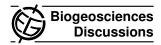
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Interactive comment on "Application of <i>delta;</i><sup>13</sup>C and <i>delta;</i><sup>15</sup>N isotopic signatures of organic matter fractions sequentially separated from adjacent arable and forest soils to identify carbon stabilization mechanisms" by Z. E. Kayler et al.

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Title: Application of 13C and 15N isotopic signatures of organic matter fractions sequentially separated from adjacent arable and forest soils to identify carbon stabilization mechanisms

C452

Authors: Kayler Z.E., Kaiser M., Gessler A., Ellerbrock R.H., Sommer M

General: The authors examine the distribution of soil organic matter C and N (and their stable isotopes) among operational soil organic matter fractions to better understand stabilization mechanisms. Soils examined included 5 paired forest/arable soils. These data are considered with associated soil chemical and physical measures - including short order range mineralogy, C content, and texture. In addition, the authors compare their findings to the conceptual model described by Kleber (2007), which provides a framework for the main chemical interactions of organic matter molecules on charged mineral surfaces. Overall the data set is a very nice addition to the literature. The topic is appropriate for this journal, and will be of interest to terrestrial biogeochemists in agricultural and forest soil areas. The authors utilize a thoughtful SOM fractionation scheme to elucidate the mechanisms involved in partitioning of the continuum of organic compounds. The findings are interesting - especially between the land use comparison. The utility of these isotope results - especially in understanding the divergent findings in arable and forest sites, could be greatly enhanced by providing more information regarding the inputs and land use history of the arable soils - as this might have significant effects of observed trends in 15N enrichment.

Overall, I recommend for acceptance with revisions. One additional review would be useful. The paper would benefit from revisions that address the following:

- 1. More information on sources of C and N and their isotopic signatures (13C/15N) among sites and especially between forest and arable soils would have been very useful to interpret possible mechanisms for differences in reported d15N and d13C(i.e., N fertilizers, manures, plant litters, etc). In addition, authors might well consider the effects of tillage in the arable soils on SOM stabilization mechanisms.
- 2. The number of figures (esp. 2-4) could be substantially reduced, as few significant differences occur. Possibly place data from figure 2 in results text and indicate some additional means/st. errors from figs 3-4? Figure 1 labels could be made larger

(clearer?) or use shades of grey to further differentiate soil origin.

- 3. The abstract would benefit from shortening; and at times, more specific in reporting what differences were found.
- 4. The authors don't comment on the relative yields of C and N in these SOM fractions. Might the extraction yield efficiency also inform this discussion essentially what is not isolated (free light material/water soluble I am guessing) and does this vary consistently by site? Also the depths of these soils were quite different. How might these differences have influenced the results observed. Some differ by  $\sim$  20 cm.
- 5. I think a clarification of the SOM extraction method would be useful for readers not experienced in these fractionations, maybe a small figure would help.
- 6. Overall the manuscript is well written, however a thorough edit would help make the paper more concise and clear.
- 7. Literature to consider in revised discussion: The role of Ca in SOM stabilization: Olk, D.C., 2006. Soil Science Society of America Journal, 1013–1022. Olk, D.C., Gregorich, E.G., 2006. Soil Science Society of America Journal 70, 967–974.
- Dr. J.A. Bird, Assistant Professor, Queens College, City University of NY and The CUNY Graduate Center. Reviewed: 4/4/2011

Interactive comment on Biogeosciences Discuss., 8, 1985, 2011.