Biogeosciences
Discussions

Interactive comment on "Modeling soil organic carbon dynamics in temperate forests using Yasso07" *by* Zhun Mao et al.

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Received and published: 30 July 2018

The study presents a model- data comparison at multi-site scale of fores sites which are relevant for management policies and accounting for global climate negotiations.

The presentation is good and I could understand what has been done. Especially the litter quality database part is already valuable to other scientists. For the model-data comparison I have several remarks of what should be done additionally/differently, that potentially could alter the conclusion quite severely. Because of the paper did not change much compared to the pre-public-discucssion, I repeat my comments in the this public discussion.

1) Steady state and observed stocks: The authors computed litter quality (percent-

ages) from steady state computations and then scaled all pools down so that the sum matched observed initial stocks. Assuming that lower stocks resulted by recovery from disturbance, however, the composition of the faster pools should be closer to steady state than the slow pools. I recommend repeating the simulations with an additional initialization procedure according to Wutzler 2007.

2) Comparing different soil depths: The authors argue that stock changes are less susceptible to differences in soil depth than stocks, because the more stable pools reside in deeper layers. However, they did not account for this effect on initialization of stock qualities. I suggest instead transforming the observations (down to 1m) to the depth assumed by the YASSO model (0.4m) before comparison. This should be possible, because several depths were measured, e.g. by fitting a function to the depth distribution of bulk density and carbon concentrations and computing the cumualive stock up to a certain depth.

3) Effects of mineralogy and potential stocks: The authors did not explain variation in residuals well by studied explanatory variables. I suggest including some soil mineralogy measures. Additionally, one could include potential stocks as derived from mineralogy by Feng 2013 and Beare 2014 or the indicators by Rasmussen 2018 to include a measure of distance to potential.

General comments (locations refer to the pre-public-discussion version)

p3l25: The authors claim that at annual time aggregation, first order decomposition is adequate. However, largest criticism of first order comes from interaction among pools, like priming instead of time aggregation (Wutzler 2013)

p4l5: The authors claim to be first study of larger scale YASSO application. I know that YASSO is the soil model of the MPI earth system model implemented by Tea Thum, and suspect that there should be also larger scale studies.

Sect. 3.4 and complicated figure 8 express the simple fact that there are initially high

changes and later on slower changes in recovering C-Stocks. They can be shortened very much.

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