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Data and model induced uncertainty of N2O and NO emission inventories for agricultural soils from Saxony, Germany

Edwin Haas, Christian Werner, and Klaus Butterbach-Bahl

Institute for Meteorology and Climate Research (IMK-IFU), Karlsruhe Institute of Technology (KIT), Garmisch-Partenkirchen, Germany (edwin.haas@kit.edu)

Recent N2O and NO emission inventories are often derived from GIS-coupled biogeochemical modeling approaches. While this methodology has great potentials (e.g., possibility for scenario analysis, simulation of complex biogeochemical process interaction) it also requires spatially and thematically explicit datasets to prescribe the environmental settings of the simulated area.
In the presented project we estimate the N2O source strength of agricultural soils in the state of Saxony, Germany, by simulating daily N2O emissions using the biogeochemical models DNDC and Mobile/DNDC for the years 1996 to 2005. The models are driven by two different datasets in order to estimate data induced uncertainty on the modelling outcome and the impact of different model parameterizations. While daily weather data (station data from German Weather Service) and agricultural management information (annual statistics) are keep uniform for all model runs, two soil datasets were produced. Dataset 1 is derived from the common BÜK1000 soil dataset for Germany whereas dataset 2 is based on a combination of the BÜK400 soil dataset for Saxony and a regional soil assessment. In addition, a sensitivity test for important model drivers was conducted to identify the most sensitive parameters.
Our calculations show that due to the importance of meteorology for soil N2O emissions multi-year simulations are required for inventory calculations. At a regional scale spatial variability was mainly driven by soil properties, and here especially soil organic carbon content, and fertilzer use. The inventory aproach followed here can be used to identify regional hotspots and management measures to reduce GHG emissions fom soils.