SOIL Discuss.,
https://doi.org/10.5194/soil-2017-30-RC1, 2018

Interactive comment on "Hot regions of labile and stable soil organic carbon in Germany – Spatial variability and driving factors" *by* Cora Vos et al.

Anonymous Referee #1

Received and published: 18 January 2018

This is an interesting study on the spatial distribution of SOC fractions (POM and fine fraction) in agricultural soils of Germany. The authors fractionated 145 selected sites und used this dataset to calibrate NIRS predictions for more than 2500 sites. Conditional inference tree modelling was then used to identify the driving factors of fractions based on 75 factors related to soil properties, management, land use (history) and environmental aspects. This well-written paper is the first that provides insights into the driving factors of SOC fractions at the regional scale. The methodology including NIRS predictions for fractions and cforest to elucidate driving factors is novel and can also be used in future similar studies in other regions. Overall, this paper is a highly valuable contribution to soil organic matter research at the regional scale and provides important information for improved SOC management. Nevertheless, there are sev-

eral points which have to be addressed before the manuscript can be accepted for publication:

L62: There is ample evidence that no-till does not lead to net increase of SOC compared to conventional tillage as indicated here, but only to a change of the depth distribution of SOC

Section 2.3: The fractionation approach is not really clear: to separate the fPOM, normally SPT is used as done in this study, but without any dispersion (as indicated by "free"). Here, ultrasonic dispersion at 65 J/mL was applied that probably destroyed macroaggregates, so the extracted POM is rather fPOM+oPOM (derived from macroaggregates). Of course you can do that, but this fraction should not be called fPOM. Furthermore, 450 J/mL was used to destroy "aggregates" (I guess microaggregates), please explain why this energy level was used (reference). I further miss information on recovery rates of the fractionation and further basic data such as fraction mass and C content in order to evaluate the approach. Particularly the measured C content of the POM is important to evaluate the fractionation approach.

L182+L194: More information is needed in this regard, Jaconi et al. is not accessible (see also the comment of Lauric Cécillon). Please include relevant information also in this paper, even if Jaconi et al. is published during revision.

L188-198: I would rather see that as results

L197-198: NIRS is certainly a promising way to predict fractions, but of course this approach is specific to the fractionation. As there are numerous other fractionation approaches (probably even better ones to derive "active" and "passive" SOC), this study should avoid giving the impression that the presented approach is the only way to estimate active and passive SOC at the regional scale.

L203-205: More information is needed on the calculation of C and N inputs as well as on the regional yield estimates.

L229: In order to avoid interaction effects between the variables, one could perform PCAs prior to the analysis and reduce the number of predictors to independent ones (e.g. dependent climate variables MAT, MAP and elevation can be reduced to one factor climate). For example, CaCO3 was identified as important, but this is probably only due to a correlation with texture (clay is the most important factor).

L316: remove “and”

Section 4.4: In principal, I agree that the fractionation approach based on a separation of POM from MOM is suitable to derive “labile” and “stable” carbon, as POM is the major constituent of “active” carbon (assuming that the contribution of pyrogenic carbon is negligible, which is the case in most regions of Germany). However, the authors could mention that there are other ways to derive labile and stable SOC.

Interactive comment on SOIL Discuss., https://doi.org/10.5194/soil-2017-30, 2017.