

Interactive comment on “Ecological Controls on N₂O Emission in Surface Litter and Near-surface Soil of a Managed Pasture: Modelling and Measurements” by R. F. Grant et al.

Anonymous Referee #2

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The manuscript “Ecological Controls on N₂O Emission in Surface Litter and Near-surface Soil of a Managed Pasture: Modelling and Measurements”, investigates to effect of the temporal variability in soil water content and soil T of surface litter and near-surface on N₂O emissions. To do so results of a simulation experiment were used to construct a mathematical model of terrestrial processes involved in N₂O emissions at high temporal and spatial resolution. Model performance compared with pluri-annuelle field measurements (eg N₂O, CO₂ and energy exchange, SWC, Ts) of an intensively managed pasture in Switzerland (Oensingen). Modelled N₂O emissions were found to be sensitive to defoliation intensity and timing (relative to that of fertilization) which controlled plant N uptake and SWC and Ts prior to and during emission

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events. In a sensitivity study, authors tested the reduction in harvested biomass (via LAI) and delaying harvest dates by 5 days. Model results indicated that C storage activity could be affected by suboptimal harvest intensity and timing. The manuscript very well written, interesting and ready to be published in the present form. Furthermore, the present model Ecosys gives further possibilities to test management options for intensively used grasslands. A long this line, what is missing here, is probably a comment of the applicability of the study (i.e. in conclusion, perspective), saying how the model will/can be used in the future. Is the model valid for other grasslands than the Swiss grassland, and can authors generalize that slow grassland growth (as a result of low harvest) does increase N₂O. As there is also fertilizer amount ... guess it's a mixture of the four, herbage use, fertiliser amount, timing of cut and fertilization. Can we use LAI as an indicator for timing and amount? this would be great for farmers

Does the paper address relevant scientific questions within the scope of BG? -YES

Does the paper present novel concepts, ideas, tools, or data? -YES

Are substantial conclusions reached? –needs to be completed

Are the scientific methods and assumptions valid and clearly outlined? -YES

Are the results sufficient to support the interpretations and conclusions? -YES

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? -YES

Do the authors give proper credit to related work and clearly indicate their own new/original contribution? -YES

Does the title clearly reflect the contents of the paper? -YES

Does the abstract provide a concise and complete summary? -YES

Is the overall presentation well structured and clear? -YES

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Is the language fluent and precise? -YES

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? -YES

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? -See comments

Are the number and quality of references appropriate? -YES

Is the amount and quality of supplementary material appropriate? -YES

Specific comments

In the results, for reader would be helpful to quicker capture why authors have chosen a given time period/ year among the whole data set to show results (eg fig 6 and 7) : reading in detail, this was to capture/show management/climate events and the fact the model can provide good simulations. Suggest to mention this briefly (eg. sub title, bold paragraph beginnings) in the respective paragraphs(L455, 477ff)/legends.

Tab 3. Would be nice to have a las columns with the mean GPP, Reco, . . . and model results and the %under/overestimation. Eg harvest is overestimated while GPP, Reco are reasonably well represented.

Tab 2 is quite long and may be interesting as a detail. Given that main management events are in the Figs., I suggest to move into supplementary material.

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