

## Modelling of Nitrous oxide (N<sub>2</sub>O) and Carbon dioxide (CO<sub>2</sub>) emissions from arable soils in the selected region of Slovakia using a process-based agro-ecosystem model

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A process-based DNDC (Denitrification-Decomposition) model with input data on the soils, climate and farming management was used in this study to predict N<sub>2</sub>O and CO<sub>2</sub> emissions from arable soils in the Nitra region in 2008. The simulated DNDC emission factors (EFs) of N<sub>2</sub>O were also compared to the EF of the IPCC methodology. Using the DNDC model, we estimated the total CO<sub>2</sub> emission of Nitra region to be 281643 t CO<sub>2</sub>-C yr<sup>-1</sup> with the mean CO<sub>2</sub> emission rate of 758,8 kg CO<sub>2</sub>-C ha<sup>-1</sup> yr<sup>-1</sup>. Total N<sub>2</sub>O emissions of Nitra region were 4835 t N<sub>2</sub>O-N yr<sup>-1</sup> of which 18% came from a background source (854 t N<sub>2</sub>O-N yr<sup>-1</sup>) and 82% from an applications of fertilizer and manure (3981 t N<sub>2</sub>O-N yr<sup>-1</sup>). The mean net N<sub>2</sub>O emission rate was 7.8 kg N<sub>2</sub>O-N ha<sup>-1</sup> yr<sup>-1</sup> (7.7% of the added N). This range didn't fall within the IPCC EF of 1.25±1.0%. Spatial variability in N<sub>2</sub>O emissions was caused by variability of soil properties (especially by SOC, where the highest N<sub>2</sub>O emissions rates were found with SOC in range of 1.6-2.0%; and on silt loam soils). Also the crop types influenced spatial variability of N<sub>2</sub>O where among all the crops included in modelling, the highest loss rates of N<sub>2</sub>O were simulated for rapeseed, sunflower and winter wheat. These results can be useful for an illustration of the spatial variations in N<sub>2</sub>O and CO<sub>2</sub> emissions caused by differences in the soil, farming management and weather conditions

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### Biography

Dr. Jan Horak, has completed his PhD at the age of 29 years at the Slovak University of Agriculture in Nitra, Slovakia. He is an Assistant Professor at the Department of Biometeorology and Hydrology, Slovak University of Agriculture (SUA) in Nitra. He has published more the 15 papers in scientific journals and is co-author of monograph chapter published by reputable publisher (Springer). Professional stays: 06/2011–12/2011 PostDoc at the University of Bern, Switzerland as a member of the research team studying the effect of adding biochar to an intensively managed grassland system.

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