

Dear Dr. Lavallee,

Thank you for the attention to detail and the revisions you suggested that improve the clarity of our manuscript. Below is our point-by-point response.

Line 39: perhaps add “and different timepoints within the same soil” or similar, but you may choose to ignore this comment.

Response: Agreed (see Lines 39-40)

Line 51: I believe this is still slightly confusing, since annual precipitation includes snowfall and so the reader may still expect it to be a larger number than the annual snowfall. It's not clear whether the snowfall number presented is snow depth or meltwater. Perhaps simply report total annual precipitation, which need not be divided into rainfall and snowfall for the purposes of this manuscript

Response: Agreed, we removed the snowfall information (see Line 52)

.Lines 52-53: change “for the prior 40 years” to “ for the 40 years prior to sampling”

Response: Done (see Lines 53-54)

Line 63: change “previously assessed (Robertson, 2016)” to “as previously assessed by Robertson (2016)”

Response: Done (see Line 64)

Line 98: Consider changing "using bootstrapping to allow for error estimates" to “using bootstrapping to estimate error”

Response: Done (see Lines 98-99)

Line 101: “zeroes” should be “zeros”

Response: Done (see Line 103)

Line 143-144: This feels too strong. Perhaps “thus calling into question its reliability as a soil health indicator”?

Response: Agreed (see Lines 145-146)

Line 145: add “subsequent” before "short-term CO2 pulses”

Response: We have deleted this sentence based on the recommendation in the following comment (see Lines 147-148)

Lines 145-146: I believe that “thereby diminishing the assay’s value as an indicator of soil health” is a bit too strong and is also repetitive with the first sentence in the paragraph. I recommend deleting, and this paragraph could be combined with the following one.

Response: Agreed (see Lines 147-148)

Line 148: Consider changing to “Without knowledge of these pre-assay CO2 losses...”

Response: Done (see Lines 148-149)

Line 152: change “daily” to 24-h

Response: Done (see Line 153)

Lines 155-160: If brevity is possible here, it would be helpful to the reader if you could clarify these mechanisms in the context of the experimental stages, i.e. would these potential mechanisms occur in or affect results of the dry-down phase or the rewetting and 24-h pulse?

Response: We have clarified that (see Line 157 and 159).

Line 171: change to “fixed, available C pool”

Response: Done (see Line 171)

Line 171-172: Please add a bit of detail as to why soil-specific correction factors are needed, e.g. differences in soil texture or microbial communities.

Response: C quality and microbial communities vary with soil type and seasonal variation, both of which are potential reasons for soil-specific correction factors as detailed in Lines 173-174

Line 183: change to “methods and/or a correction factor”

Response: Done (see Line 185)

Respectfully,

Matt Belanger, Carmella Vizza, Phil Robertson, and Sarah Roley