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Interactive comment on "Inventories of N_2O and NO emissions from European forest soils" *by* M. Kesik et al.

Anonymous Referee #2

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The Manuscript by Kesik et al. describes a method to make out an inventory of NO and N2O emissions from European forest soils. Like it is mentioned by the authors this work is the most probably comprehensive effort to date to simulate NO and N2O emissions from forest soils in Europe. To perform the spatial and temporal extrapolation of the NO and N2O fluxes the authors use a biogeochemical model (PnET-N-DNDC) coupled with different data bases : Soil Geographical Data Base of Europe (SGDBE), Land cover data set (CORINE/PELCOM), climate and N deposition (EMEP MSC-W oxidant model). All of these data bases were perfectly described in this paper as well as the coupling between them and the model. The validation of this inventory was also largely achieved: The authors compare for 19 different measurement sites (inherent in the NOFRETETE project) the NO and N2O outputs of the PnET-N-DNDC model with the measurements at the different given sites. According to the uncertainties of the flux measurements relative good accordance's were observed between the measurements

and the model outputs indicating that the model is able to discriminate the emission magnitudes according to the soils properties. To examine the uncertainties (or variability's) of this inventory the authors use different climatic scenarios and the soil property uncertainties. For the meteorological scenario the authors simulate the emissions for 3 different years (1990, 1995, and 2000). This study indicates significant variations of emissions from on region to the other but at European scale this variation is limited. For the soil property uncertainties the authors use the MSF (Most Sensitive Factor) method. If I correctly understand the Monte Carlo routine was only used to validate the MFS method for some grill cells (50). But I find that the conclusions (chapter 2.5 page 793) of the comparison between the MFS and Monte Carlo approaches are not good enough. For the NO the MSF method covers 79% of the NO variability's obtained with Monte Carlo method and for the N2O the maxima are 50% lower compare to the maximum emissions using the Monte Carlo approach. Does it mean that the MFS method is sufficient to examine the uncertainties of the NO and N2O flux estimations? What are the conclusions? I don't see anywhere in the text any comment about this comparison? Also to be completely exhaustive, why were the N wet depositions uncertainties not tested versus modelled N2O and NO emission uncertainties? Nevertheless in conclusion of these general comments the manuscript is well in the scope of BG, It is clearly written. The overall presentation is well structured clear, consistent and full. The results obtained are original and could be use as a reference to evaluate the NO and N2O forest soil sources at European scale.

I have some minor comments:

- In the abstract page 781 line 22 Ĕ 'which showed a range in NO emissions from 44.4 to 254.0 kt N yr-1 for NO and 50.7 Ĕ' delete the first NO.

-In the introduction page 782 lines 6 and 7: delete either 'further' or 'in the future'

- Page 786 line 4: add 'solar' to radiation.

- Page 786 lines 11 to 14. I don't understand the meaning of the sentence 'Further-

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more, the model needs information about inorganic N concentration in rainfall which are used to calculate throughfall values of N, surrogate of wet and dry deposition, in independency of forest type and N concentration'

- Page 787 line 20 what are the 'stand' properties?

- Page 789 line 9 and figure 2B. For the SOC content in 't C ha-1' what is the considered depth of the soil ?

- Page 792 line 7, 15, 18: what is the link between NO (or N2O) emissions and clay content (or fraction)? line 7 the authors say that biogas emissions vary in inverse with clay fraction but lines 15 and 18 they say the opposite.

- Page 793 line 3: for soil properties what is the 'skeleton rate'?

- Chapter 2.5: It would be good to add that the 'same' set of soil properties (6) were testing with MSF and Monte Carlo methods ?

- Tables 2 and 3: What is a RMSPE? Root mean square percentage error or root mean squared prediction error. It must be specified? Give the achievement of RMSPE compare to a simple RMSE?

- Fig 2, 3, and 8 the legend fonts are too small

- Tables 1, 2 and 4 the fonts are also too small

Interactive comment on Biogeosciences Discussions, 2, 779, 2005.