



Controls of soil carbon stock development – comparison of Swedish forest soil carbon inventory measurements and two process based models

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The key question in greenhouse gas research, whether the soils continue to sequester carbon under the conditions of climate change, is mainly evaluated by process based modelling. However, the models based on key processes of carbon cycle ignore more complex environmental effects for the sake of simplicity. In our study, based on extensive measurements of Swedish forest soil carbon inventory, we used the recursive partitioning and boosted regression trees methods to identify the governing controls of soil carbon stocks, and for these controls we compared the carbon stocks of measurements with carbon estimates of Yasso07 and CENTURY state of art models. The models were strongly vegetation and weather driven, whereas the soil carbon stocks of measurements were controlled mainly by the soil factors (e.g. cation exchange capacity, C/N ratio). Contrary to our expectation, the more complex CENTURY, which indirectly accounted for the exchangeable cations by incorporating the clay content into the model structure, still heavily depended on the amount of litter input and generally performed worse, than simpler Yasso07, that ignored the soil properties. When estimating the carbon stock for the specific soil type management, the soil properties should be considered while keeping the plant-weather related processes and parameters in their calibrated optimum.