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Biogeosciences Discussions

Interactive comment on "No-tillage lessens soil CO_2 emissions the most under arid and sandy soil conditions: results from a meta-analysis" *by* K. Abdalla et al.

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please see attached files

Interactive comment on Biogeosciences Discuss., 12, 15495, 2015.

Response to reviewers' comments

Anonymous Referee #1
Received and published: 13 October 2015
I think the paper is a good piece of work and can be useful in improving our understanding of factors driving soil CO_2 emissions. However, there are many typo-grammatical errors that require significant attention. A few of the discussion points, e.g. around crop rotations and nitrogen fertilizer application, also need to be explored further.

- Thanks very much. Corrections have been performed as requested with a special attention on the discussion part. Please see comments below on this same page.

Anonymous Referee #1
Received and published: 14 October 2015
1. General comments While the paper is about an exciting and important subject, there are significant grammatical errors that require serious attention. It is understandable that many authors are not native speakers of the English language, but effort should be taken to have manuscripts edited by people with a good grasp of the language. There is also a lack of consistence in the style or structure of the discussion section. The author started off with short discussions under attribute based sub-topics and drifted to one long discussion where a number of attributes were lumped together. The danger in adopting the approach of the short discussions under specific sub-topics based on attributes is the interactions between/among the attributes e.g. the impact of most of the attributes analysed depend on length of time under adoption, climate, soil texture etc. It is often difficult to treat these factors independently in a discussion. Some results are poorly discussed e.g. the impact of (i) crop rotations, and (ii) nitrogen fertilizer application on SOC_C and CO_2 emission. There is no depth in the discussions and one wonders if the efforts in analysing the impact of these attributes were worthwhile.

- We fully agree about the difficulty to treat the factors independently in a discussion. However what we intended here was to investigate the extent to which each of them impacted the till *vs* no-till differences for CO_2 emissions.

  In this new version of the manuscript a greater emphasis was given to the discussion of crop rotation and fertilization impacts with a series of new research studies cited to explain the observed trends (underlined text as new adds):

4.5. Crop types, residues management and crop rotation
The no-tillage versus tillage variations of CO_2 emission and SOC_C amongst the crop types (Fig. 4a-b) are related to variability in the quantity and quality of crop residue. Both quantity and quality of crop residues, are important factors for soil carbon sequestration and CO_2 emissions, and are highly dependent on crop type. Reicosky et al. (1995), reported that maize returns nearly twice as much residue than soybean, but soybean residues decompose faster because of their lower C:N ratio. Thus, maize residues result in higher soil organic matter than soybean. Al-Kaisi and Yin (2005) also reported reduced soil CO_2 emissions and improved soil carbon sequestration in maize-soybean rotations due to better residue retention. Reicosky (1997) summarized that a maximizing residue retention results in carbon sequestration with subsequent decrease in CO_2 emissions. However, several recent studies pointed to the lack of impact of residue management on soil carbon, with Lemke et al. (2010)

Fig. 1.

No-tillage lessens soil CO_2 emissions the most under arid and sandy soil conditions: ***results from a meta-analysis***

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Fig. 2.