Interactive comment on “Stable soil organic carbon is positively linked to microbial-derived compounds in four plantations of subtropical China” by H. Wang et al.

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We thank the reviewer for the constructive comments. We have thoroughly revised the manuscript and addressed all of the comments. We hope that the revised manuscript has adequately addressed the reviewer’s comments. In the following, we respond to all general and specific comments from the reviewer. The manuscript is attached with changes marked.

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This paper estimates the C composition of litter and fine roots of 3 broadleaf and 1 coniferous forests by 13C CPMAS NMR and analyzes soil microbial community struc-
ture in the surface soils from those forests using PLFA analysis. The results are discussed including previous results of the surface soil C composition. Experiments are simple. One of the conclusions, “the composition of organic constituents in litter and plant roots does not affect the composition and stability of SOC in the A-horizon soil”, is interesting and important. A technical problem is the use of constant CP in NMR analysis that probably underestimates %carbonyl C and/or %aryl C, although alternative method called ramp CP is also not complete. The presence of SSBs is another problem. These faults are more serious in the analysis of SOC. The authors do not exhibit any spectra they obtained and do not explain how treated SSBs during C composition estimation process, which are essential for trusting the data in Table 1 even if the conclusion would not change.

Answer: In NMR analysis the constant CP method is more commonly used than ramp CP in the literature. CP-MAS in NMR analysis is a commonly used technique in many publications, and contribution of SSBs (spinning side bands) to spectral intensity is usually ignored, given their low intensity. The results from this study should be comparable with those earlier publications that used the same technique. We have now provided NMR spectrums as Figure 1 in the revised manuscript to support the information in Table 1. Some of the publications that used the CP-MAS in NMR analysis for soil organic matter research are listed below:


Figure 1. Solid-state 13C CPMAS NMR spectra from soil, leaf and fine root in the four plantations in subtropical China subject to Pinus massoniana (A), Castanopsis hystrix (B), Michelia macclurei (C) and Mytilaria laosensis (D).

High alkyl C/O-alkyl C ratio of SOC can be achieved by preferential decomposition of O-alkyl C among plant derived C or by addition of microbial alkyl C after both alkyl C and O-alkyl C derived from plants. Microbial C may contribute to stable SOC pool, but the size of contribution is unknown. This paper does not give any data indicating the considerable contribution from microbial C to alkyl C in the soils analyzed. PLFA suggestion is too weak to your second conclusion.

Answer: We agree with the reviewer that microbial processes are just one of the major factors affecting SOC composition. Thus, we revised the description of results in the revised manuscript. “We thus suggest that the stable SOC composition would be linked to microbial composition” and “soil microbial processes are one of the major factors
affecting stable SOC composition.” Please see the revised manuscript Page 2, line 15-16 and Page 17, line 9-10.

Minor point: The proportion of alkyl C in total C is not ‘alkyl C content’.

Answer: We revised “alkyl C content” to “the proportion of alkyl C in total C” in the revised manuscript.

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Figure 1. Solid-state $^{13}$C CPMAS NMR spectra for soil, leaf and fine root samples from four plantations in subtropical China: (A) Pinus massoniana, (B) Castanopsis hystrix, (C) Michelia macclurei and (D) Mytilaria laosensis.