

Interactive comment on “Separation of soil respiration; a site-specific comparison of partition methods” by Louis-Pierre Comeau et al.

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The paper presents an interesting comparison of different respiration measures. I like the paper in general, and it's generally well written. I do however have a number of points on which the paper can be improved for better understanding and readability.

To begin with, please have a good look at the order of paragraphs in methods, results and discussion. Currently the used respiration methods are discussed in random order. I would suggest to follow a consistent order, for example following tables 6 and 7 in all three sections, so starting with regression, followed by lab incubation, root exclusion bags and finish with d13 C. This would improve the readability of the paper.

The five used respiration measures are mentioned in the abstract (lines 15-17), but the

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introduction ends with simply stating that five methods were compared without further elaboration. Please explain the used methods here as well (for example in line 56), with the underlying thoughts on why these specific methods were selected.

At the start of the methods section, after describing the site selection, please start with soil characterization (lines 151-160). Also move the soil classification (line 177) to this section.

It could be helpful for understanding the sampling procedure followed in the lab incubation method if a sampling schema is added as figure, as currently it's a bit difficult to follow what happens with the various groups of samples (starting with 16 from the field, and in line 196 there are 22 samples?). In addition, if I read it correctly, the same samples went sequentially from a low incubation temperature to a high temperature. In the ideal scenario, the samples would be divided over the different incubation temperatures and studied independently. In the current setting dependency of the samples could be argued (repeated measurements from the same samples), but more importantly it adds uncertainty in terms of C present in the soils and potential shifts in the microbial community during the incubation (i.e. adapting to lower resource availability). Please include these limitations in the discussion of the used method.

Please remove Table 3, as it contains only information that is fully described in the text already (lines 197-198).

Also, please use consistent units for respiration throughout the paper, so either $\text{Mg C ha}^{-1} \text{ y}^{-1}$ or $\text{g m}^{-2} \text{ h}^{-1}$ to improve comparability of the various measures.

Some more specific comments: L124 (equation 1): please specify what $f(x,y)$ represents (CO_2 efflux)

L150: In the site selection you describe only forest vegetation. What do you mean with different landforms here?

L177: Please move this sentence to the method section on soil characterization.

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L195-203: Please split this section according to the respiration measures that you discuss, as regression and incubation are presented as separate methods in tables and in the rest of the paper.

L199-200: please check carefully, I assume that you mean that Rh represents 54% of Rs, so I think the first time Rs in the sentence should be Rh.

L201-202: are these CO₂ efflux values for all moisture groups combined?

L208: The notably large respiration components. Please remove this sentence as it's trivial information.

L245: When I look at figure 1b I don't see an equilibrium in any of the groups. There seems to be the variation in respiration following the changes in temperature, but it does not show stability. Perhaps use the wording careful here.

L211-212: It is unclear where these values are coming from, as I can't find or derive them from table 6?

L323: I find "minimally disturbed microcosms" a bit doubtful here, as soils were sorted and repacked in different vials in the lab. Keeping the soil and the larger aggregates intact during such a procedure is hardly possible, I assume that you refer here to undisturbed microaggregates?

Minor textual comments:

L64: surveyed -> found

L102: report -> analysis

L105: soil cores with a volume of

L120: the boxes were opened to vent

L140: previous to -> before

L180: sub-superficial -> sub-surface or sub-soil

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L184: based on previous results

L185: type of parent material and level of mineralization of the bedrock

L187: Split sentence in two, the first discussing climate, the second discussing respiration.

L252: rephrase for readability: Although not statistically significant, the maximum Rh in the HS and IB bags was found at a relatively low moisture content (9.5 and 21.4%, respectively, Table 4).

L262: please remove "In this study the regression had ten points (45%) outside the confidence interval but". The rest of the sentence is a repetition of L197-198, so either generalize for discussion or remove as well.

L295: variance -> variation

L298: in this regard

L300: to standardize

L338: variance of -> variation in

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