Abstract template for the conference "A century of national forest inventories – informing past, present and future decisions"

Dear author. This is a two-page template that in the first page will ask for information on presenter name, topic, and preferred presentation form.

On page two, you are asked to fill in your abstract in the format and font size indicated. Please remember to include authors affiliation information in the footer section of page two. The length of the abstract may not be more than one page including references.

Abstract title:		A new Swedish forest attribute map predicted using 3D data from aerial images and field data from the National Forest Inventory
Take-home message:		The project provides a new and up-to-date forest attribute map of Sweden that can be used by foresters, researchers and many other users.
Presenter name:		Mats Nilsson
Presenter contact info:		SLU, Dept. of forest resource management mats.nilsson@slu.se
General topic, see website: (please double click on the check box and activate the relevant one)	☐	Improving future NFIs by learning from the past
	☐	NFIs today and in the future
	☒	Cutting edge and futuristic inventory techniques and technologies
Preferred presentation form:	☒	Oral presentation
	☐	Poster
Abstracts will be reviewed by members of our scientific committee and you will be given information on decisions in due time after the submission deadline has passed.		

A new Swedish forest attribute map predicted using 3D data from aerial images and field data from the National Forest Inventory

Mats Nilsson, Jonas Jonzén, Mikael Egberth, Peder Axensten, Kenneth Nyström, André Wästlund, and Håkan Olsson.

Introduction:

In Sweden, a wall-to-wall raster-map with predictions of forest variables have been produced for the entire nation using laser scanning data and field data from the Swedish National Forest Inventory (NFI) (Nilsson et al., 2017) . The laser scanning campaign started in 2009 and almost all forest land were scanned in 2015. The forest attribute map has been widely used by, for example forest companies, forest owners, forest owner associations and authorities. However, it is almost 10 years since the first parts of the country were laser scanned which limits the use of the predictions. It is therefore important to update the map. Thus, the Swedish government has provided funding for a new national laser scanning campaign that started in 2018

The Swedish Land Survey (Lantmäteriet) registers aerial images for about one third of the country annually and they provide 3D surface models derived by automatic matching of the images. This makes it possible to update the forest attribute map in the time period between the first and the second national laser-scanning campaign. The aim of this study was to predict stem volume, basal area, mena tree height and mean diameter for 12.5m * 12.5m raster cells in a wall-to-wall map covering Sweden.

Materials and methods:

The 3D surface models produced by the Swedish Land Survey have a 0.5m resolution in both the southern and the north-eastern parts of Sweden. In the remaining parts of the country, the resolution is 1m. Regression models were used to predict the variables of interest and the regression parameters were estimated using field data from the Swedish NFI as reference data.

All predictions were evaluated using data from forest stands surveyed using a systematic sample of on an average 8 plots with 8 m radius per stand.

Results:

Our preliminary results show that the RMSE for stem volume, basal area, mean tree height and mean diameter at stand level were 20.4%, 17.5%, 10.0%, and 15.4%, respectively. For all variables, the RMSEs are slightly higher than the ones obtained for the same variables in the existing national forest attribute map, predicted using laser scanning data. Final results will be presented at the conference.

Conclusion:

Although the accuracy of the predictions based on surface models was found to be lower than the ones for the predictions based on laser scanning data (Nilsson et al. 2017) we conclude that the predictions are valuable for forest practitioners, researchers and many other users, including authorities.

References:

Nilsson et al. 2017, Remote Sensing Environ. 194, 447-454.

Authors affiliation for example: 1. Norwegian Institute of Bioeconomy Research NIBIO, 1431 Ås, Norway.
Corresponding authors email address in italics