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Simulating N2O and NO emissions from European forest and grassland ecosystems using the process based model DailyDaycent

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Changing climatic conditions has affected green house gas (GHG) emissions in recent decades and will continue to effect change it in future. These effects will again give a feedback to the climate. Among the important biogenic GHGs, N2O and NO have a large impact and will play a crucial role in climate change over the coming decades. Therefore, simulations of nitrogen emissions are essential to quantify the impact and investigate interaction between climate change and GHG emissions. The DailyDaycent model was evaluated for its ability to simulate N2O and NO emissions from European forest and grassland ecosystems with various management practices from 1971-2000. The model was applied using a newly complied NitroEurope soil/ climate/land use database. The objective of this work is to quantify nitrogen emissions from forests and grasslands in Europe for the period 1971 to 2000. According to soil type, climate data and management the area is divided in NitroEurope calculation units (NCU). The model simulates the emissions for each NCU and the results are transferred later to the corresponding NCU. The number of tree species considered is limited to 5 (oak, pine, spruce, beech and birch) for the simulations, which covers 60 to 70 percent of the actual forest area in Europe. For the grasslands different management and grazing regimes are considered. Therefore, the amount of grazed biomass is determined based on the number of animals on the grassland NCUs. The soil parameters are derived by pedotransfer functions of the texture that based on a soil map (US Taxanomy). The simulation results are transferred to the corresponding NCUs and give a spatial distribution of the N2O and NO emissions over Europe. This represents one of the first presentations of spatial data for nitrogen emissions from semi-natural areas at pan–European scale.