

Interactive comment on “Patterns of microbial processes shaped by parent material and soil depth in tropical rainforest soils” by Laurent K. Kidinda et al.

Anonymous Referee #1

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This is a conceptually straightforward incubation study seeking insight to the effects of soil parent material geochemistry on soil microbial biomass and extracellular enzyme activity in tropical Africa, where limited research has been conducted previously. The general results were that SOM and depth were the most important explanatory variables for MBC (and C-limitation), soils were consistently P-limited and P-limitations were strongly related to SOM, and not surprisingly, SOM was related to depth. The conclusion was that soil geochemistry affected MBC indirectly through affecting resource availability. Although analyses were detailed and meticulous, the results provided little novel insight and are generally consistent with other studies of resource limitations in tropical soils. Thus, microbial systems in tropical soils in Africa appear to have similar

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constraints as elsewhere. The paper provides a solid background for this system, but the discussion could be much shorter with greater emphasis on similarities to other tropical systems.

Section 2.5. The calculations of vector characteristics of extracellular enzyme activities were based on log ratios rather than proportions suggested by Moorhead et al. (2016). This choice affects results and warrants a brief explanation of choice. Moreover, both equations 1 and 2 seem to have mathematical errors. Equation 1 lists $\ln(\text{BG}+\text{CB})/\ln(\text{LAP})^2$, that should be $(\ln(\text{BG}+\text{CB})/\ln(\text{LAP}))^2$, whereas equation 2 lists $\ln(\text{BG}+\text{CB}/\ln(\text{LAP}))$, that should be $\ln(\text{BG}+\text{CB})/\ln(\text{LAP})$, and $\ln(\text{BG}+\text{CB}/\ln(\text{NAG}+\text{LAP}))$, which should be $\ln(\text{BG}+\text{CB})/\ln(\text{NAG}+\text{LAP})$. Please confirm and correct.

Section 3.3. There is no absolute vector threshold for C, N or P limitation, only relative indications within a study. For example, vector (relative EEA) characteristics do not directly reflect availability of C, N or P that does not require enzyme action to acquire, only indirect evidence of such availability through relatively lower enzyme activity needed to acquire it from hydrolysable sources.

The convergence in post incubation vector length patterns with depth across the three soils indicates a similar balance of enzyme-driven C, N and P acquisition despite differences in other soil characteristics. This is interesting in light of the substantial geochemical differences between soils.

Section 3.5. The correspondences between predictions and observations are not convincing.

Section 4.1. It was hard to follow this discussion, but the general relationship between MBC and resource availability (C and N) seems to contradict the following paragraph stating that microbes were P-limited throughout. Also, the implication that EEA is not responsive to short term variations in resource availability questions those parts of this study.

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Section 4.3. This paragraph reiterated the relationship between MBC and SOM, mentioned earlier, and responsive to soil characteristics that vary with site and depth. This is consistent with many other studies. The most important point arrives at lines 389-391, i.e., relative resource limitation is complicated.

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