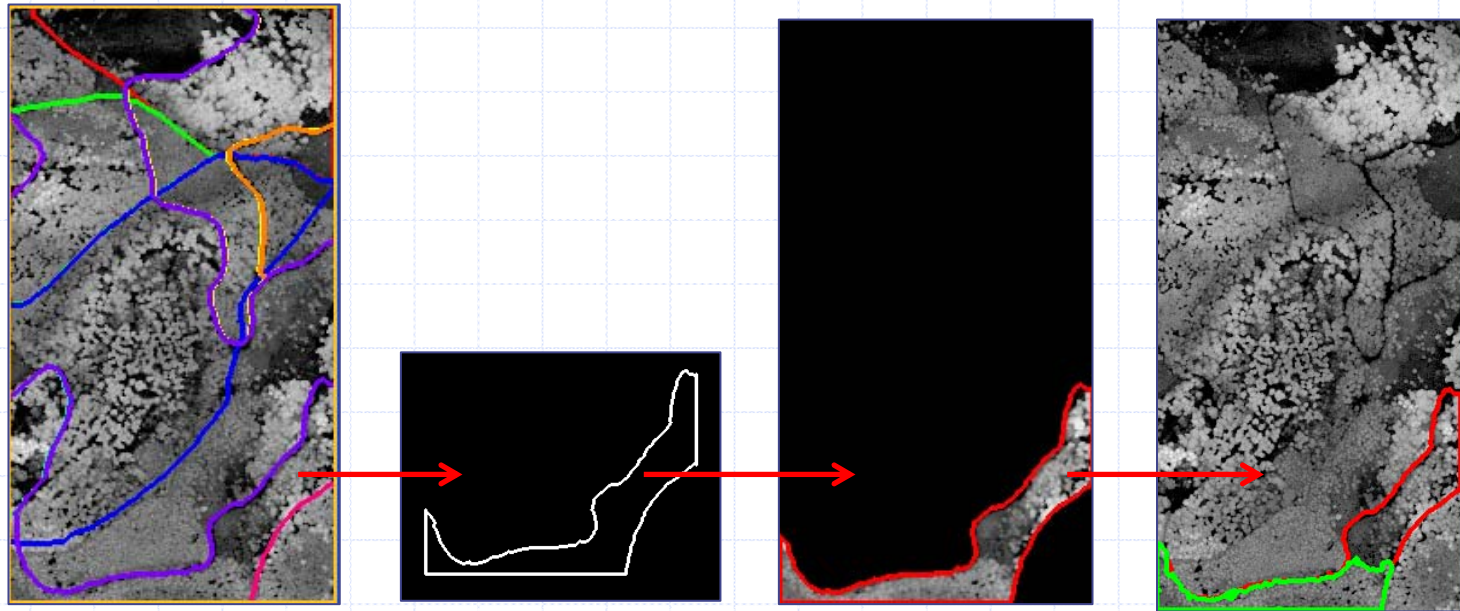
3. Methodology

3. Classification with height classes based on nDSM:

Developmental stage	Height
Juvenile	< 2 m
Sapling	2-10 m
Pole	10-15 m
Mature	> 15 m

3. Methodology

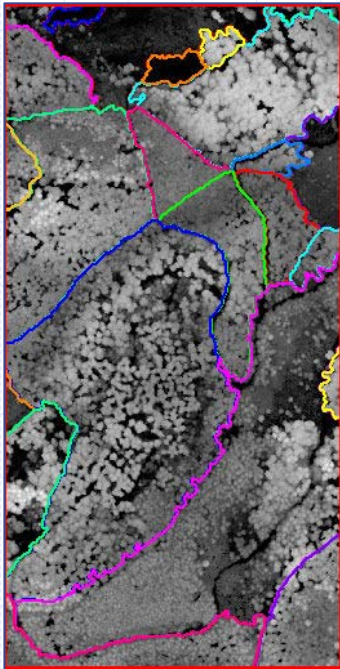
3. Classification with height classes based on nDSM:



3. Methodology

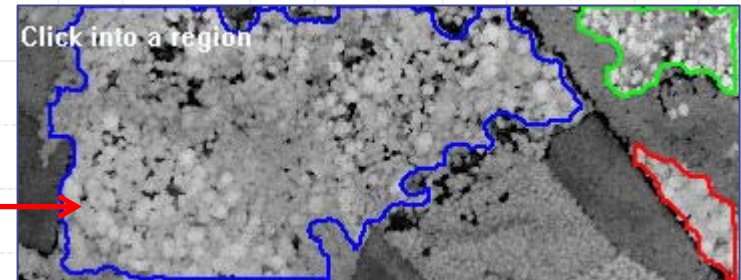
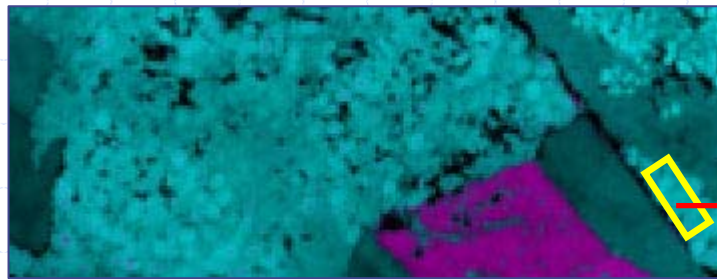
3. Classification with height classes based on **nDSM**:

Study area 2:



3. Methodology

5. Supervised Classification:

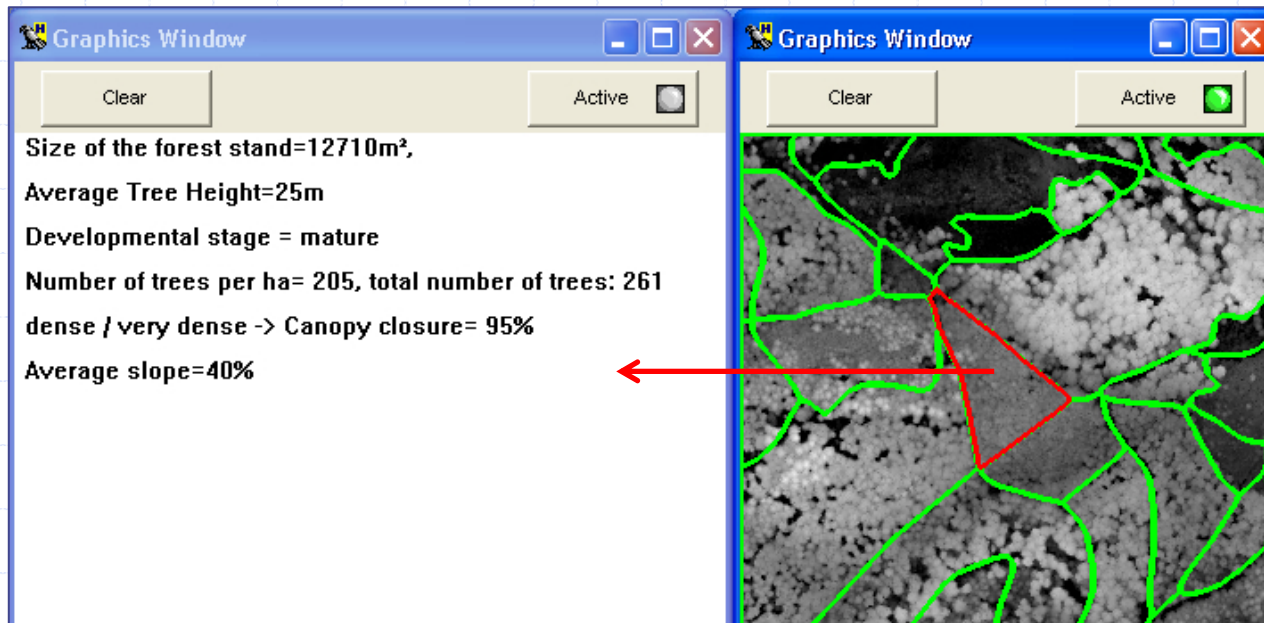


nDSM_[le_w]	nDSM_[fe_w]- nDSM_[le_w]	nDSM_[fe_w]
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Coniferous Trees	Deciduous Trees	both
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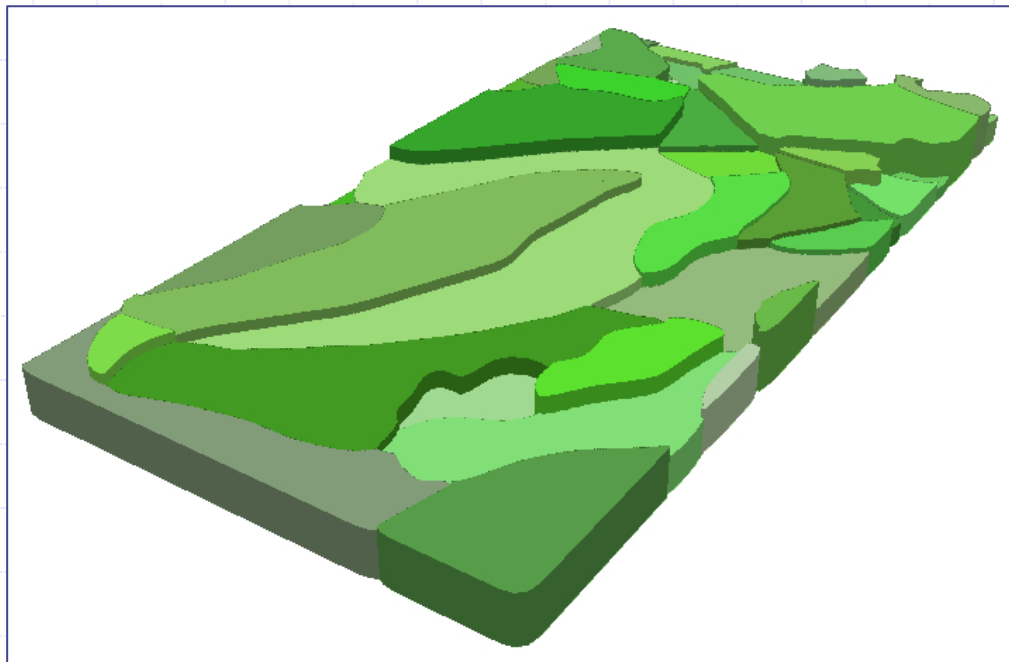
3. Methodology

6. Interactive Graphical Processing Tool



3. Methodology

7. Import into a GIS → 3D forest stand model



4. Results

- **85%** of the the forest stands could theoretically be identified with Airborne Laserscanning.
- **50%** were delineated fully automatically.

5. Conclusion

- The processing chain showed good results in both study areas.
- Input from a human operator was required to improve the results.
- But the processing time could be reduced compared to conventional methods
- Based on stand boundaries important variables for inventories can be derived.

...the last slide!

Thank you very much for your attention!

Any Questions?