

## ***Interactive comment on “Impacts of management practices on soil organic carbon in degraded alpine meadows on the Tibetan Plateau” by X. F. Chang et al.***

**Anonymous Referee #1**

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### General comments

Century model was calibrated and validated to simulate the response of soil organic carbon stock to grazing intensity in alpine meadow on the Tibetan Plateau. The manuscript focused on the recovery speed of SOC stock in degraded grasslands, which is of great importance in both the understanding of ecosystem succession and formulation of grassland management strategies, especially in the fragile alpine ecosystems on the Tibetan Plateau. However, I am not satisfied with the description of model calibration and the completeness of model calibration and validation. (1) These two processes are the core of the whole study. Therefore, it is necessary to list the parameters that were modified during model calibration in detail, for example, in the form a table.

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(2) Since the object of the study is SOC stock, it should be selected as an output parameter for model calibration, besides aboveground biomass. (3) In model calibration, after running for 5000 years to get to the equilibrium state in 1980, the modeled SOC stock should be used to compare with SOC measured in a degraded grassland. SOC stock in year 1980 is not necessary, instead, the value measured recently is also acceptable if the grassland have been continually grazed at similar intensity. (4) As there are plenty of soil samples in Zeku county, it seems better to randomly select a part of the samples for model calibration, and the others for model validation. The method of calibration by comparing the aboveground biomass in a fenced grassland in Haibei has two shortcomings. First, SOC stock is more appropriate than aboveground biomass. Second, Haibei is not near to Zeku, as shown in the text, which may introduce extra uncertainty for model validation.

### Specific comments

In model calibration, 13 biomass data from year 1998 to 2010 were used. However, in Fig. 1, the number of data were  $n=19$ . Why? In addition, the aboveground biomass varied so largely in the fenced meadow. Please check the values.

In model simulation, a series of scenarios were set as list in Table 2. However, this seems different from those shown in Fig. 3 and Fig. 4.

The terms, such as “shoot : root ratio”, “winter grassland”, and “summer grassland”, were confusing. “shoot : root carbon allocation ratio”, “winter grazing grassland”, and “summer grazing grassland” may be used instead.

Whether SOC stock will become saturated after implementation of a certain management strategy is interesting and important. I suggest to add this part in the manuscript.

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