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Uncertainty analysis of the top-down inventory based carbon budget for selected European countries

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In the top-down approach of the CarboInvent project, European Forest Information Scenario model (EFISCEN) was used to calculate improved estimates of biomass and soil carbon stocks and stock changes for different European countries. Previously, carbon stock estimates have been calculated using constant biomass allocation, but in this approach the age-specific biomass allocation were applied. Uncertainties of these improved carbon estimates was analysed using Monte Carlo simulation.

EFISCEN calculates the carbon stock estimates by converting the inventory data (stem volume) into carbon in different biomass compartments using the values of dry wood density, biomass allocation and carbon content. The soil module of EFISCEN, the Yasso soil model, calculates then the soil carbon stock on the basis of two climatic indexes and litter production, which is determined from compartment-wise biomasses using turnover rates. Calculated carbon stock estimates were based on inventory data around the year 1990 and stock change estimates were simulated for the next 20 years assuming current climate, similar growth than in the last inventory period and constant fellings.

In the Monte Carlo simulation, uncertainties of the inventory data, dry wood density, biomass allocation, turnover rates and soil model parameters were represented using probability density functions. Uncertainties of the stock change estimates were analysed assuming that calculated change is based on two inventories since the uncertainty of the used scenario cannot be estimated.

The results will be presented and discussed for case study countries from different European regions.