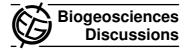
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Interactive Comment

## 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.

## J.A. Bird (Referee)

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Received and published: 5 April 2011

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



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Interactive Discussion

**Discussion Paper** 



## 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

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(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

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