

Interactive
Comment

Interactive comment on “How will organic carbon stocks in mineral soils evolve under future climate? Global projections using RothC for a range of climate change scenarios” by P. Gottschalk et al.

Anonymous Referee #2

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The manuscript ‘How will organic carbon stocks in mineral soils evolve under future climate? Global projections using RothC for a range of climate change scenarios’ by Gottschalk et al. describes the outcomes of an extensive modelling approach to predict global soil C stocks by end of this century. The authors used a variety of climate predictions and coupled these scenarios with projections of land use changes and net primary production rates. Their overall conclusion is that global soil organic carbon will increase, as NPP rates accelerate faster than decomposition rates under predicted climate change scenarios. Their model approaches are based on a series of well-

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established climate projection models and soil carbon models. However, there are several critical issues which must be clarified:

1)NPP increases: The authors use a model to predict future NPP values which takes into account solely mean annual temperature and total annual precipitation. However, I doubt that these NPP predictions are accurate for tropical regions, as tropical ecosystems are mainly limited by nitrogen and phosphor. An increase in MAT and MAP will therefore not lead to an according increase in NPP. However, the predicted increases in NPP in the tropics are the largest predicted NPP changes globally (Figure 7), and the increase in these soil C-stocks led to the main conclusion that global soil C-stocks will increase by end of this century.

2)Organic soils exclusion: Although the authors mention several times that organic soils were excluded, they conclude that global soil C-stocks will increase. But as they show in the results, organic soils contain about 40% of total SOC stocks. Therefore, predictions of future soil C stocks ignoring 40% of total SOC shouldn't be called global SOC stocks. The authors mention in the manuscript title that predictions are for mineral soils, but these must also be stated throughout the discussion and conclusions. Ideally, the authors should simulate organic soils with e.g. the ECOSSE model, which some of the manuscript authors especially developed for organic soils.

3)No model validation: There is no single measurement or long term experiment outcome given or mentioned in the manuscript that could give some hint about the correctness of the model outcomes. Therefore, it is very hard to guess whether the model predictions are reasonable or not. Please try to incorporate any kind of long term study, metadata, or published long term study results which could validate the model outcomes e.g for the time period from 1970 to 2000.

The authors should clarify these points, before the manuscript can be considered for eventual publication in Biogeosciences.