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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.

Anonymous Referee #2

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General comments

I find this article novel using an interesting approach to understand the role of landscape in the carbon cycle, and linking results of two different scales (landscape and soil profile). The authors a solid dataset with interesting results, and, in general, their discussion of results is solid and clear. I appreciate the methodological details, although I find that they are sometimes too detailed (the 'Material and Methods' part has almost the same number of words as the 'Results' and 'Discussion' combined). I suggest to accept publication of this article with minor revisions.

My general comments concern the involved mechanisms for both summit and foots-

lope: soil micro-organism respiration seemed to control CO2 emissions in the summit soils, whereas soil respiration also increase the CO2 flux in the first 10 cm of the footslope soils (second §of 4.2, lines 3-16, page 13717). I understand that, in general, the CO2 flux at the footslope position is limited by the diffusivity, but they authors should state that microbial activity as a driver for CO2 emission is not specific to the summit soil only, as authors mentioned in the conclusion. Moreover, comparisons with results from Goffin et al. (2014) were not discussed in term of types of soil or vegetation (for example, forested ecosystem in Goffin et al., 2014), and I would welcome more detailed comparison to the results provided therein (i.e., not be exclusively focus on the surface or deep layers).

Moreover, I frequently read "in agreement with the recent findings of Wiaux et al. (2014)", "corroborates the results of Wiaux et al. (2014)", or "as described by Wiaux et al. (2014)". The authors have should better highlight the novelty of their current findings. In the current manuscript, it seemed that several results were already found in the previous studies, so I suggest that the authors focus on the novel aspects only. Furthermore, I do not understand the exact meaning of "hillslope aggregated CO2 flux" (abstract, as well as in the text). It will be nice to clarify the expression "aggregated" (spatial scale through the landscape, through the soil profile, temporal scale. . .?).

Finally, I find that figures are, in general, too small and it is difficult to read the captions, particularly for figures 5 and 6 where I cannot distinguish the different depths. Also, the figure 4 is little bit complex: the caption need probably more explanation, like the difference between the foreground and the background. The figures 1 and 2, rapidly described in line 11 (page 13703), are part of 'Results' (rather than 'Material and Methods'). A final comment about the very frequent use of "ca." (circa). I suggest to replace this term with "about" or "approximatively" when necessary, and to remove it from many sections (e.g., when the authors write "and reach ca. 1811 g CO2-C m−2 year−1", it seems that this is quite a precise value and "ca." is not needed).

Minor comments

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Abstract

Line 10: “for two periods of 6 months”

Line 14: “from the first 10 cm”

Lines 18-19: you have a problem in the unit: g CO2-C m−2 year−1

Introduction

Line 19 (page 13702): “that the first 30 cm of soil”

Material and methods

Line 13 (page 13703): “for 48h”

Line 7 (page 13704): I think that you mean Fig. 3 and not Fig. 4, right?

Line 26 (page 13707): the parenthesis is not closed

Line 7 (page 13708): “by Wiaux et al. (2014c)”

Results

Line 6 (page 13712): “from 4 to 28 °C at both, the submit and the footslope” (if it is the same temperature for the two locations)

Lines 10. . . (page 13712): can you use the same units in both text and figure 5 (% or cm3 cm−3)

Line 12 (page 13712): I do not understand the “(respectively)”. Did you mean from 38 (23+15) to 39 (34+5)? It is not clear.

Line 23 (page 13712): “at ca. 50 cm depth”, right?

Line 8 (page 13713): “in the first 10 cm”

Line 10 (page 13713): “depending on”

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Line 12 (page 13713): “of the first 10 cm”

Line 14 (page 13713): “the first 30 cm”

Line 23 (page 13713): “Table 1 and Fig. 8”, right?

Line 15 (page 13714): “ca. 1.5 times more CO2-C”

Line 17 (page 13716): “the first 10 cm”

Line 20 (page 13716): change “who” to “which”, it is “the study of Goffin et al. . .”

Line 22 (page 13716): “neither”, did you mean “not” or “never”?

Conclusions

Line 11 (page 13721): “the first 10 cm”

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