Metsäteho

Correlation between outer and inner quality attributes of forest stand

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Aim of the study

- To test in operative scale how accurate quality characteristics based on airborne laser scanning (ALS) represent inner quality of timber cut from the same stands

- Based on this data comparisons between outer and inner quality attributes will be produced using existing predicting models and new ones developed during the study.

Backround

- Quality of the logs determines quality of sawn goods
- Quality upgrading not possible in basic sawing
- If the quality (and stem size distribution) of the stand would be known prior to purchasing and logging of the stand, all operative decisions in wood harvesting could be done optimally
- Preharvest methods based on field work in principle could deliver this information, but
  - Are too time consuming
  - Costly

Use of information

- Purchasing
  - Stand selection
  - Inventory management

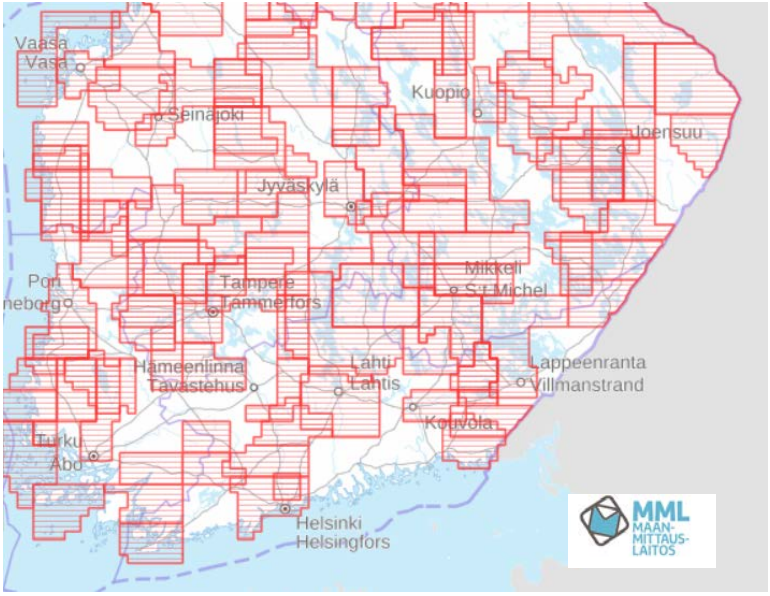
- Cutting optimization
  - Site specific intructions

- Operative logging and delivery planning
  - Better forecasts for mills sales and production planning

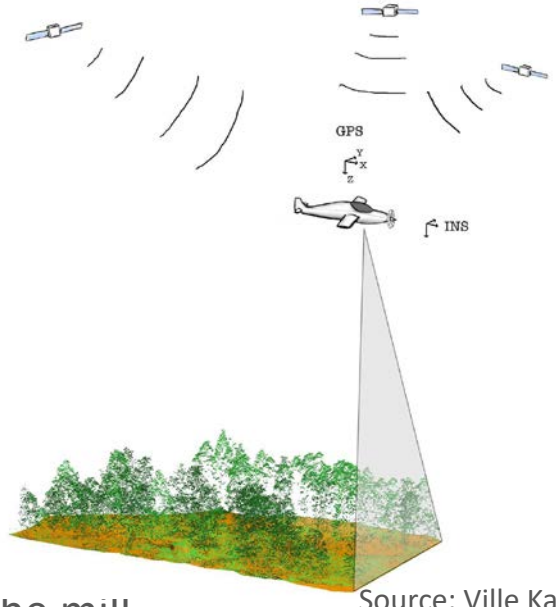
Material

- X-ray tomography from one sawmill
- Pine logs from 1012 stands
- Clearcuts and thinnings
- ALS-data availability

Laser scanned 2011 - 2016



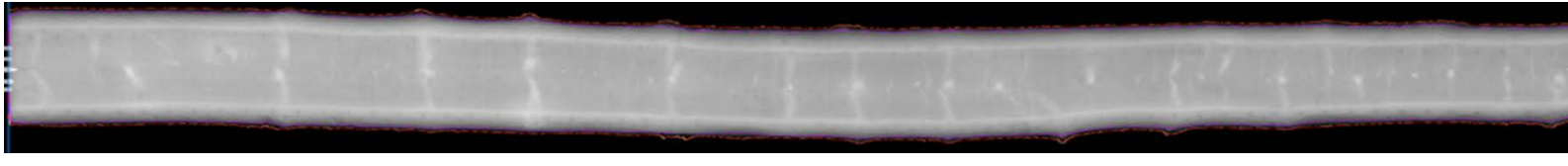
Method



Source: Ville Kankare

Airborne laser scanning

X-ray tomography measurements at the mill



Source: Finnos Oy

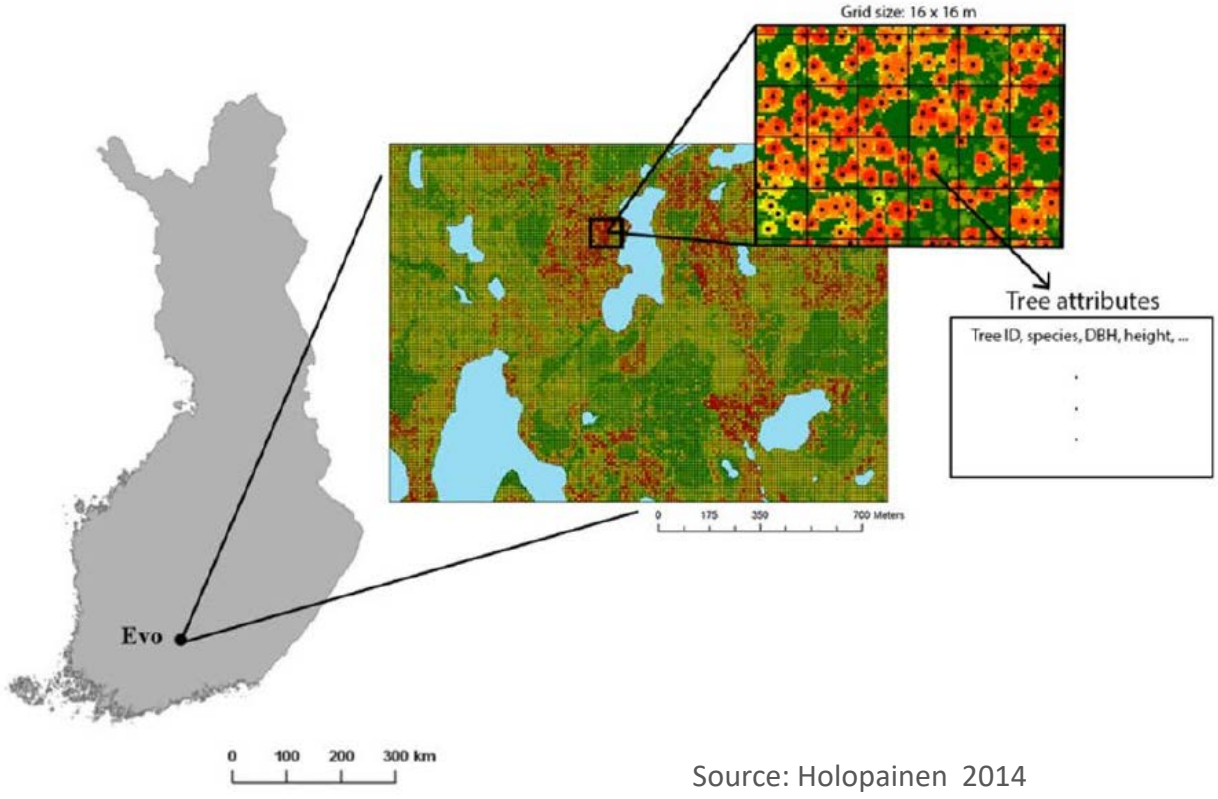
Variables describing inner quality

- Average size of a stem/log
- Overall knottiness
- Log quality class persentages of total
  - e.g. share of knottless butt logs
- Knot cluster identifiers
  - distance between, length, volume
- Conicality
- Average ring width

Examples of ALS variables

- Height distributions of canopy height hits (H_0, H_1, H_5, …)
- Cumulative proportional canopy densities (P_0, P_1, P_5, …)
- Proportion of ground hits versus canopy hits
- Average height
- Height of the living crown

Quality attributes for forest resource management system in future



Source: Holopainen 2014