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Interactive comment on "No long-term effect of land-use activities on soil carbon dynamics in tropical montane grasslands" *by* Viktoria Oliver et al.

Anonymous Referee #2

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In the present study Oliver and colleagues tried to identify impacts of land management practices (i.e. grazing and burning) on soil C dynamics in the top 30 cm of Peruvian montane grassland soils. Soil and gas sampling was conducted at two different sites 8/9 years and 6/7 years, respectively, after burning. Oliver et al. point out that both sites differed in elevation, mean annual precipitation and air temperature but were similar in soil conditions and grass species composition. By means of density and particle-size fractionation methods they quantified soil C content in free light, occluded and heavy fractions. Soil CO2 efflux and decomposition rate measurements were additionally conducted using static flux chamber technique and mesh bags, respectively. Overall, Oliver et al. observed an increase of soil CO2 efflux and decomposition rates and a

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decrease of the soil C proportion in the free light fraction in the grazed+burned plots. Total soil C stocks did not change.

It is an interesting study but my major concern is about the experimental design. There is no random plot or site selection. Hence, there is no true replicate in the whole study. This makes it very difficult or even impossible to interpret the results in an appropriate way. Unfortunately, results are mainly analysed/described based on pooled data (P9, L260-261; P10, L280-284, L292, L308-315; P11, L319-324;) derived from two different sites with significant site-specific differences and differences in fire history (e.g. P10,L284; P11,L338; P5,L145). Then, this information even gets lost throughout discussion and conclusions (e.g. P12, L347-352; P13, L385-386, L395-396; P14, L413-420).

Specific comments: P1,L3: Title is too general.

P1,L32: . . .impacts of burning but not of fire history. Oliver et al. have not studied effects of past fire frequency or intensity on soil C dynamics but rather differences in soil C dynamics at two sites 8/9 years and 6/7 years, respectively, after a burning event.

P6,L162: Explain “puna areas”.

P6,L162: Do you have more information about the “unburnt” grassland area. I guess that this “control” grassland area has been burnt as well in the past. Are there potential differences between both “control” sites?

P5,L132: grazing and burnt plots.

P5,L133-134: Please explain the connection between labile and stable organic matter pools with your quantified soil C content in free light, occluded and heavy fractions more in detail! What is what?

P5, L135-L137: Please do not pool the data among sites but rather describe/interpret the site-specific patterns.

P6, L159-170: A figure presenting the spatial distribution of the plots at both sites would be great.

P8,L234: Please explain “proximity”. Did the bags cover the whole area? What was the distance between buried bags?

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