Evaluation of the impact of low versus high resolution data on nitrous oxide emissions from a rural landscape

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Emission estimates of nitrous oxide (N_2O) are usually made at country level or at continental level. These estimates are generally based on model approaches ranging from rather simple default IPCC Tier 1 methods to rather complex dynamic process oriented models, using low resolution input data that are easily available and accessible. The use of rather coarse data across the whole spatial domain of a country may entail uncertainties in the final estimates. This paper presents an analyses of how the resolution of input data may affect the results of large scale N_2O emission estimates. We illustrate this for a rural landscape in the Netherlands for which detailed high resolution data are available.

We compared N_2O emission results of the simple process based model INITIATOR, using landscape scale data, national scale data and European scale data. All three methods where applied to the Noordelijke Friese Wouden (NFW), a rural landscape in the Netherlands. The various geographic resolution of the input data and modeling method ranged from a 25 m × 25 m grid for the landscape scale, homogeneous STONE plots consisting of a multiple of 250 m × 250 m grid cells for the national scale and homogeneous NCU plots consisting of a multiple of 1 km × 1 km grid cells for the European scale. The differences in input data refer specifically to livestock, land use and soil data.

Results show that although the spatial variation in model input data at landscape scale is rather large compared to European scale data, the effect on the total N_2O emission for the landscape was rather small. Locally, however, large differences may occur.