

## ***Interactive comment on “Soil resources and climate jointly drive variations in microbial biomass carbon and nitrogen in China’s forest ecosystems” by Z. Zhou and C. Wang***

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Responses to Referee 2 [General comment] The study of Zhou and Wang reported that the variations of soil microbial biomass carbon and nitrogen are greatly driven by soil resources and climate in China’s forest ecosystems. Before its acceptance for publication in BG is given, I may have the following comments on their manuscript. [Response] Thanks for your valuable comments. Following your suggestion, we revised the manuscript and hope you will satisfy with the revision.

[Comment 1] P192 L9-14: It is easy to understand their major results if the authors could present the detailed data of these indices at least for nature and planted forests.

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In addition, I don’t think the coefficients of variation here as well in other places are necessary. [Response] Following your suggestion, we added detailed data of these indices for the nature and planted forests and deleted the CVs, which was revised as “There was a large variability in Cmic (390.2 mg kg<sup>-1</sup>), Nmic (60.1 mg kg<sup>-1</sup>), Cmic:Nmic ratio (8.25), Cmic/Csoil rate (1.92

[Comment 2] P192L15-17: How could you make this suggestion according to your results, because in Fig. 7 the values of R<sup>2</sup> are less than 0.2? [Response] Ecological models have to face tradeoffs of realism, generality and precision on a specific system. It’s true that the values of R<sup>2</sup> are small in Fig. 7 and thus the predictive precision is low, but we hope to show the general trend of changes in microbial stoichiometry that has important ecological implications, because these relationships reflect the stoichiometric flexibility of microbial communities (Li et al., 2012; Fanin et al., 2013), and small adjustments of the stoichiometry may have significant effect on soil resource cycles (e.g., respiration and N, P mineralization, c.f., Mooshammer et al., 2014). Fanin N., Fromin N., Buatois B., and Hättenschwiler S.: An experimental test of the hypothesis of non-homeostatic consumer stoichiometry in a plant litter-microbe system. *Ecology Letter*, 16, 764–772, 2013. Li Y., Wu J., Liu S., Shen J., et al.: Is the C:N:P stoichiometry in soil and soil microbial biomass related to the landscape and land use in southern subtropical China? *Global Biogeochemical Cycles*, 26, 2012. Mooshammer M., Wanek W., Zechmeister-Boltenstern S., et al.: Stoichiometric imbalances between terrestrial decomposer communities and their resources: mechanisms and implications of microbial adaptations to their resources. *Frontiers in Microbiology*, 5, 1–10, 2014.

[Comment 3] P192L18: What is the difference of the responses of Cmic/Csoil and Nmic/Nsoil to soil resources and climate? [Response] Since the words are limited in Abstract, we did not state the difference explicitly there, but in Discussion showing that (1) Cmic/Csoil decreased with Csoil:Nsoil but Nmic/Nsoil increased with Csoil:Nsoil, and the Cmic/Csoil was more influenced by soil resources than Nmic/Nsoil (36.7

[Comment 4] P192L21-22: I think it’s hard to understand why the authors make such

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conclusion, please explain it. [Response] We agree with you, and deleted this sentence. Also refer to response to Comment 7.

[Comment 5] P193 L23-24: Because this kind of work has already done by others, so they probably need to revise this sentence. [Response] Thanks for your suggestion. We revised as "Synthetic analyses of these data will help to understand the patterns and environmental controls of soil microbial biomass."

[Comment 6] P195 L7: Please explain why the authors collected the studies only starting from Jan. 2000. How about the earlier studies? L9-10: Why they didn't use 'China' or 'Chinese' as the key words? [Response] Sorry for not articulating. In fact, there were no papers reporting the soil microbial biomass published before 2000 in China that were measured with the chloroform fumigation-extraction method. In addition, we did not use 'China' or 'Chinese' as key words in the literature retrieval through the China National Knowledge Infrastructure (CNKI, <http://www.cnki.net>) online databases because almost all studies indexed in CNKI are conducted in China. However, we did use 'China' or 'Chinese' as key words as the restrained key words when conducting the Web of Science (<http://apps.webofknowledge.com>) online databases search. To clarify these confusions, we revised correspondingly.

[Comment 7] P201 L3-6: What is the significance of such small differences? I don't think it is necessary to conduct such comparison in the first paragraph. [Response] We agree with you, and deleted this paragraph.

[Comment 8] P201L26-30: In Fig. 4, it is hard to believe that the differences of both slopes and intercepts between high- and low-quality soils are significant. Did they perform the ANCOVA analysis to confirm it? [Response] Yes, we did. The ANCOVA analysis (showed in follow table) was consistent with the standardized major axis (SMA) analysis (Warton et al, 2006) presented in the manuscript.

Warton D I, Wright I J, Falster D S, et al: Bivariate line-fitting methods for allometry. *Biological Reviews*, 81, 259–291, 2006.

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[Comment 9] In the conclusions, they should not repeat what they have presented in results and discussion. Rather, they need to summarize the significance of their results, and how they findings could contribute to the detailed aspects of biogeochemical cycle of forest ecosystems. [Response] Yes, thanks for your suggestions. The conclusion was revised as "By synthesizing 689 measurements from 207 independent studies across China's forest ecosystems, we find large variations in soil microbial biomass carbon and nitrogen and microbial quotient that are subjected to changes in soil resources, climate, and management regimes. We also provide evidence for stoichiometric flexibility of microbial communities. These results will improve our understanding of soil microbial metabolic processes, ecological stoichiometry, and microbial responses to environmental change."

[Comment 10] In both Fig. 6 and Fig. 7, I think the relationships between the indices of C-N and MAT/MAP are not essential. To some extent, given the very small values of R<sup>2</sup> in the model results, they should use the results of group analysis in Fig. 2 and Fig. 5 to discuss the effects of climate on the variations of C<sub>mic</sub> and N<sub>mic</sub> in China's forest ecosystems. [Response] Thanks for your suggestion. The effects of climate on the variations in C<sub>mic</sub> and N<sub>mic</sub> in China's forest ecosystems were fully discussed based on the figures and table. Please refer to the response to Comments 2 for why we would like to keep Figures 6 and 7.

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**[Comment 8]** P201L26-30: In Fig. 4, it is hard to believe that the differences of both slopes and intercepts between high- and low-quality soils are significant. Did they perform the ANCOVA analysis to confirm it?

**[Response]** Yes, we did. The ANCOVA analysis (showed in the following table) was consistent with the standardized major axis (SMA) analysis (Warton *et al*, 2006) presented in the manuscript.

Model	coefficient	sum of squares	<i>df</i>	mean square	<i>F</i>	<i>P</i>
Log( $C_{\text{soil}}$ )–Log( $C_{\text{mic}}$ )	slope	0.286	1/497	0.286	3.782	0.052
	intercept	0.698	1/498	0.698	9.171	0.003
Log( $N_{\text{soil}}$ )–Log( $C_{\text{mic}}$ )	slope	0.004	1/497	0.004	0.057	0.811
	intercept	0.591	1/498	0.591	8.353	0.004

**Fig. 1.**