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

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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:		Deadwood dynamics – a bayesian approach for turnover estimation
Take-home message:		*National Forest Inventory data are the primary data source for the estimation of the C fluxes in forests that are reported in national GHG inventories. Due to existing differences in national methods to obtain such estimates particularly for deadwood and litter C pools, there is a need for harmonizing methods to estimate changes in these C pools.*
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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.

Deadwood dynamics – a bayesian approach for turnover estimation

Oleksandra Hararuk and Markus Didion

Introduction:

Deadwood is an important component of forests as a structural element providing habitat and as an indicator for biodiversity. Deadwood is also an important carbon pool. Mortality and decomposition determine deadwood dynamics over time. During decomposition wood density decreases affecting the structural integrity and C stock of deadwood.

In National Forest Inventories, the presence and state of deadwood in forests is recorded to various degrees of detail although the decay stage determining wood density is not always measured. The aim of this study was to develop a simple model to estimate fallrates of standing dead tress (snags) and mass loss of deadwood. Such a model could be used in inventories where only deadwood volume is measured.

Materials and methods:

In this study we focus on quantifying the decay rates of the standing and downed deadwood using data from the Swiss National Forest Inventory (NFI). In this study we only used data for tree stems as the volume estimates are highly accurate. Volume estimates of deadwood are converted to biomass based on measured wood densities of dead wood of different sizes for *Picea abies* and *Fagus sylvatica* across Switzerland (Didion et al. 2014) and observed decay stage. In total, data were available for initially 653 snags and 363 logs from 671 sample plots that were measured repeatedly in three consecutive NFIs. To quantify deadwood decay dynamics we adopted a widely-used first order exponential decay model and calibrated parameters using a Bayesian Markov Chain Monte Carlo (MCMC) technique (Besag et al., 1995).

Results:

The best-fitting parameters indicated that in Swiss forests logs decay 1.7 times faster than the snags, however temperature sensitivities did not differ between the standing and downed deadwood. Overall, the C half-lives in the snag pool varied from 22 years on the warmest NFI plots to 118 years on the coldest NFI plots, and in the log pool from 11 to around 65 years. C half-lives for *P. abies* snags in wet sites varied from 30 to 118 years across NFI plots, compared to 45 to 90 years on drier plots. Wood type was a significant predictor of model residuals for early and later decomposition stages for both snags and logs.

Conclusion:

Conifers decay slower than broadleaves; European beech decays faster than other broadleaves. This matters when estimating the mass loss following a disturbance, e.g. windthrows and insect outbreaks. Increasing temperatures will not affect broadleaved and conifer snags and logs in the same way and conifer snags will be more responsive to temperature changes in wet sites than those in dry sites.

References:

Besag et al., 1995, Stat. Sci. 10, 3-41

Didion et al, 2014, Ecol. Model. 291, 58-68

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