

Interactive comment on “Simulating soil organic C dynamics in managed grasslands under humid temperate climatic conditions” by Asma Jebari et al.

Anonymous Referee #2

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The manuscript soil-2020-76 “Simulating soil organic C dynamics in managed grasslands under humid temperate climatic conditions” aimed to improve the prediction of SOC dynamics in managed grasslands under temperate climate conditions by uses of RothC model. To run Roth C under defined conditions, the SOC model was recalibrated to account for: (1) water content up to saturation conditions in the soil water function , (2) entry pools that account for particularity of exogenous organic matter (EOM) such as ruminant excreta), (3) annual variation in the carbon inputs derived from plant residues considering both above- and below-ground plant residue and rhizodeposits components as well as their quality, and (4) the livestock trampling (i.e., poaching damage). the mode was than evaluated against four existing field experi-

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ments in Europe. Analyses show a good model performance when implementing the four modifications. A higher sensitivity to soil moisture and plant residues modifications was observed compared to other modifications when grasslands were under intense grazing regime. Overall analyses suggest that RothC humid grassland modifications are applicable for farm and regional SOC dynamics from managed grassland-based systems.

The manuscript is well written, understandable and to my opinion definitely improves RothC for grazed grasslands (or at least the four tested). Given that RothC is originally a crop model, which has been improved for different crop residues and organic amendments, a “grazed grassland version” is most well, come. To be published, the present version would need some improvements to help the reader to get through the model modification and validations (in the moment in the supplementary material).

I thus recommend “revisions “.

General comments Tests of model-modifications (Table2) though I understand that modification where added on top of the other, I was wondering if they were tested individually and combined as some might go together e.g. (water saturation and poaching), (excreta and plant residues) see L359. I suggest to add a table on model performance on individually. (e.g. 2.3.4 and table 4) Along the some lines, I also wonder how the model (versions) were evaluated on SOC data, as most sites do not provide more than 2 to 3 soil sampling dates. The MM does not mention the tested data , see also comment just after.

The manuscript deals with the quality of plant residue and residues inputs by below-ground biomass. However, the reader does not get any information on the tested sites !!!! They might all be the same. During model performance and sensitivity , these lack of basic information is misleading I thus strongly recommend to move site tables B1/ B2/B3 to the main text, and to add main variables for the tested sites, so that reader can follow the model improvements/modification. I also suggest to add the basic columns to

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differentiate the sites such as (tables B2/B3) i) temporary and permanent grasslands, ii) mowing and grazing and intensity iii) biomass production and biomass removal, iv) Root/Shoot, v) biomass quality (i.e. digestibility) These variables are used later on to evaluate.

This is also important to understand model sensitivity and sensitivity analyses. (eg L410ff,) as reader has only little idea on the field sites and grazing animals it is difficult to follow the mode performance. E. C inputs via animal dejections are result of stocking density and animal weight. Accordingly, there is difference between sheep and cattle. . . . I suggest to add more information on sites and data inputs to MM section (i.e. tables B1 to B3 and texte L510 to L535).

It might also be interesting/useful to add tables of the sensitivity analyses to the main text. Eg. merger D2 to D4 for the different variables (leading to 10 column in total)

PLEASE find more specific comments to the texte in the here added supplement.zip file, including a .docx "revision mode" version of manuscript lines.

Please also note the supplement to this comment:

<https://soil.copernicus.org/preprints/soil-2020-76/soil-2020-76-RC2-supplement.zip>

Interactive comment on SOIL Discuss., <https://doi.org/10.5194/soil-2020-76>, 2020.