

# ***Interactive comment on “Plant functional traits determined the latitudinal variations in soil microbial functions: evidence from a forest transect in China” by Zhiwei Xu et al.***

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Reviewer #1: General comments The Authors of the manuscript ‘Plant functional traits determined the latitudinal variations in soil microbial functions: evidence from a forest transect in China’ (bg-2018-499) by analyzing numerous parameters in forest soils located along North-South Transect of Eastern China (NSTEC) tried to answer the questions if: (1) the profiles of soil microbial substrate use varies along a latitudinal gradient, (2) biogeographical patterns of soil microbial substrate may be limited by climate and plant functional traits, and (3) the associations between soil microbial community and function could show functional dissimilarity. The Authors have found

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that soil microbial community structures and functions were significantly correlated along NSTEC and that plant functional traits may influence patterns of soil microbial substrate. Moreover, based on analysis of relationships between soil microbial community structure and functions they concluded that there was functional dissimilarity. In my opinion, the study is interesting and has merit; however it needs major revision. The methods have been properly designed and the results are reliable. Specific comments Major points: (1) The Authors must include section 'Chemicals' in which all compounds used in this study will be described including their name, purity/activity, place of purchase Response: We have added the Chemicals used in this study as follow: The Biolog-ECO plates were purchased from Biolog, US. The substrates for BG, NAG, AP, and LAP were 4-MUB- $\beta$ -D-glucoside, 4-MUB-N-acetyl-b-D-glucosaminide, 4-MUB-phosphate, and L-Leucine-7-amino-4-methylcoumarin, and were stored at -20 °C. An MUB standard was used for the BG, NAG, and AP enzymes and an AMC standard was used for the LAP enzyme. The substrates and standards were purchased Sigma. Analytical grade reagents were used for the soil nutrient analysis. (P8, Line 200-204) (2) The paper suffers from 'Abbreviations' section in which all important full and shortened names must be included. This will help the Authors to read the text. Response: we have added "Abbreviations" sections including all important full and shortened names as follow (P3, Line 54-81): Abbreviations: NSTEC North-South Transect of Eastern China AWCD Average well color development RDA Redundancy analysis Soil microbial community PLFAs Phospholipid fatty-acids G+ Gram positive bacteria G- Gram negative bacteria F/B Fungi/Bacteria Soil enzyme activities BG  $\beta$ -glucosidase NAG N-acetylglucosaminidase AP Acid phosphatase LAP Leucine aminopeptidase Soil properties SMC Soil moisture content SOM Soil organic matter SOC Soil organic carbon TN Total Nitrogen DOC Dissolved organic carbon MBC Microbial biomass carbon Silt Soil silt fractions (<53  $\mu$ m) Plant functional properties: CWM Community-weighted means SLA The specific leaf area LDMC Leaf dry matter content Leaf C Leaf C concentrations Leaf N Leaf N concentrations Minor points: (3) Page 3, line 51, '....functional diversity to understand ..' functional

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diversity (of what?), please add Response: we have rewritten this sentence as “It can be used to test fundamental questions about soil biological resistance and resilience (Jagadamma et al., 2014; Swallow and Quideau, 2015), and help us understand the role of microbial communities in different environments (Preston-Mafham et al., 2002).” (P4, Line 84-87) (4) Page 3, line 61-62, correct this sentence Response: we have rewritten this sentence as” For example, Tian et al. (2015), from their study of Changbai Mountain, China, found that the soil microbial metabolic activity and functional diversity were spatially dependent.” (P4, Line 95-97). (5) Page 3, line 73-74, correct to: ‘reflect . . .phosphorous and pesticides concentrations over . . .’ Response: we have rewrite this sentence as “For example, the geographic patterns in soil microbial activities mainly reflect the climate, soil pH, and total phosphorus concentrations over large geographic scales (Cao et al., 2016).” (P4, Line 109-111). (6) Page 5, add section: ‘Chemicals’ Response: We have added the Chemicals used in this study (P8, Line 200-204). (7) Page 12, line 297, write ‘positively’ instead ‘negatively’ Response: The correlation coefficient in the Figure 4 refers to the correlations between the environmental properties and the RDA1 or RDA2. Silt and SMC were negatively correlated and Leaf N, Leaf C, and LDMC were significant positively correlated with RDA1, MAP, SOC, and TN were significant correlated with RDA2. The RDA1 represent the major variance of soil microbial carbon use efficiency. (8) Page 13, line 336, correct to: ‘species’ Response: DONE (P16, Line 438). Technical comments (9) Write (for example) ‘20 °C’ instead of ‘20°C’ Response: DONE (P7, Line 178). (10) English of the paper should be corrected in some places Response: According to the comments and suggestions, we have carefully revised our manuscript. We rewritten the long sentences all through the text. In addition, we have our revised version manuscript professionally edited by a native English speaker colleague, Dr Deborah Ballantine from the United International College, Beijing Normal University-Hong Kong Baptist University.

Please also note the supplement to this comment:

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