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Interactive comment on "Annual litterfall dynamics and nutrient deposition depending on elevation and land use at Mt. Kilimanjaro" *by* J. Becker et al.

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Dear Reviewer #2, Thank you very much for your comments and suggestions. The review helped to enhance the quality and improve the comprehensibility of our study. We adjusted our manuscript and tried to clarify the issues that you pointed out.

*p.10033, l.13: What is ecosystem cycle??

We changed the term to "ecosystem carbon and nutrient cycles" to clarify.

*p.10034, ll.4-6: Please check the order again!

The order was changed as follows: (Zhou et al., 2006; Vasconcelos et al., 2008; Chave et al., 2010; Celentano et al., 2011; González-Rodríguez et al., 2011; Fontes et al.,

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2014)

*p.10034, ll.9-12: Is this comments by Schrumpf et al. or other references? Please refer these previous article correctly.

*p.10034, ll.12-14: Please distinguish what you want know from well-known fact by previous studies.

Both of the above mentioned comments were adjusted as follows: We changed the paragraph to: “Various studies in other ecosystems have shown that artificial nutrient addition accelerates nutrient cycles (Allison and Vitousek, 2004; Forrester et al., 2005; Homeier et al., 2012). It remains unclear how agricultural land use affects nutrient balances and its interrelation to litter quantity, quality and the above- and belowground element cycles in tropical (agro)ecosystems.”

*p.10034, l.22: Please add other information related to litterfall, such as biomass, history, scale of each ecosystems.

We added information or respective references on biomass and vegetation structure (Ensslin et al, 2015). Because no specific land-use history is available for our sites, we added reference for general land-use history of Mt. Kilimanjaro (Pabst, 2015).

*p.10034, l.23: Why did you choose this slope? At least, please describe general outline of the unique field, Mt. Kilimanjaro and the feature of SW slope.

Our study was part of the German Research Foundation Project: Kilimanjaro ecosystems under global change. This interdisciplinary project provides a number of long term research locations, plots, data and facilities along the SW slope of Mt. Kilimanjaro. We chose our research sites according to the joint study design. All information given in the study site description is related to the features of SW slope.

*p.10035, ll.22-24: I suppose that this paragraph is suited in not here but in Introduction, because this point is one of the strong points in your research.

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As you suggested, the paragraph was added to the introduction.

*p.10036, l.1: How many??

We rephrased the paragraph to clarify: "Within each ecosystem, 10 litter traps (1m^2, 1mm mesh size) were installed as replicates along two 100m transects (5 per transect). Due to the areal structure of one of the homegardens (HOMb), the number of litter traps had to be reduced and only five replicates could be installed. To exclude undergrowth, net heights were set between 20 and 100cm above ground."

*p.10038, ll.17-18: I suppose this results is insightful and/thus, you had better to show not only this data but also total data, such as matrix.

Thank you for pointing out this unclarity. Since Reviewer#1 was concerned about this sentence as well, we and added a new figure to clarify and visualize the results (see Figure attached). We also changed the method of comparison to a more straight forward calculation.

*p.10039, l.13: There are some errors, for example use of tense here and there in this paragraph. Please check your english before you submit revised version.

The manuscript has been sent to a professional language correction. Additionally, we revised this paragraph carefully with respect to the used tense.

*p.10041, ll.1-2: It is very difficult to conclude that and discuss from this result (table 2), I cannot conclude and discuss as follows. If you want to demonstrate and discuss about this feature, you have to show another clear results.

We agree with your criticism here. We rephrased and corrected the sentence and added respective parts to the discussion. The discussion is based on the visual interpretation of Figure 2 and the percental increase of minimum to maximum litterfall. We added the percentages to the results section 3.2: “In natural forests, peaks increased about 350% in FLM, 300% in FOC and 450% in FPO.” The discussion was adapted according to these results.

*p.10052, Table 1: Judging from these information, it is quite difficult to divid effect of elevation and land-use pattern in this study. You had better add other statistical analysis to speculate each effect on litterfall.

We agree with your comment and would have preferred to do so. However, with our limited number of treatments (i.e. elevation levels and land-use types) we refrained from applying more complex statistics here. Of course we would appreciate any suggestion to overcome this issue. In the current manuscript, we pointed out this limitation to our study as part of the discussion section. We further extended this part in the revised manuscript and add to the methods section. The main points are as follows: The elevation effect was evaluated only within the natural forest ecosystems to exclude land-use effects. This still covers a gradient of ∼900m and three very interesting ecosystems. The effect of land use was statistically analyzed comparing one homegarden (HOMb) and the lower montane forest (FLM). According to Hemp (2006) and Mt. Kilimanjaro exhibits a strong ecological zonation. Both ecosystems are located in the same altitudinal zone (i.e. lower montane) and were selected to represent the respective zone of natural species composition (Ensslin et al., 2015). Therefore, we assume low elevation related variability. COF and HOMa were further used as indicators for the strong effect of land use practices that is overlaying elevation effects. We think that this is adequate to (at least qualitatively) assess the effect of land use.

Ensslin, A., Rutten, G., Pommer, U., Zimmermann, R., Hemp, A., and Fischer, M.: Effects of elevation and land use on the biomass of trees, shrubs and herbs at Mount Kilimanjaro, Ecosphere, 6, art45, doi:10.1890/ES14-00492.1, 2015.

Hemp, A.: Continuum or zonation? Altitudinal gradients in the forest vegetation of Mt. Kilimanjaro, Plant Ecol, 184, 27–42, doi:10.1007/s11258-005-9049-4, 2006.

Pabst, H., Factors controlling microbial biomass in soils of Mt. Kilimanjaro, Dissertation, Faculty of Biology, Chemistry and Earth Sciences, University of Bayreuth, Germany, 130 pp., 2015.

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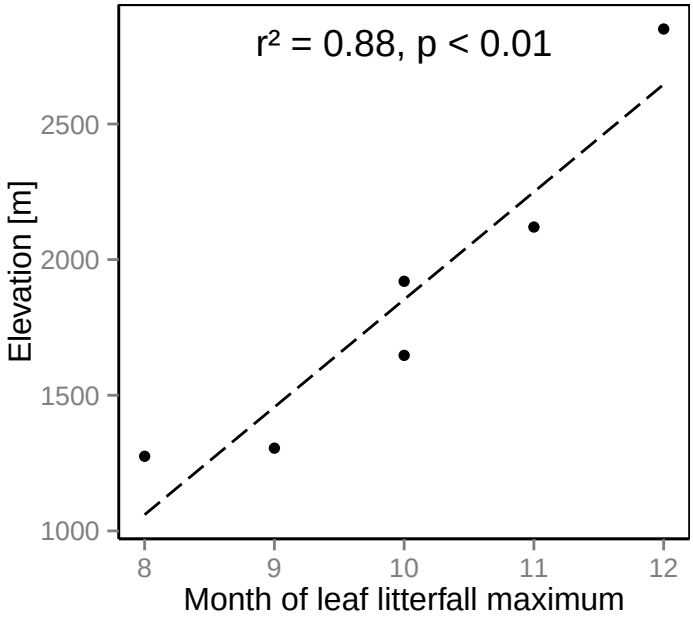

Fig. 1. Linear regression between elevation and month of highest leaf litterfall in six ecosystems of Mt. Kilimanjaro.

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