

***Interactive comment on* “Spatial changes in soil stable isotopic composition in response to carrion decomposition” by Sarah W. Keenan et al.**

Anonymous Referee #1

Received and published: 23 January 2019

Overall the manuscript, “Spatial changes in soil stable isotopic composition in response to carrion decomposition,” within minimal revision is a well written and a sound contribution towards understanding the spatial influence of pulsed organic nutrient inputs into terrestrial ecosystems from the deposition of carrion. Numerous studies have approached this subject but the geographic expanse and complexity of the resultant biogeochemical responses leaves ample room for investigation. This work helps to bridge the gap between previous studies through both the spatial layout of the observations and the utilization of isotope discrimination factors and $\delta^{15}\text{N}$ methodologies to tease apart the spatial extent of carrion influence within the soil profile.

Addressing the following concerns and comments will enhance the quality of this manuscript:

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Specific comments:

Table 1: Insert note that defines N.M.

Perhaps note that control values do not have an error term due to being homogenized into a single sample.

The table caption or a note should include the statement about this data being from Keenan et al. 2018 except for the one year data. Also include a reprint permission statement in text (section 180) and with the table if required by either journal.

The caption states that the letters indicate differences between samples but it is not clear as to between which samples the letters are referring to from the caption or from what was readily found in the text.

Figure 3. Again the caption states that the letters indicate differences between samples but it is not clear as to between which samples the letters are referring to from the caption or from what was readily found in the text.

Figure 5. Similar comment to Figure 3. Clearly there are differences signified with depth but it is not readily apparent what the difference is between A, AB, B, etc.

Technical corrections:

Section 110: The equations as written may prove confusing to readers unfamiliar with isotope ratio calculations due to the use of the backslash as the division symbol both within the numerator and denominator as well as between. Perhaps something like $^{13}\text{C}/^{12}\text{C}_{\text{sample}} \div ^{13}\text{C}/^{12}\text{C}_{\text{standard}}$ would be better.

Section 175: The following sentences seem to be restating a similar conclusion, “The pulse of nutrient-rich fluids resulted in significant changes to surrounding soil physiochemistry (Table 1, Table S1). Soils exhibited long-term changes to physiochemistry following fluid degradation by soil microbial communities.” Consider strengthening this paragraph by combining or differentiating these statements.

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Section 185: “. . . values around 80 cm of the hotspot” presumably should read “80cm from the hotspot”.

Section 200: Finesse this sentence a little bit to clarify that the 60 cm extent was beyond the carcass decomposition island. I believe that is what you are trying to state.

Section 235: The flow and the strength of the second sentence could be enhanced by revising the inclusion of “, here at least one year,”. This is an important point that should specifically state that the results are for the given location, climate, soil, etc. and perhaps it would be better to give this its own subsequent sentence.

Typo - The third sentence, “The beaver carcasses used this study,” should be “used in this study”.

Section 315: Typo - Sentence missing "a", “Based on the isotopic discrimination factor (D) for N in hotspot soils, a linear regression”

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