Supplementary Information for the article:

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

Journal: Biogeosciences vol XX, pages XX-XX

Authors: Kayler Z.E.[1], Kaiser M., Gessler A., Ellerbrock R.H., Sommer M.

[1]Corresponding Author: zachary.kayler@zalf.de

S.1 Additional figures depicting isotopic values of OM fractions compiled by land use (S.1.1) and soil type (S.1.2).

Figure S.1.1 Comparison of the isotopic composition of OM(ER) and OM(PY) in arable and forest land use types. The differences are not significant when the data are grouped by OM fractions and land use type. The y-axis is divided by stable isotope, $\delta^{15}N$ is shown on top, and $\delta^{13}C$ is shown below. Note: To highlight the differences between land use types, different scales are used for each isotope. Error bars are standard error of the mean.

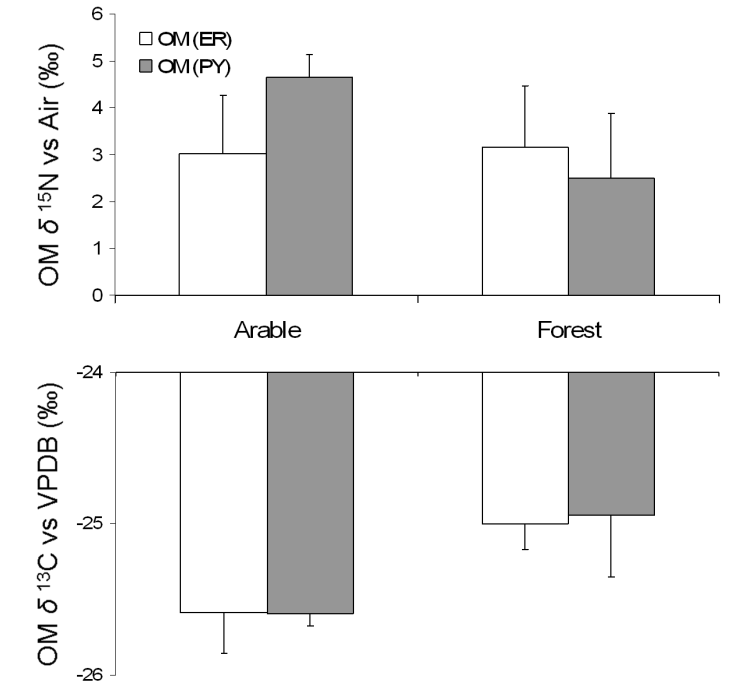
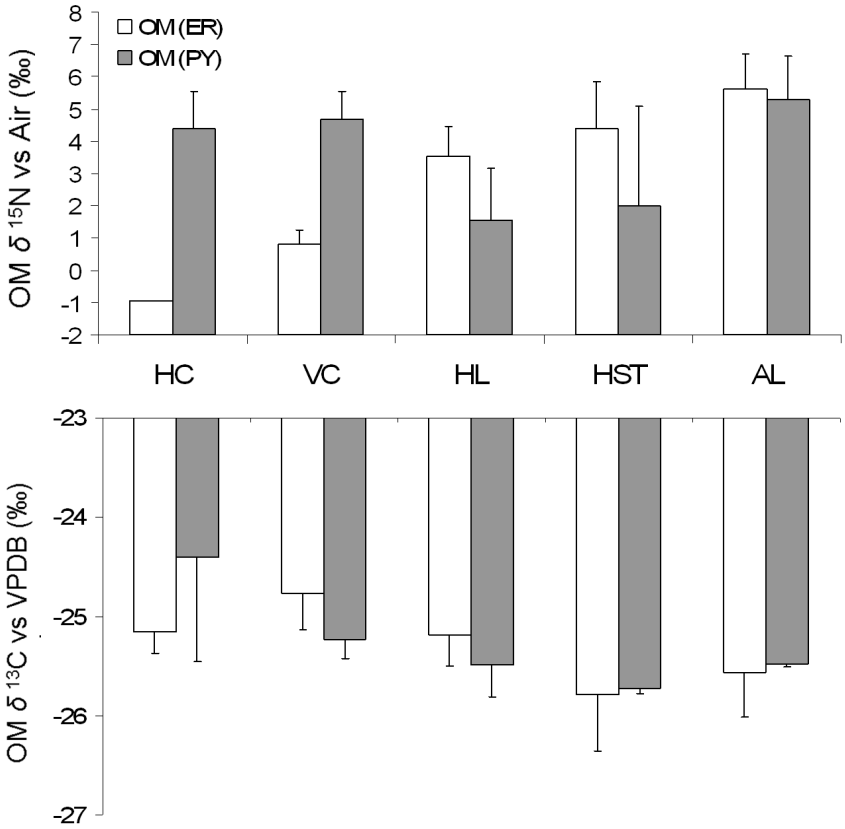


Figure S.1.2 Comparison of the isotopic composition of OM(ER) and OM(PY) across different soil types. The differences between OM fractions were not significant when grouped by soil type (i.e. irrespective of land use type). The y-axis is divided by stable isotope, $\delta^{15}N$ is shown on top, and $\delta^{13}C$ is shown below. Note: To highlight the differences between soil use types, different scales are used for each isotope. Error bars are standard error of the mean.



S2 Partial Least Squares regression results for component 1 and 2.

In this supplementary material we report the weight of influence by the examined parameters on the first two components calculated from the partial least square regression analysis (PLS). Based on the results presented below, we argue that the first two components for both arable and forest land uses are primarily representative of soil textural properties (i.e. the proportion of sand, silt and clay). The efficiency of the PLS algorithm of ensuring components that are orthogonal to each other is illustrated by comparing the weights of the textural properties below and the much smaller values in the third component which we present in the main text. Stabilized organic matter (OM) is known to be distributed non-randomly in different soil particles, particularly silt and clay fractions. Thus, it is important to, in effect, control for this known relationship when comparing mechanisms across different soil types as we do in the present study. Consequently, we can be assured that the subsequent analysis of the third component is largely dependent on the soil mineral properties we set out to investigate initially.

Figure S2.1a Parameter weights on **Component 1** resulting from the PLS analysis of the **arable** isotopic and soil data.

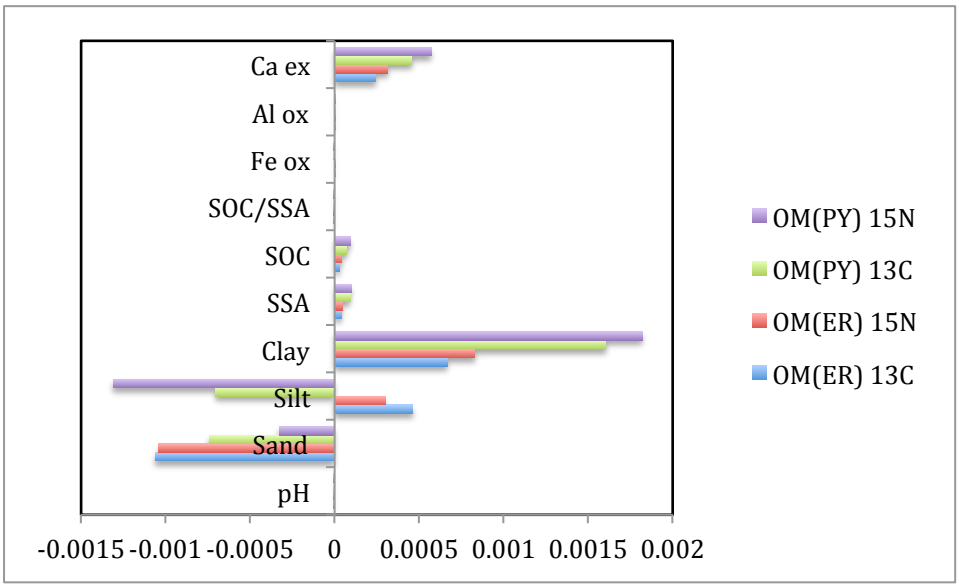


Figure S2.1b Parameter weights on **Component 1** resulting from the PLS analysis of the **forest** isotopic and soil data.

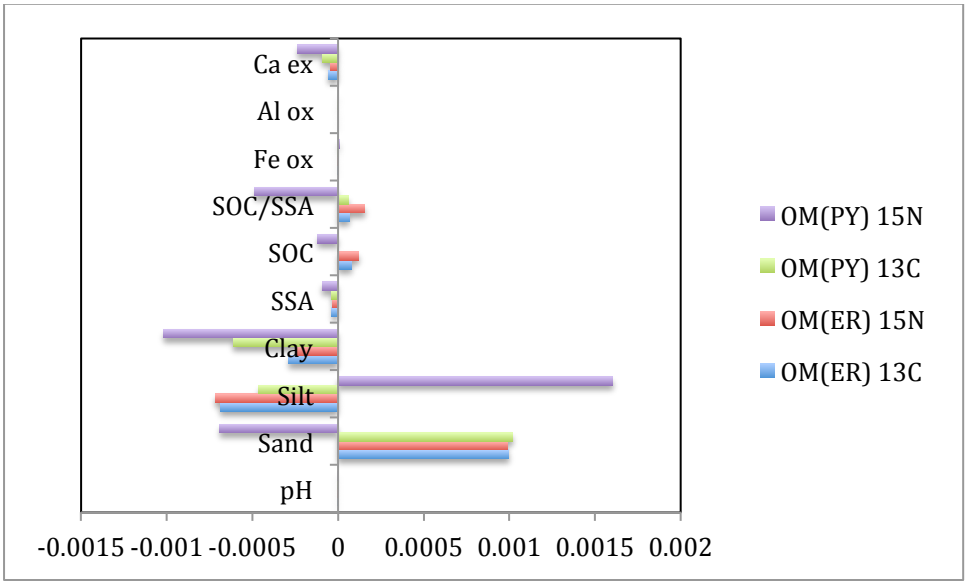


Figure S2.2a Parameter weights on **Component 2** resulting from the PLS analysis of the **arable** isotopic and soil data.

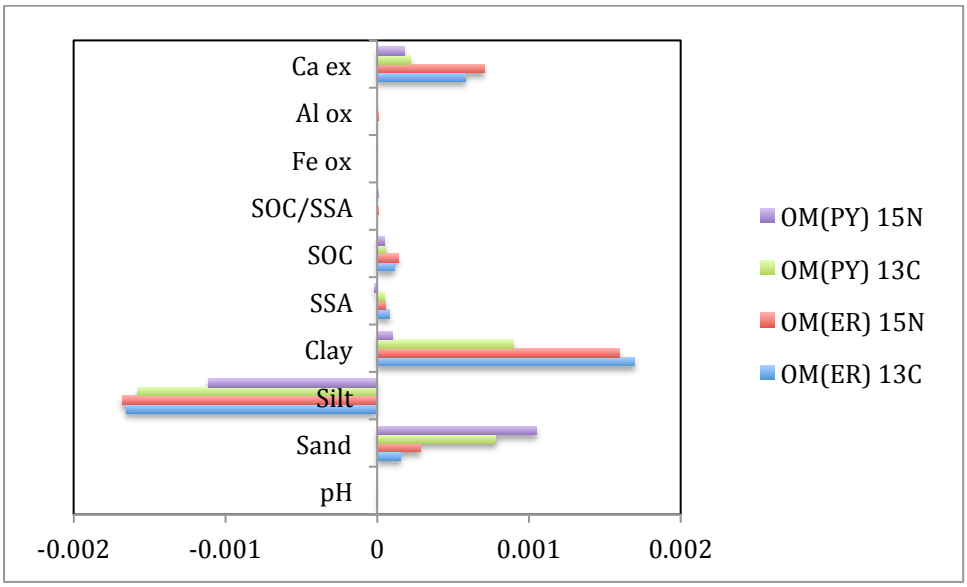


Figure S2.2b Parameter weights on **Component 2** resulting from the PLS analysis of the **forest** isotopic and soil data.