

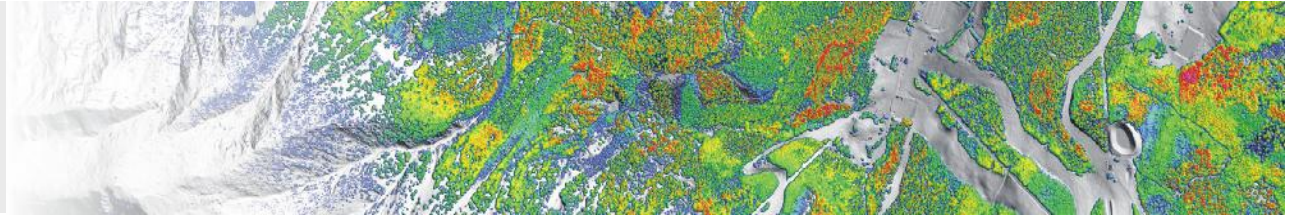
**Sustainability:**

Monitoring

Mapping

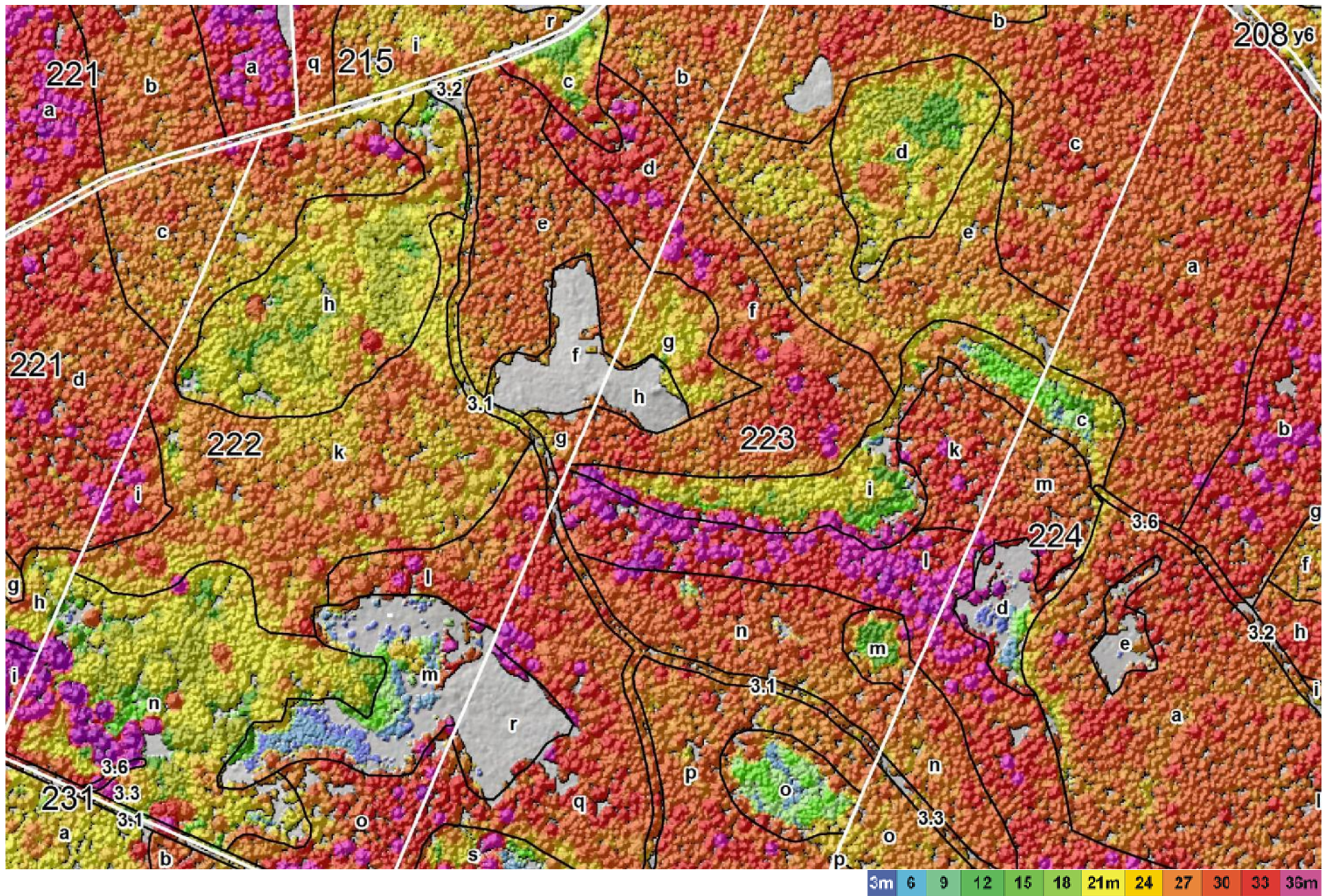
Modelling

Management

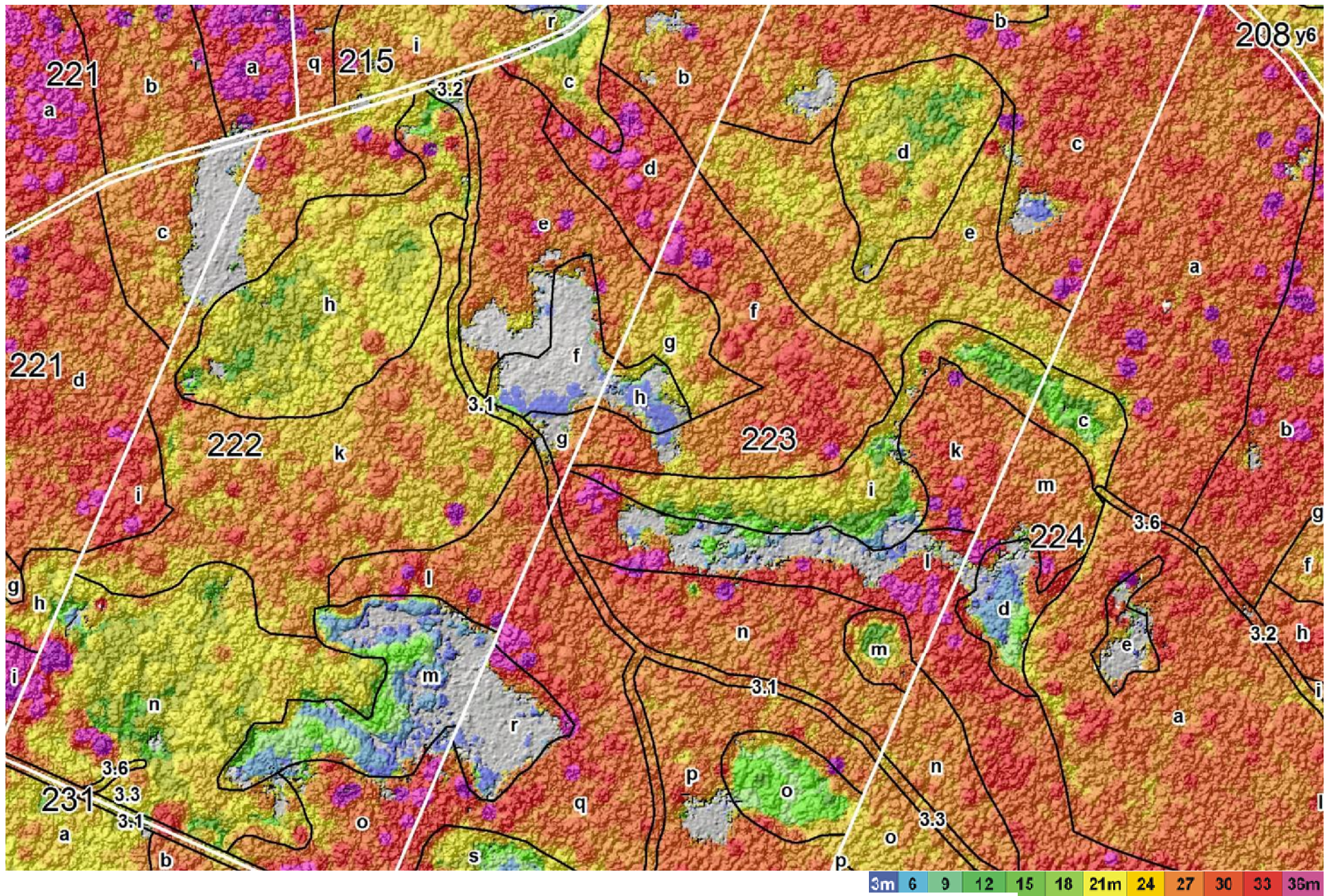


# DSM's for Forestry

Requirements  
in operational Forest  
Management,  
Planning and  
Monitoring



# LIDAR



# Image Matching ( $\leq 70\%$ overlap)

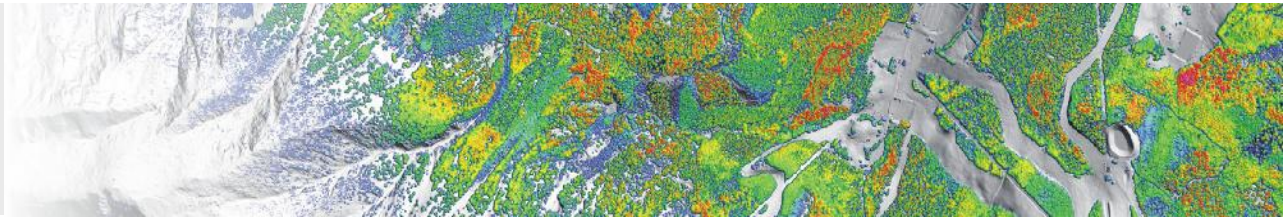
**Sustainability:**

Monitoring

Mapping

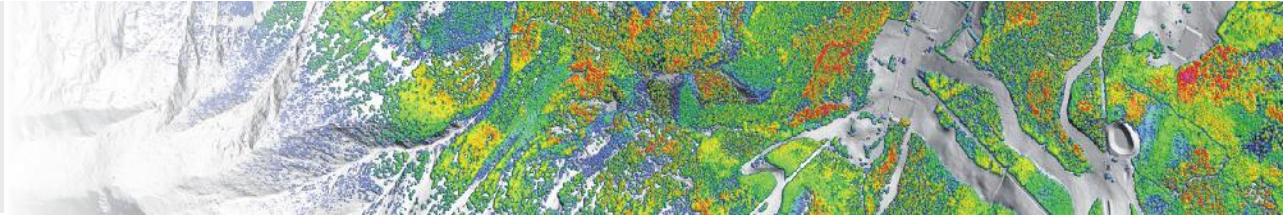
Modelling

Management



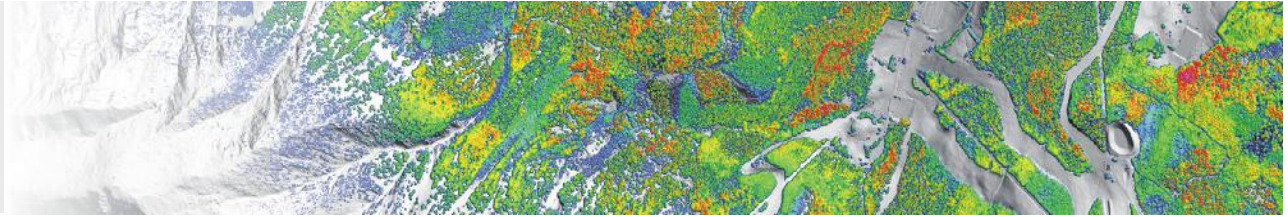
# Forest Enterprises expect from RS (1)

- Estimating the Stock Volume and its spatial distribution
- Estimating the Annual Yield and its spatial distribution
- Monitoring the Felling Activity in its spatial distribution



## Forest Enterprises expect from RS (2)

- Information about Forest Density and its spatial pattern (CHM)
- Information about Tree Species and its spatial distribution (spectral analysis)
- Information about Site and Relief (DTM => LIDAR; ~stable)

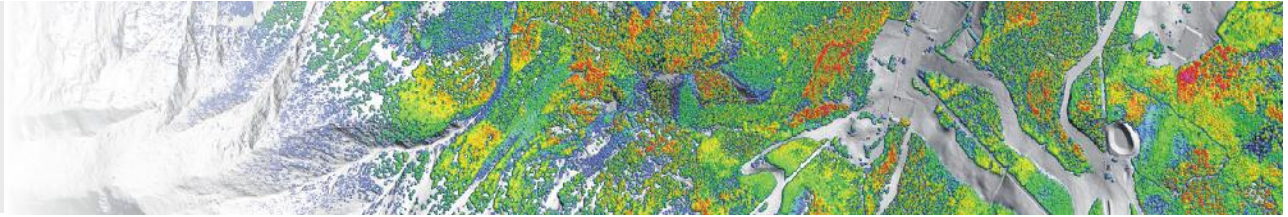


# Estimating the **Stock Volume** and its spatial distribution

$$V_{\text{stock}} = f(V_{\text{CHM}}, \text{treeSpecies}, \dots)$$

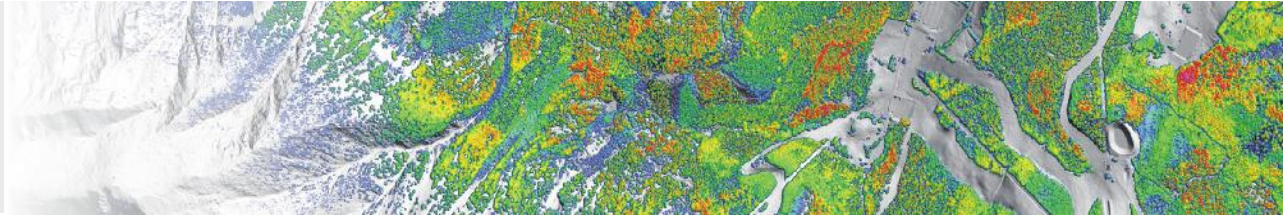
Hollaus et al.

Methods from LIDAR will probably not work  
in the same way!



# Estimating the Annual Yield (Tree Growth)

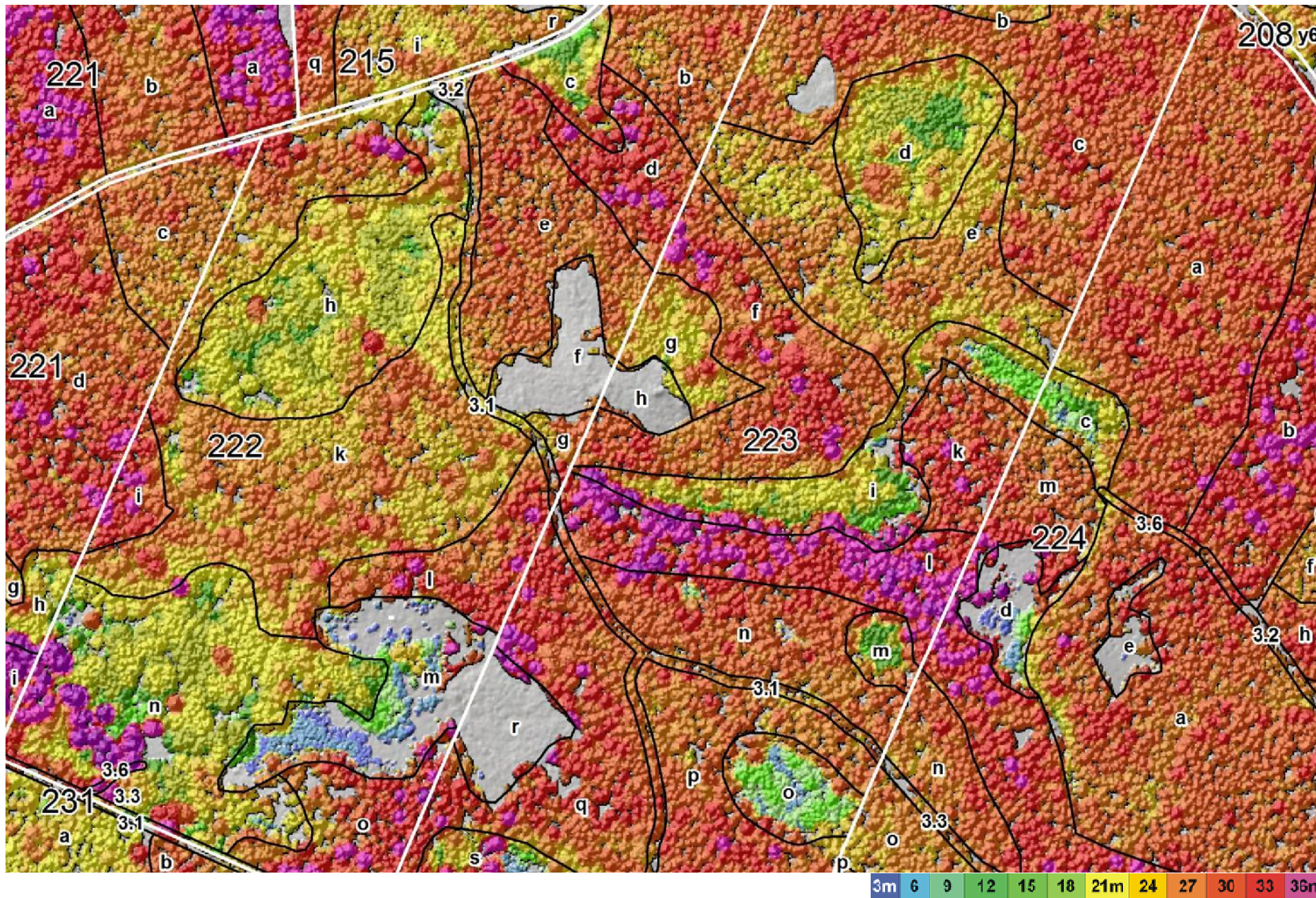
- Growth of height, growth of basal area of stems
- $\Delta\text{CHM}$  = delta canopy height model  
multi temporal canopy height models
- Comparing treetops:  
Problem: Identification of trees is necessary
- Comparing the whole CHM:  
Problem: Reference area has to be identified
- Comparing upper parts of highest trees
- Considering dimension of individual crowns



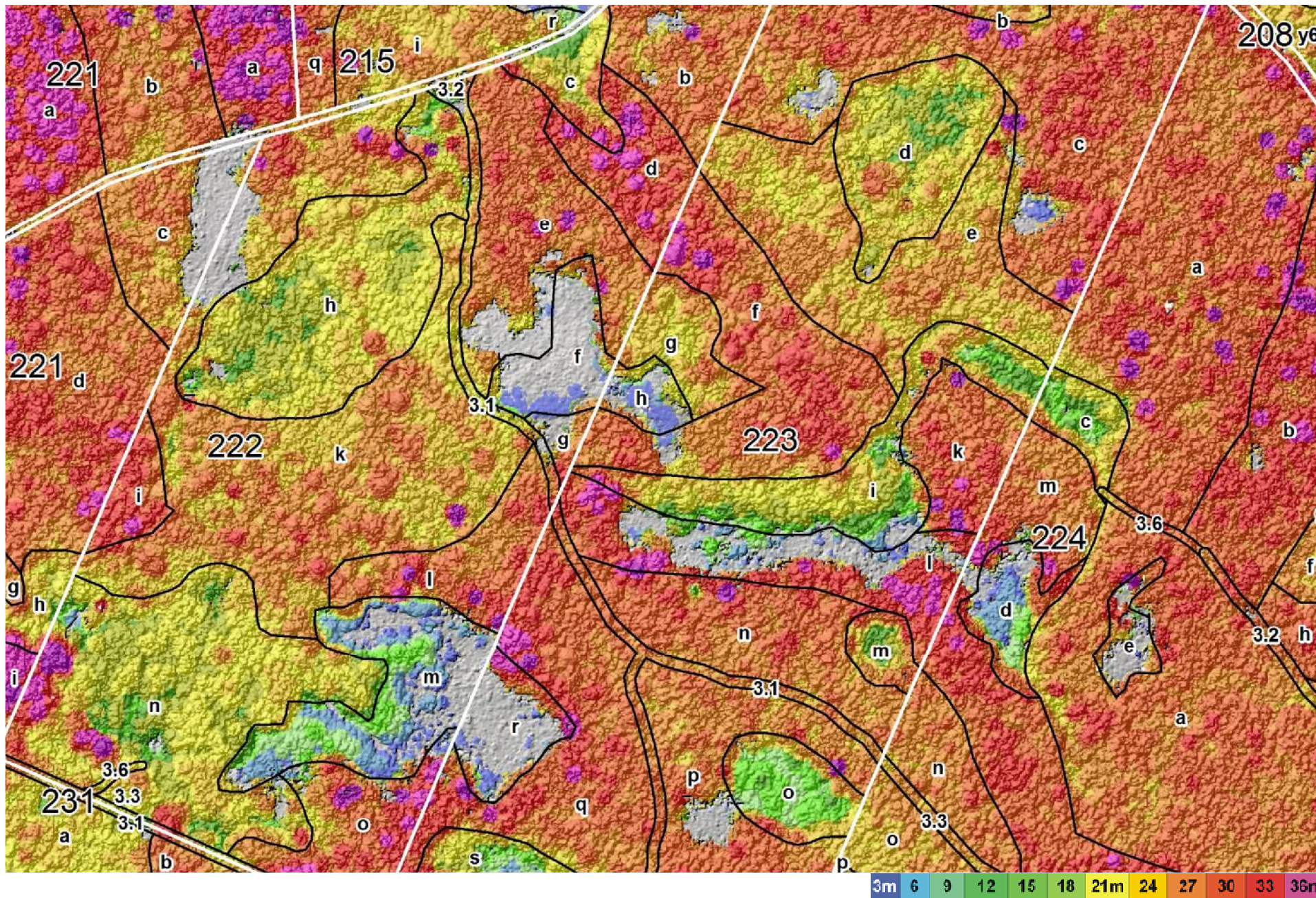
# Monitoring the Felling Activity in its spatial distribution

- Questions of sustainability:  
Balancing site qualities, contribution margins, ...
- Auto-calibration of stand data by:
  - log records from sawmills
  - log records from harvesting machines
- Semi-automatic updating of forest inventory
- Get rid of uncontrolled timber loss

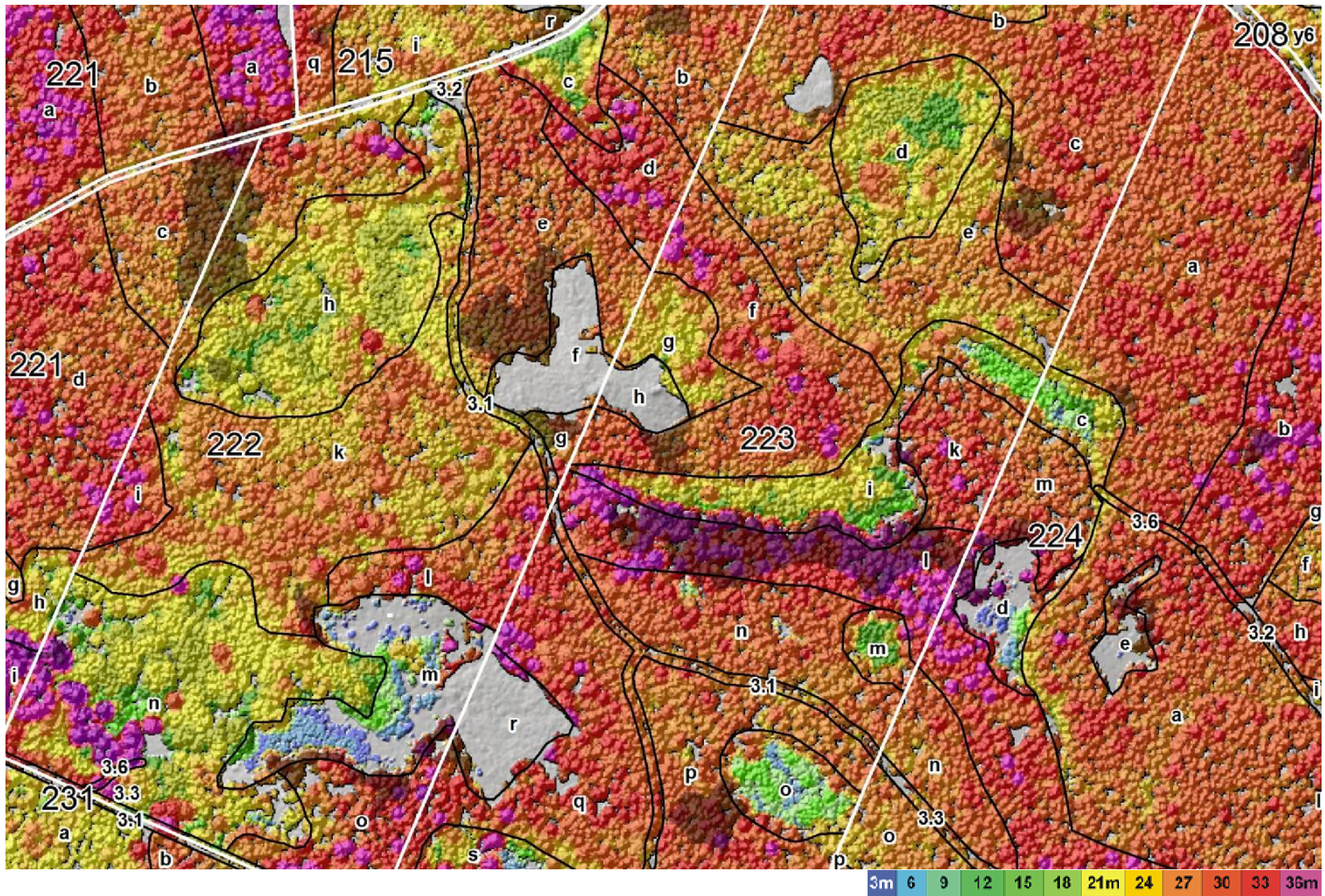




Tree Heights from LIDAR 2006

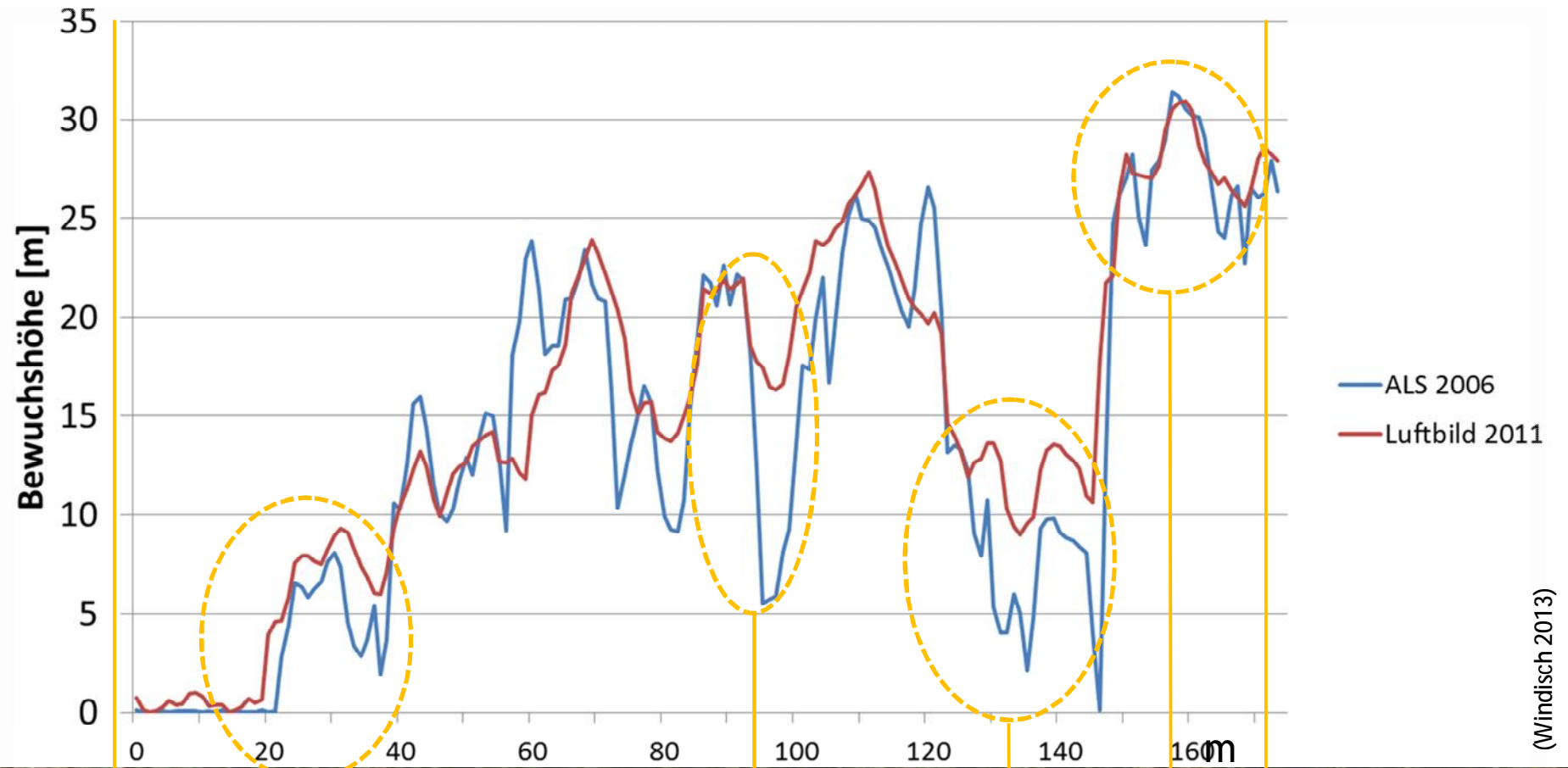


Tree Heights from Image Matching 2011



## Felling Activity 2006-2011

# Delta Canopy Height Models from different technologies



(Windisch 2013)



Airphoto 2011

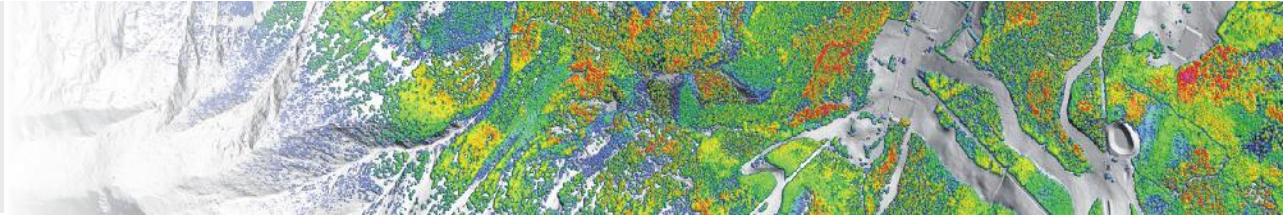
**Sustainability:**

Monitoring

Mapping

Modelling

Management



Political and social background:  
**Transparency**  
in the forest areas  
makes discomfort,  
more than ever in times of  
tax estimation!  
=> questions of **data privacy**

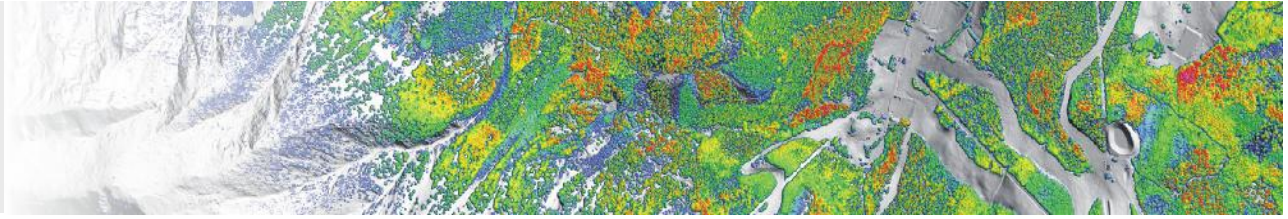
**Sustainability:**

Monitoring

Mapping

Modelling

Management



# Thank you for your attention!