Biogeosciences Discuss., 11, C6885–C6887, 2014
www.biogeosciences-discuss.net/11/C6885/2014/

Biogeosciences
Discussions
Open Access

Interactive comment on "Quantitative estimation and vertical partitioning of the soil carbon dioxide fluxes at the hillslope scale on a loess soil" *by* F. Wiaux et al.

F. Wiaux et al.

francois.wiaux@uclouvain.be

Received and published: 20 November 2014

We thank the referee for the comments on our submission (Biogeosciences Discuss., 11, 13699-13737, 2014 doi: 10.5194 / bgd-11-13699-2014). We are pleased that the reviewer appreciated our study and highlighted the importance and the relevance of our work. We are very honored that his first impression was to approve this publication with minor edits. However, at this stage we would like to stress that we strongly disagree with the reviewer's assertion that significant portions of the manuscript have already been published.

This research presented in our manuscript is part of a concerted research action where

the interactions between pedological, hydrological, biological and geomorphological processes are studied in relation to soil organic carbon turnover. Although the reviewer correctly observed that we have already published results that were obtained from the same experimental catchment. While this is true that some findings presented in this manuscript are indeed in agreement with either of these other papers (i.e. Wiaux et al., 2014 a-c), this does not mean that these findings are similar, but well that they are complementary and support each others.

In the Wiaux et al. (2014a, in Geoderma), we provided a quantitative evaluation of the spatial and vertical patterns of OC pools and discussed the mechanisms governing soil OC quality. This assessment was based on laboratory experiments (NaOCl attack to mimic oxidation of soil OC by micro-organisms) and therefore only represents the potential mineralization of OC, regardless of the environmental conditions that may have resulted in its stabilization. In the new manuscript submitted to Biogeosciences, we measured and discussed in-situ soil CO2 respiration and this allows us to quantitatively analyze the spatial, vertical and temporal patterns of soil CO2 respiration under real-life conditions.

In the Wiaux et al. paper (2014b, in Soil Biology and Biogeochemistry) we quantified the role of abiotic factors controlling soil organic carbon persistence using soil surface respiration for 34 measurement days. This study was informative to qualitatively understand the processes and key controls on in-situ soil surface respiration. This is very different from our new manuscript submitted to Biogeosciences where we (i) evaluate soil CO2 production at different depths in the soil profile, and (ii) monitored continuously or almost 3 years. This neither only provides new insights into processes, nor only show a trend of soil respiration along the hillslope, but also provides a quantitative assessment of the tempo and annual soil C respiration budget. Such a quantitative assessment at a yearly time-scale need continuous time-series as well as modeling results presented in this manuscript, and could not have been done if it was only based on the few measurements of Wiaux et al. (2014b).

Finally, the Wiaux et al. paper (2014c, under review in European Journal f Soil Science) is a methodological paper that evaluates different gradient-based methods for assessing CO2 fluxes in loamy soils. More precisely, we evaluate the different calculation methods to asses CO2 diffusivity based on soil water content measurements. For the 2014c paper, we used a very small subset of the observed soil CO2 profiles (8%) and we did not interpret the data. Again, the current manuscript uses the whole dataset (180 observation days) to interpret the data in terms of soil respiration processes.

In summary, we thank the reviewer for the constructive comments. We fully agree that we can improve the manuscript by shortening the paper and by more clearly identify the novel aspects of this work. However, we strongly disagree that the current paper lacks novelty. In contrast, we are convinced that the paper submitted to Biogeosciences presents a novel approach, novel data and new insights.

Interactive comment on Biogeosciences Discuss., 11, 13699, 2014.