



Slow in, fast out – short-term impact of grassland afforestation on NEE

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Article 3.3 of the Kyoto-Protocol acknowledges afforestation as measurement to sequester additional carbon in terrestrial ecosystems. The European forested area is increasing annually by 800 000 ha, which correspond to 0.08% of the total forest area. Afforestations of grassland and arable land account for most of this increase. In order to understand the mechanisms underlying the carbon balance of afforestations observational data with high temporal resolution are required. The net effect can be negative (C-source) especially during the first years after tree planting and this is due to a rapid loss of soil carbon. As a case study we investigated the effect of afforestation of a grassland site in Thuringia/Germany on the carbon balance during the first year after site preparation and tree planting. We present data of two Eddy covariance towers – one at the afforestation site and one on an adjacent grassland – with which we quantified the disturbance effect of the afforestation together with biomass inventory data. The initial results indicate a decrease in NEE of 30% on the afforestation compared to the undisturbed grassland. Assimilation of the non-woody vegetation was reduced during the second half of the vegetation period due to the new management regime. Additionally, night time ecosystem respiration was enhanced by 14%. We expect increased soil carbon mineralization of the tilled planting rows to account for this finding. The impact of perturbations such as afforestations on soil carbon stocks will play a crucial role determining whether or not young tree stands are carbon sinks or sources.