



From field measurements to process based modelling of N₂O and CO₂ emissions of forest, arable and grassland systems in developed landscapes – impact of land use, management and upscaling

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This paper presents a new study catchment with two years of continuously measured N₂O and CO₂ emissions from adjacent arable, forest and grassland sites in weekly time intervals in a developed landscape in Germany. Measured emissions are investigated according to seasonal patterns and management effects like fertilizer/manure application, tillage, harvest and sheep grazing. The biogeochemical model LandscapeDNDC was used to reproduce and increase the temporal resolution of data from weekly to daily time intervals. A close look is given on model outputs for both, before and after management occurs. Our results indicate that the model is capable to predict the trace gas emissions of the different land uses. Good model performance was found in predicting seasonal effects, while the model struggles in the representation of direct management effects. An upscaling approach is performed by validating plot scale LandscapeDNDC outputs like percolation water and nitrate-leaching concentration on the catchment scale by using the data as input data for the fully distributed process-based hydrological model CMF.