# Contribution to research papers

# Christoph Stepper

## Stepper et al. 2015, Can. J. For. Res.

Christoph Stepper and Christoph Straub developed the concept for the study and Christoph Stepper designed the experimental setting. Hans Pretzsch gave helpful comments on the study structure and the relevance of the research.

Christoph Stepper processed all ground inventory and remote sensing data. He performed the photogrammetric working steps to gain the image-based canopy height information and the orthoimage for the complete test site. In this study, we scrutinized both height and spectral variables as predictor variables for modelling gross volume. Christoph Stepper computed the point-cloud variables and Christoph Straub computed the variables extracted from the gridded CHM and the orthoimage. Christoph Stepper performed the area-based modelling workflow testing both regression approaches and applied the models for wall-to-wall mapping. He conducted the model evaluation at the stand level and compiled all results. Christoph Stepper and Christoph Straub interpreted the model outcomes and formulated the findings of this research.

Christoph Stepper prepared the manuscript including all figures and tables in close collaboration with Christoph Straub. Hans Pretzsch gave valuable advice for the interpretation of the results, for the discussion of the findings and the composition of the manuscript. All authors contributed to the critical revisions of the article.

## Straub & Stepper 2016, PFG

The idea for this comparative analysis of models for a set of forest inventory attributes across two different forest types was developed together by both authors.

For the implementation, Christoph Stepper processed the aerial imagery and the SGM data to generate the CHMs for both test sites. He also computed the not readily available forest inventory attributes based on the tree list data from the ground plot measurements. Christoph Straub calculated the set of predictor variables from the CHM height values at the inventory plots and built the predictive random forest models based on existing code developed in Stepper et al (2015).

Both authors conducted the analysis of the modelling results and wrote the manuscript.

## Stepper et al. 2016, Scand. J. For. Res.

Christoph Stepper developed the idea for this study and the other authors contributed to the experimental layout.

Christoph Stepper conducted the analysis. He processed the image data and prepared the inventory data for subsequent use in modelling. He wrote the R code following previous work (Stepper et al., 2015) and performed all modelling steps. Christoph Stepper discussed the results, considering helpful comments of the co-authors.

Christoph Stepper wrote the manuscript and compiled the figures, with comments and advise from all other authors.

## White et al. 2015, Forestry

This research was made possible by international collaboration of the Bavarian State Institute of Forestry, the Department of Forest Research at University of British Columbia, and the Canadian Forest Service. The contact was made by Christoph Stepper and Joanne White.

Joanne White and Christoph Stepper set up the design of the study, with conceptual advice of all other authors. Joanne White coordinated the progress of the study, including the contacts with external partners for acquisition of all field inventory and remote sensing data used. Christoph Stepper conducted all photogrammetry work for obtaining image-based canopy height information. Piotr Tompalski and Christoph Stepper processed the ALS and DAP data for further analysis. Joanne White lead investigations on the comparison of point cloud metrics across a series of strata defined by slope and canopy cover and Christoph Stepper was responsible for modelling and analysing plot level predictions for Lorey’s mean height, basal area, and gross volume. All authors discussed the results and implications and contributed in formulating the findings of that research.

Joanne White and Christoph Stepper wrote the manuscript. Christoph Stepper, Joanne White, and Piotr Tompalski prepared the figures and assembled the artwork. All authors commented on the manuscript and participated in revising the manuscript.

## Immitzer et al. 2016, Forest Ecol. Manag.

Markus Immitzer and Clement Atzberger initiated the study. Markus Immitzer, Clement Atzberger, and Christoph Stepper contributed to the initial experimental design and developed the new approach for using ACS-based NFI plot data as training data for wall-to-wall mapping applications. The novelty of the approach, i.e., the simultaneous use of multiple concentric circles around the NFI plot centres for calculating explanatory variables based on remote sensing information, was developed by Markus Immitzer and Clement Atzberger in close collaboration with Christoph Stepper.

Markus Immitzer processed the remote sensing data and conducted the main parts of the analysis, including programming of the procedures and compiling the results in tables and figures. Christoph Straub computed the vegetation mask based on the WorldView-2 data. Christoph Stepper prepared the inventory data used for model training (NFI) and model evaluation (MFI). Sebastian Böck helped in programming and analysis.

Markus Immitzer and Christoph Stepper prepared all figures and flowcharts for the article and wrote the initial draft of the manuscript together with Clement Atzberger. All authors contributed to the final manuscript and participated in revising the manuscript for publication.

## Stepper et al. 2015, Forestry

All authors contributed to the idea of the work and jointly conceived the experiment.

Christoph Stepper made all data ready for analysis, including the processing of the aerial imagery and the ground inventory data. He conducted the main parts of the statistical analysis, i.e., selecting the appropriate methods, writing the code and carrying out the experiments. Christoph Stepper and Christoph Straub examined and discussed the results. Hans Pretzsch contributed in result interpretation and in placing the findings into a broader context in the forest research discipline.

Christoph Stepper wrote the first draft of the manuscript and prepared all figures and artwork, with valuable contributions of Christoph Straub. Hans Pretzsch added helpful edits to the manuscript and gave advice on the content.