

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

Abstract title:		Scalable pan-European model-assisted biomass estimation
Take-home message:		<i>We present a novel software system for the efficient and fully scalable provisioning of forest information from the European national forest inventories. Design-consistent, model-assisted regression estimators are used to integrate high-resolution auxiliary data and to realise important gains in the precision of the resulting estimates.</i>
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General topic, see website: <small>(please double click on the check box and activate the relevant one)</small>	<input type="checkbox"/>	Improving future NFIs by learning from the past
	<input checked="" type="checkbox"/>	NFIs today and in the future
	<input type="checkbox"/>	Cutting edge and futuristic inventory techniques and technologies
Preferred presentation form:	<input checked="" type="checkbox"/>	Oral presentation
	<input type="checkbox"/>	Poster
<i>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.</i>		

Scalable pan-European model-assisted biomass estimation

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Introduction: We present the components of an innovative forest inventory estimation system designed to provide timely and accurate forest information on the basis of data collected on NFI sample plots and high-resolution land monitoring and monitoring data. The system is implemented as a PostgreSQL extension which has been assembled within the Horizon 2020 Diabolo project.

Materials and methods: A modified direct survey regression (GREG) estimator has been developed which optionally borrows strength from outside estimation region of interest, but basically is a direct design-consistent estimator. The estimator and software tools have been adapted for the joint treatment of single plot and cluster sampling designs, as well as plots with different plot configurations and varying sampling weights.

Results: We present the results from a demonstration study carried out with sample of 540'000 terrestrial sample plots from the national forest inventories (NFI) of the Czech Republic, Germany, France and Switzerland, in which we compare the results with those obtained with the an earlier e-forest estimation system for 510 INSPIRE grid cells of 50km by 50km. The precision gains when adding high-resolution Copernicus forest type (FTY 2012) and tree cover density (TCD 2012) maps as auxiliary data are evaluated for the estimation of harmonised above-ground biomass.

Conclusion: The results of the demonstration study confirm the expected important precision gains in the model-assisted estimation of biomass with auxiliary data. The system is implemented in a generic way which facilitates the integration of NFI data collected under different sampling and auxiliary data from various sources. The system is not limited to the estimation of biomass, but is immediately available for the estimation of any target variable, harmonised and made available on NFI plots. The estimation of totals and mean spatial densities of these target variables is easily scalable to any trans-national geographic region of interest, such as the Carpathian Mountains, the Alps and the North European Plain, or any other arbitrary biogeographic or administrative region of the continent.

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