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Interactive comment on "Divergence of dominant factors on soil microbial communities and functions in forest ecosystems along a climatic gradient" *by* Zhiwei Xu et al.

Anonymous Referee #2

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The authors present a comprehensive study of soil microbial communities and extracellular enzyme activities in different forests along a climatic gradient. The methods are technically sound. This paper clearly elucidates the dominant factors controlling microbial communities and enzyme activities in each climatic zone. The authors also attempt to emphasize the importance of climatic zones in addition to forest types. However, it's unclear for readers why different dominant factors exhibit in different climatic zones. For example, the authors state that "soil clay content had most influence on the soil enzyme activities in subtropical forests" (Line 353). However, the following discussion is very general and does not explain why this is only found in the subtropics. Here is another example, soil nutrients (N, P) are more important in warm temperate and

subtropical forests than in temperate forests, because nutrients are more likely limiting factors in warm temperate and subtropical forest. This kind of comparison between different climatic zones should be expanded in Discussion and could add value to this study. I have a few more suggestions to improve the presentation of this study: In Conclusions, soil clay fraction is identified as an important predictor in subtropical zones. However, "soil clay" is not mentioned in Abstract. Line 266-268: I don't understand the logic here. The authors are talking about microbial/enzyme responses to forest types in Section 4.1. The concluding sentence addresses "climatic region may be more important than forest types" without any expanded discussion, though I understand "climatic effects" may be indirectly discussed in Section 4.3. Line 298-300: This clause does not explain why there are more Gram-negative bacteria, less Gram-positive bacteria, and (less?) bacteria PLFAs under increasing pH.

Minor comments: Line 210-212: please spell out G- (Gram-negative bacteria) and G+ (Gram-positive bacteria) when they are first introduced. Line 241-243: The causal explanation herein is not specifically related to the results in Section 3.3 and Fig. 4a. Does the "higher inputs of mixed litter" mean higher litter C/N and lower litter TN? To my understanding, from Fig.4a, BG/NGC/LAP activities are positively correlated with litter C/N and negatively correlated with litter TN. The following explanation for the warm temperate zone is more informative. Line 262: please spell out SLA and LDMC. Line 328: please spell out F/B ratio.

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