

Interactive comment on “Free and protected soil organic carbon dynamics respond differently to abandonment of mountain grassland” by S. Meyer et al.

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We thank the anonymous referee for the interest in our study especially because he/she mentioned not to be an expert in radiocarbon modeling.

You mention a very important point when addressing the underlying assumptions of the modeling approach, in particular the space-for-time substitution.

We are aware of the restrictions and think that the choice of sites validates its use. Sites are all south-southeast facing with similar slopes and parent material. We have good knowledge of the history of each grassland provided by the farmers. You will find more information on site (clay content) and fractionation (recovery) characteristics in C4999

Meyer et al. (2011), which has meanwhile been accepted and should be published soon. However, we consider to add some more information on sites and possible disadvantages to the revised version of the manuscript.

Furthermore, we tested the accumulation model for sensitivity to initial carbon stocks and changes of time-periods since LUC. For example, the estimated C input rates to total soil vary in the range of the AMS precision. We consider to extend the corresponding Methods section or to include an own section on uncertainties in the Discussion part.

You wonder about the two solutions (one implausible) for carbon decomposition and input rates provided in Table 3 and 4. This is a characteristic of the bomb radiocarbon record. There is no relation to the space-for-time substitution. Several methods exist to decide which values are plausible and appropriate, and we describe our choice clearly in the Methods section.

Minor corrections will be implemented directly in the revised version of the manuscript.

The authors

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