Biogeosciences Discuss., 11, C1572–C1574, 2014
www.biogeosciences-discuss.net/11/C1572/2014/

Biogeosciences Discussions
Open Access

Interactive comment on "Substrate quality alters microbial mineralization of added substrate and soil organic carbon" *by* S. Jagadamma et al.

Anonymous Referee #1

Received and published: 13 May 2014

General comments:

This is a valuable and comprehensive study, addressing some key questions in soil organic matter cycling. The authors have conducted a thorough investigation with a range of soil types and amendments, including organic amendments that are not commonly studied. Some specific and technical comments follow.

Specific comments:

Introduction:

4453, 13. It's not clear what leaf litter is an example of - a substrate that has not yet decomposed? Maybe cut.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

4453, 25. Maybe note that the work by Strickland et al is cited here as an exception to the statement, not a support to the statement?

4456, 16. Perhaps don't use the term "long-term", just state the day. It's relative, right?

4456, 18. Clarify with "historical organic C inputs"?

Results:

4463, 14-18. Good discussion - maybe results not the best place for it, though – perhaps methods or discussion?

4463, 17. Why not include the archaeal data in the SI? Or, if it is not informative at all, maybe exclude it entirely from the manuscript, including the methods?

A note on section 3.4. I am somewhat leery of the direct comparison of the modelling constants across pools. For example, could similar results be obtained by making the slow pool larger, but increasing its rate constant, vs. making the fast pool larger, but decreasing its rate constant? Figure 4 seems to roughly illustrate this trend - increasing pool 1 (A) is accompanied by decreasing k1(B). I.e., it is necessary to interpret the pool sizes and changes in rate constants together - simply noting that Pool 1 is smaller without explicitly stating how its associated k value changed does not necessarily allow the reader to make conclusions about the stability/lability of the C in that soil. An extreme example: if a given soil (X) contained C that is, on average, relatively recalcitrant, but still of widely varying stability, it could be modelled as having a very large pool 1, but this pool would have a low k constant. If compared to a soil with very labile C (Y), a small sub-fraction of which is especially labile, this soil may be assigned a very small pool 1 (representing this small, highly labile sub-fraction), but with a very high k. Considering only the pool size, the reader might conclude that X is more labile than Y (it has a bigger pool 1), but this would be incorrect. This seems particularly important since these pools are not expected to correspond to a "real" soil fraction. Perhaps, though, since, in the example of the Andisol, where the fast pool is smaller

BGD

11, C1572–C1574, 2014

than in other soils AND the slow pool has a slower rate constant than in other soils, this point holds true - C cycling in the Andisol is generally slower. In any case, perhaps a careful discussion and justification of the statistical treatment of the rates alone while allowing the pool size to vary would be useful. Or, an alternative - what about holding one property constant (pool sizes or rate constants), and then allowing only the other to vary across addition types? Would that make sense? Or is there a good reference to support/justify the approach taken? Something to consider.

Discussion:

4465, 21-25. I think this point would be stronger if supported only by fungal qPCR numbers, rather than the F:B ratio. For the reasons discussed by the authors earlier, could we not imagine a scenario where the bacterial community responds to substrate additions by shifting toward dominance of species with low 16S copy numbers, while fungi do not change, thus increasing the F:B ratio? While I do not necessarily think this is the case, this specific point (fungi respond to sugars) might be stronger if the authors just considered the fungal data. Would that be possible with this data? In general: the authors could probably go deeper into the findings with regard to how the different substrates affected native SOC mineralization rates in the different soils, with more speculation on why the effects vary from one soil to the next, and why, for example, they did not find that glucose additions increase SOC mineralization, as many previous studies have found.

Technical comments:

4453, 22. Likely mean "complementary" here

4462, 15. typo - "combined"

4466, 17. "influences"/"could also influence"/"structures also influence"[...]"and the relative..."?

Interactive comment on Biogeosciences Discuss., 11, 4451, 2014.