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Linking of the DNDC ecological model and the WRF Numerical Weather Prediction System

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The most accurate information about trace gas fluxes within the ecosystems and the atmosphere has a key role in air quality research. The DNDC (Denitrification-Decomposition) biogeochemical model has been applied for the evaluation of soil gas fluxes such as CH_4, CO_2 and N_2O at agriculture fields on a daily basis. Initial meteorological dataset for DNDC has been provided by i.) climatological dataset on a $\sim$10 x 10 km grid for Hungary; ii) by local micro-meteorological measurements in the framework of the NitroEurope EU-VIIth Intergrated Project at Bugacpuszta site above semi-natural grassland; and iii) by a mesoscale meteorological model. In the last case, the DNDC has been coupled to the WRF (Weather Research and Forecasting) mesoscale numerical weather prediction model. Based on local measurements and forecast dataset for Bugacpuszta station the results of the DNDC model are compared to plant and nitrogen budget measurements during the vegetation period of 2010. The WRF meteorological model provides regional input meteorological database for the regional scale DNDC model. Based on soil and land-use surveys the DNDC model runs has been performed for different countryside of Hungary. The dataset of background air pollution monitoring stations and the bi-weekly soil N_2O, CO_2 and CH_4 flux measurements at three different points of Hungary was used for the validation of the model system. These measurements have been performed by static manual chamber method followed by gas chromatography. The main goal of the development of the coupled WRF-DNDC system is to provide continuous model calculation of CH_4, CO_2 and N_2O fluxes at each grid cell (10 km x 10 km) in regional scale on a daily basis. The results of i) previous model calculations (climatological grid scale meteorological dataset + DNDC model), ii) the validation of the coupled WRF-DNDC model system and iii) the block scheme of the continuous model runs and the structure of the output database are presented.