Biogeosciences Discuss., 12, C3762–C3764, 2015
www.biogeosciences-discuss.net/12/C3762/2015/

Biogeosciences
Discussions
Open Access

Interactive comment on "Microbial carbon recycling: an underestimated process controlling soil carbon dynamics" *by* A. Basler et al.

Anonymous Referee #1

Received and published: 22 July 2015

Basler et al. investigate stabilisation and recycling of soil sugars as processes controlling soil carbon dynamics. This is addressed by d13C analyses using HPLC/IRMS of soil sugars in density fractions from a natural 30 year old labelling experiment with wheat-maize vegetation change. Overall, this is a well designed and presented study appropriate for publication in BG.

The authors clearly state the motivation/relevance of this study for better understanding turnover dynamics of sugars in the introduction, formulate a clear working hypothesis at the end of the introduction (turnover of plant-derived sugars is ruled by stabilisation versus turnover of microbial-derived sugars is ruled by recycling) and provide all necessary information where and how the study was performed in the Material and Method section.

The authors found that the contribution of maize-derived carbon in the POM fractions is considerably higher in sugars compared to the bulk fractions, equivalent to mean residence times (MRT) being lower for sugars than for bulk C in these fractions. This is interpreted in terms of aggregate formation being fuelled by microbial activity and fresh organic matter. Concerning the working hypothesis, the authors found that the MRT of xylose is considerably lower than the MRT of the other sugars. The authors argue that xylose (plant-derived) dynamic is primarily dominated by stabilization, whereas the dynamic of the other sugars (microbial-derived) is strongly controlled by recycling. Interestingly, this also holds true for arabinose; this is well highlighted and discussed by the authors. However, as alternative interpretation, I would like to suggest (and the authors may want to include this in their discussion) that the dynamic of arabinose, like that of xylose, is primarily controlled by stabilisation (not by recycling). The arabinose/xylose ratio is close to 1 in the soil fractions, possibly because former vegetation contributed relatively high amounts of arabinose to the soil. The addition of wheat/maize sugars with low ara:xyl ratios (1:6 and 1:5, respectively) thus resulted in a low admixture of maize-derived arabinose during the last 30 years, while the admixture with maize-derived xylose was much higher.

Furthermore, if I understand right, the authors have a second MS under review in BGD also focussing on stabilisation versus recycling of soil sugars. Hence, in order to increase the impact of their papers, it may be advantageous to publish both papers as companion papers with

a) similar titles, e.g.:

1) Recycling vs. stabilisation of soil sugars – I) a natural 30 yrs old labelling field experiment

2) Recycling vs. stabilisation of soil sugars – II) a long-term laboratory incubation experiment

b) establishing clear links between these two papers. So far, this is unfortunately not done at all.

Minor issues:

- The sugar analyses are performed (in contrast to Amelung et al., 1996) with Serdolit. Is there a reason why you did not use XAD resin as in the original procedure?

- When emphasizing the importance of recycling dynamics, position-specific d13C differences/methods (co-author M.D. is well known for her excellent expertise on this field) are or will at least soon become of high importance. Hence, the readers will profit from one or two respective sentences and references (maybe in a Conclusion and Outlook chapter)

- Fig. 1: Please specify what for light/dark grey bars stand for (I guess you mean Ap and E horizons, respectively)

- Table 1: The carbon contents of the POM fractions seem to be very/too low, please check and correct if necessary.

Interactive comment on Biogeosciences Discuss., 12, 9729, 2015.