

Interactive comment on “Influence of short-term transfers on nitrogen fluxes, budgets and indirect N₂O emissions in rural landscapes” by S. Duret et al.

Anonymous Referee #2

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This discussion paper uses a new model, “NitroScape”, by a group including the present authors, to simulate the transfers of reactive nitrogen, Nr, between different parts of terrestrial and aquatic ecosystems, and then to estimate direct and indirect N₂O emissions. The new model is a brave attempt to deal with a very complex series of interacting processes, and the Introduction very adequately explains the rationale that has led to the paper. However, some revisions are desirable, as indicated below.

Specific comments: The Methods section is clearly set out, although it would be useful to include “N₂O” in the heading “2.2 The methodology to estimate indirect emissions”, as this part is devoted solely to indirect emissions of N₂O.

C4461

On p7601, lines 21-23, there is no mention of the form of N applied, although this would affect the NH₃ and NO_x emission calculations (see p 7603). Also the Discussion, on p7606, begins as follows: “NH₃ emissions from soils were 11% of the Nr inputs. This value was lower than the expected value of 37% of fertilizers applied (ECETOC, 1994).” One would hope for a more penetrating analysis here, as this old estimate of NH₃ emissions from fertilizers has been superseded by more recent studies (e.g. Sheppard et al, 2010), that take into account the differences in such emissions between nitrate-based forms of N and ammonium compounds or urea.

The discussion of other simulated quantities, e.g. NO_x emissions and nitrate leaching, concentrates on the highest values found, but doesn't discuss the average values or how they relate to measured values either in this particular soil or other soils with similar properties; this ought to be rectified. For reasons that are not made clear, Table 1 only cites values for N₂O emissions obtained by use of IPCC methodology, instead of listing the average values obtained by the model simulation. Here, too, one would have liked to see comparisons with experimental observations in comparable conditions – or, if such information does not exist, at least a statement to that effect.

The two different sets of IPCC emission factors – from 1996 (discussed in Mosier et al 1998) and from IPCC 2006 – are used in an inconsistent way for the purpose of making comparisons with the outputs of the model; it would be better to indicate where these factors differ and how the simulations compare with the alternative versions.

One further general point regarding style: such phrases as “The highest losses were simulated” (p 7608) are used several times. Phraseology such as “the model predicted that the highest losses would be in the east of the landscape....” would be more appropriate, and would avoid giving the impression that there were actual measured losses that could be compared with the simulations.

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C4462