

## ***Interactive comment on “Modeling the effects of tree species and temperature on soil’s extracellular enzyme activity in 78-year-old tree plantations” by Xiaoqi Zhou et al.***

### **Anonymous Referee #1**

Received and published: 22 June 2017

#### General comments:

This study modelled the effects of tree species and temperature on soil extracellular enzyme activities in a 78 year old plantation in southeast Queensland of Australia. This is an interesting topic and the MS is generally well written. However, there are some major limitations which I think need to be addressed before accepted for publication.

My biggest concern is that some writing and terms did not reflect the actual design of the study. For instance, the authors concluded that Eucalyptus had highest EEA, long C residence time and lowest C turnover rate. This is contradicting. Higher enzyme activities mean quicker C turnover. The actual C decomposition and stabilisation, and

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C residence time in soil cannot be measured without the use of stable isotopes. While results show clear differences between different tree species, it is arbitrary to make such conclusions. Therefore the conclusions need to be more relevant to the design and topic.

Also, the title and many parts of the introduction make the readers believe this study is to investigate the effect of warming on soil EEA. Actually, the incubation under the temperature gradient is just a methodology study of enzyme activities incubation with substrates at different temperatures. It’s not an actual experiment testing climate warming on soil microbial properties. The readers can easily be confused.

The introduction did not clearly identify the knowledge gaps in this area. Was not a study on tree species on EEA? If any what did they tell us and what the current research gap is? Also the authors only mentioned very briefly in the introduction temperature effects. More work needs to be done.

The DISCUSSION is the weakest part of this MS. Clearly the results and relevant implications have not been explicitly discussed.

#### Specific comments:

Lines 67-72, the logic is reversed. Better say climate warming would increase SOM decomposition, and, in return, C losses from SOM decomposition would have feedbacks on atmospheric CO<sub>2</sub> concentration and global temperature.

Lines 92-93, Vague, what’s the point of this sentence?

Lines 94-96, Again this sentence is not clear. Why do microbes produce less EEA under warmer temperatures?

Lines 107-109, what are these models about? If incorporated EEA, what did they tell us and what are their limitations so you need to develop a new model?

Lines 126-128, as the hypotheses, please be specific. Everyone know that EEA would

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be different under different tree species and temperature.

Line 160, where is the result for MBC and MBN?

Lines 304-305, yes and obvious, not surprising.

Lines 308-317, all textbook sentences, repetitive.

Lines 323-324, Eucalyptus has highest EEA but lowest C turnover rate? Sounds contradicting and hard to understand. I think it has quick turnover, and the reason it's still building soil C is because of its massive input.

Line 328, the reason for low pH could be a direct result of SOM decomposition caused acidification, which means quicker turnover.

Lines 343-350, all RESULTS sentences, no DISCUSSION.

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-144>, 2017.