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Interactive comment on "Depolymerization and mineralization – investigating N availability by a novel ^{15}N tracing model" *by* Louise C. Andresen et al.

Anonymous Referee #2

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There has been increased interest in the cycling of organic N in soils. This manuscript provides a quantitative assessment of amino acid production and consumption in soils using a 15N tracing model approach that builds upon prior work of senior author.

General comments: 1. Table 1. It is peculiar that soil ammonium concentration is not provided. If available (and it should be), it should be added. It is important for the reader to know how the amount of 15N-label added compares to the natural background. 2. Units. Although maybe not the best, most 15N tracer studies provide concentrations and rates in terms of mass of N (e.g., mg, ug) rather than as moles N. I would suggest tables and figures be converted to mass of N to make the data easily comparable to previous studies. Also, rates are most often "per day" rather than "per hour". 3.

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Discussion paper

Model. It strikes me as odd that SON was not separated into microbial biomass and non-biomass pools. Any N “immobilized” into the non-biomass pool will be misrepresented as N assimilated by the microbial biomass and thus misrepresent NUE as the term is commonly understood. Along with this, measuring the 15N incorporated into the microbial biomass (e.g., using chloroform fumigation) would have been a helpful addition. 4. Model comparisons. I don’t know that there is a “right” way, but comparing rates from a zero-order analytical model with a mixed kinetic numerical model seems fraught. The attempt at determining an integrated rate for a given time period seems reasonable, but exactly how this was done is not described in much detail. In reality the rates given by the two model types agree quite well (Table 2) except for Cfaa, which leads me to question the validity of Eqn. 4. I was too lazy to go back to check Barraclough’s derivation, but it makes me wonder if there is a flaw in Eqn. 4. Could the averaging to get the a’ values be a factor?

Specific corrections: p. 1, l. 8âĂŤUse commas to set off the “such as” phrase. I also wonder if “monomers” is too limiting? It is was the authors measure in this research; however, others (Farrell et al. I believe) have shown that small oligopeptides are preferred over amino acids. p. 1, l. 15âĂŤdelete extra “2)” p. 2, l. 15âĂŤa good “classic” reference that would fit here is: “Jansson, S.L., and J. Persson. 1982. Mineralization and immobilization of soil nitrogen. p. 229–252. In F.J. Stevenson (ed.) Nitrogen in Agricultural Soils. ASA, Madison, WI.” p. 2, l. 17âĂŤdelete “to address” p. 2, l. 19âĂŤ“thereby” rather than “hereby” p. 2, l. 31âĂŤdefine “NUEfaa” p. 3, l. 9âĂŤparentheses around the year p. 3, l. 15âĂŤthe “th” by dates can be deleted p. 3, l. 24âĂŤcapitalize Laboratories p. 4, l. 4âĂŤProvide the rationale for the calcium sulfate/formaldehyde extraction. It is not a standard method that readers will know. p. 4, l. 18-24âĂŤamino acids don’t need to be capitalized p. 4, l. 25âĂŤit is more typical to oven dry mineral soils at 105C; 75C is more normal for plant tissue (or organic soil horizons) p. 5, l. 5âĂŤThe Andresen ref is inappropriate here as the equations come directly from the original Kirkham and Bartholomew paper. p. 5, l. 18âĂŤAre you sure it is logarithmic, or was it exponential? p. 6, l. 6âĂŤdelete comma after “could” p. 6, l.

8âĂŤI don't think the pool is "infinite"; it is large and changes imperceptibly during the short incubation period. p. 6, l. 28âĂŤadd "%" after "22" p. 7, l. 15âĂŤThis seems like a "throw-away" sentence as it doesn't really lead to greater understanding of the results. p. 7, l. 18âĂŤThe problem of additions stimulating processes is as true regardless of what approach one uses to analyze the data. Now, it is true that if the model uses first-order kinetics, then this "mass dependency" is accounted for to some degree, but one can incorporate these kinetics in the analytical model (see "Case 2" in the rarely quoted 1955 paper by Kirkham and Bartholomew). p. 7, l. 16âĂŤcorrect to "assess" p. 8, l. 6âĂŤIs "irrational" the best word? The result is illogical, but that raises a question as to whether there is a flaw in the logic behind equation 4? p. 10, l. 5âĂŤchange to "points" p. 10, l. 26âĂŤChitin is not an amino acid, it is an amino sugar polymer. ReferencesâĂŤCapitalization of titles is inconsistent (particularly older references)

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