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Biogeosciences Discussions

Interactive comment on "Combining a coupled FTIR-EGA system and in situ DRIFTS for studying soil organic matter in arable soils" *by* M. S. Demyan et al.

Anonymous Referee #1

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General comments

This manuscript is a timely contribution to the research on soil organic matter, which has received renewed interest in the last decade because of the link between soil carbon stock and climate change. The advance in SOM research, however, is slow in terms of the development and use of new methodologies and techniques. The idea of combing FTIR-EGA system is novel, and the techniques the authors has developed are sound in principle.

The manuscript would be publishable after some revisions.

Specific comments

As the authors correctly pointed out, methodologies are much needed to rapidly characterize the dynamics and stability of soil organic matter, for which CO_2 max was proposed as an indicator. Does the value of CO_2 max depend on the heating rate in thermal analysis? Could the authors provide an example of the dependence or independence of CO_2 max on heating rate?

Why did you hold samples for heating at 700^{o}C for 10 minutes? Was it for complete combustion of soil organic matter at 700^{o}C or other purpose?

Would it be a better choice to decrease the heating rate to half (34^{o}C per min) and eliminate the holding time at 700^{o}C? My own thermal analysis of a soil sample shows that the onset temperature of SOM decomposition changed from 221^{o}C to 258^{o}C, and peak maximum of heat flow curve increased from 295^{o}C to 389^{o}C when the heating rate was increased from 10^{o}C to 60^{o}C/min, although the shape of weight loss and heat flow curves was less affected by heating rate.

Have you compared the C content determined by your elemental analyzer with the data from thermal analysis (i.e., the weight loss from combustion, divided by a factor 1.724 for a conversion to C%)? These two values would be similar if you could determine the temperature at which SOM starts to decompose.

p. 15390, line 24. (0.13 to 48%). Please specify which sample has a C content of 0.13%.

Technical corrections

There are several errors that the authors must correct during their revision of the paper. The below is an incomplete list of the errors:

- P. 15388, lines 1-2. The clay contents in the sentence do not match with the numbers in Table 1a.
- These references were cited in the text, but not listed in the references section:

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Interactive Comment

von Lützow et al., 2008 (p.15384); Demyan et al., 2012 (p.15394); Schulten, 2009 (p.15401); Dell'Abate et al., 2003 (p.15403); Schulten and Leinweber, 1999 (p.15405);

- The reference of Schütt, 2010 was listed at the end, but not cited in the text.

Interactive comment on Biogeosciences Discuss., 9, 15381, 2012.