

Interactive  
Comment

## ***Interactive comment on* “Forest conversion to poplar plantation in a Lombardy floodplain (Italy): effects on soil organic carbon stock” by C. Ferré et al.**

**C. Ferré et al.**

guenther.seufert@jrc.ec.europa.eu

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The authors thank Anonymous Referee #6 for his/her profound review and useful comments which will certainly help to improve this paper. Author responses and explanations (ACn) are given with referee comments (RCn).

R6C1: This study highlights the spatial variability within and between plots in this study area, in that spatial variability in the PP site was structured similarly to that of coarse sand content, but not at the NF site. The implications of this second point need to be discussed more thoroughly and explicitly. On one hand, it suggests a need for inclusion of such spatial statistics in methodologies of SOC sampling, which is a very important

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contribution to the methodology in this field of study. On the other, it calls into question the very nature of this type of study, which substitutes space for time in addressing land use change. If there is an underlying spatial structure driving SOC variability, can we really be sure that differences between NF and PP can be attributed to land use change? If so, the case needs to be made more clearly in the manuscript. If not, the authors need to make the case for why this sort of study should be pursued rather than more intensive, controlled studies with a greater number of preconversion measurements and/or number of replicates (as opposed to pseudoreplicates as presented here), despite such uncertainties.

AC1: This comment tackles the very core of our study, related considerations guided us from the very beginning of the sampling design for our case study that intended to show and to handle the real world complexity: 1. A core feature of this land use change is the horizontal and vertical soil homogenization effect by deep plow and regular harrowing at PP, in contrast to the diversification effect by vegetation / tree species heterogeneity at NF; therefore, a specific difference of the spatial structure and variability of related soil parameters must be expected and linked to this type of land use change itself. 2. Accordingly, a strong and in most cases significant (negative) correlation between sand content and SOC stock was noticeable for both sites and for all layers considered, whereas a spatial structure could be identified for PP only; at NF site, the SOC stock distribution of the 0-55cm layers involved in the land use comparison was quite scattered and not spatially structured, probably due to the impact of tree species heterogeneity as mentioned above. 3. On the contrary, the deepest layer 55-100cm (less influenced by vegetation and management mainly representing the soil parent material) shows a spatial structure for SOC content also at NF (data not shown) 4. In consequence, we compared the SOC stocks for equal classes of coarse sand content, thus considering the effects of soil texture variability on SOC stocks, which are not connected to the land use change but to the alluvial origin of the investigated area

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For a revised ms. we will describe this core feature of our study more explicitly in all chapters; in addition we propose to include in supplementary material a table with the correlation matrix between soil properties for the two sites and all layers.

R6C2: There remain a number of technical issues raised by the previous reviewers, such as the presence of large stones and handling of data at depth, that should also be addressed in the final version of this paper. However, I think those have been adequately covered by those reviews, so I will not reiterate them here.

AC2: Find explanation about BD, rock fragment content and literature citations in author comments to the other reviewers

R6C3: The greatest area for improvement of this manuscript is in placing this study in a larger context (as highlighted by other reviewers comments regarding literature citations) and making sure each section contributes to an overarching message of how this study contributes to the target readers' (I presume those interested in the implications of land use change on SOC) understanding of this larger issue. This, in turn, may lead the authors to decisions on reducing or expanding the discussion of different subtopics to produce a more readable paper that will make a greater impact in this research community.

AC3: we agree with this comment that was delivered in principle by all 4 referees, and we see some potential to reduce the discussion of a few topics (esp. in ch., 4.2. and 4.4) in order to get place for expanding the discussion and conclusion into a larger context, e.g., with regard to the value of mature native ecosystems as reference systems, implications for IPCC reporting, increasing relevance of woody crops in bioenergy context

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