

## ***Interactive comment on “Soil carbon stock estimates in a nationwide inventory: evaluating performance of the ROMUL and Yasso07 models” by Aleksi Lehtonen et al.***

**Anonymous Referee #2**

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Being able to predict the current inventory is very different than being able to accurately assess changes in carbon stocks due to land use or climate. The authors more or less make this point in the introductory comments but then go on to try to model the current inventory data as a means for improving soil carbon models. Given the detailed inventory data already available, a spatial model seems to be the way to go to improve the national inventory. If the authors are trying to develop a model that can predict year-to-year variations in soil carbon stocks then calibrating models on a few sites with really good long-term data seems more powerful than trying to recreate mean latitudinal trends on soil carbon. Additionally, most of the year-to-year change in soil carbon is going to come from land use and management decisions which have essentially been

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ignored here because this MS only focuses on established forests on upland soils.

I really struggled with this paper. It seems that two separate ideas on model testing ending up getting merged together in this MS along with some new measurements on understory biomass and litter turnover. Given the goals of the paper, I would have thought that one model needed to be used that could have different levels of complexity added or removed. Given the fundamental differences between the Yasso07 and ROMUL models I do not see how it is possible to test the hypothesis that “accounting for soil properties” would improve model performance and then go on to say that time step (annual v. daily) might matter. The second hypothesis is only related to the ROMUL model. Since most of the hypothesis testing relates to the ROMUL model, why not just try to add a better litter module onto the ROMUL model and see if this matters?

Model success was never really defined. The author’s suggest that the ROMUL model with some information on soil water holding capacity is the superior model but based better representation of southern soil carbon data but the goodness-of-fit statistics presented in Fig 6 are equivocal on this point.

Detailed comments are included in annotated PDF file.

Please also note the supplement to this comment:

<http://www.geosci-model-dev-discuss.net/gmd-2016-144/gmd-2016-144-RC2-supplement.pdf>

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Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-144, 2016.

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