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FARMING FOR A BETTER CLIMATE BY IMPROVING NITROGEN USE EFFICIENCY AND REDUCING GREENHOUSE GAS EMISSIONS (FarmClim)

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The project FarmClim (Farming for a better climate) assesses impacts of agriculture on N and GHG fluxes in Austria and proposes measures for improving N efficiency and mitigating emissions, including their economic assessment. This paper focuses on animal husbandry and crop production measures, and on N2O emissions from soils.
FarmClim applies national inventory reporting methods to assess Austrian NH3 and GHG fluxes in order to develop flux estimates with implementation of mitigation measures. Based on scientific literature and on the outcome of the Austrian working group agriculture and climate protection a list of potential mitigation measures has been produced: phase feeding, dairy cattle diet, biogas production. Data cover resulting production levels as well as GHG mitigation. In crop production, an optimisation potential remains with respect to N fertilization and nutrient uptake efficiency. Projected regional yield data and information on the N content of arable crops have been delivered from field experiments. These data complement official statistics and allow assessing the effect of increasing proportions of legume crops in crop rotations and reducing fertilizer input on a regional scale. Economic efficiency of measures is a crucial factor for their future implementation on commercial farms. The economic model evaluates investment costs as well as changes in direct costs, labour costs and economic yield.
Biophysical modelling with Landscape DNDC allows establishing a framework to move from the current approach of applying the IPCC default emission factor for N2O emissions from soils. We select two Austrian model regions to calculate N fluxes taking into account region and management practices. Hot spots and hot moments as well as mitigation strategies are identified. Two test regions have been identified for soil emission modelling. The Marchfeld is an intensively used agricultural area in North-East Austria with very fertile soils and dry climate. The area of central Upper-Austria is characterized by heavy gley soils and higher annual precipitation (890mm). Based on site parameters, vegetation characteristics, management and meteorology, the model is able to predict C and N bio-geo-chemistry in agricultural ecosystems at site and regional scale. This is the basis for assessing further mitigation specifically focussing on the hot spots and hot moments of N emissions on a regional scale.
The list of mitigation measures resulting from the project activities has been tailored to fit Austrian conditions in order to be attractive to stakeholders and farmers. Providing information on economic impacts to farms adds to the transparency of the approach taken. We expect that understanding the interest and the worries of farmers from the beginning supports creation of realistic output that can provide a strong incentive to urgently needed actions on improving farm N efficiencies.