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Interactive comment on “Compound-specific ¹⁵N stable isotope probing of N assimilation by the soil microbial biomass: a new methodological paradigm in soil N cycling” by A. F. Charteris et al.

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Received and published: 9 December 2015

We thank Anonymous Referee #1 for their comments. Our responses to their general remarks are given first. We then address their specific comments.

While we are pleased that the reviewer recognises the novelty of the results reported we feel the comments regarding the framing of the paper and the novelty of the methodology are unjustified on two accounts:

1. We agree that the results reported are interesting in their own right and would benefit from further discussion. Indeed, we have a manuscript in preparation, which includes

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these and other results from further studies involving additional substrates and more than one soil. That paper will provide a significantly more comprehensive picture of the behaviours of the different substrates and discusses the implications thereof. Hence, as this is a separate matter we would prefer not to discuss these findings more than we have here.

2. Importantly, the reviewer implies that our “new methodological paradigm” has already been published in Knowles et al. (2010) and believes that for this reason the manuscript should be reframed to remove this aspect. In suggesting this we feel the referee is overstating what was reported in Knowles et al. (2010) and ignores critical aspects of our new paper. While it is true that Knowles et al. (2010) used the same experimental approach, the paper focuses on AA processing from applied Gly and Glu in relation to C- and N-cycling, and does not begin to discuss the potential wider utility of the methodology. Indeed, it was only more recently as we began to evaluate the wider use of this approach that we realised that it offers more than just insights into AA cycling but also provides a genuinely new conceptual approach. In considering how this point could have been missed we wonder whether the reviewer is taking the term “methodological” too literally to mean “the technical details of how to determine $\delta^{15}\text{N}$ values of AAs in soils”, when we were using the term “methodological” to mean the overall approach, i.e. experimental design, analytical protocol and interpretive framework. One possibility to improve clarity is that we change the term “methodological paradigm” to “conceptual paradigm” although we would prefer to leave as is.

Specific comments:

Abstract: The approach has been described to highlight its broad utility. The results are not the main focus of this paper and are included for illustrative purposes only.

Pg 1138, line 19-24: We would prefer to leave this part of the text as it is as it highlights a critical pathway by which inorganic N is routed into AAs, which we can determine, making the latter an ideal proxy for microbial N assimilation.

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Pg 1143, line 14: “These values” will be changed to “Percentage incorporations”.

Pg 1145, line 5: Only SEs will be reported.

Section 3.1: We will change the title of this section to “Limitations of bulk N and AA concentrations to detect ^{15}N substrate assimilation by soil microorganisms”

Pg. 1148, line 14: We were referring specifically to turnover of AA's/soil protein pool. We will make this clearer. i.e. to “ ^{15}N incorporated into the soil protein pool does not simply accumulate with time, but is turned over as native soil N turns over, e.g. via catabolic mineralisation. Insights into the dynamics of this aspect of the N cycle in soil can now be gained at the AA level.”

Pg 1148, line 25: This typographical error will be corrected.

Tables: The errors in Table 2 will be corrected and we will only report SE.

Interactive comment on SOIL Discuss., 2, 1135, 2015.

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2, C631–C633, 2015

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