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Interactive comment on "Evaluating soil erosion and sediment deposition rates by the ^{137}Cs fingerprinting technique at karst gabin basin in Yunnan Province, southwest China" *by* Yanqing Li et al.

Anonymous Referee #2

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This paper aims to quantify the erosion and sediment deposition rates in the Karst region of Southwest China using 137Cs tracing technique. Further, the authors evaluated the relationships between 137Cs and selected soil properties (soil pH, total nitrogen, total phosphorus, and SOC content) by PCA analysis. The purpose of this study is worth giving the intensity of soil erosion in the area. However, I have many concerns about the conclusions:

1. The authors only sampled 10 soil cores (nine along 3 transects and one from the depression). I think the size of samples is inadequate for obtaining a catchment-scale

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conclusion, e.g. Line 20 “the sediment delivery ratio summarized 0.82 in the whole catchment according to the square of hillslope and depression bottom”. Given the complexity of topography of the study area showing in Fig. 1, erosion rates and soil properties can be highly variable.

2. Statistic relationship between 137Cs and soil properties cannot be obtained by PCA (Line 25). The angle between two variables in PAC Biplot just indicates a tendency of correlation. The authors should perform simple correlation analysis to confirm the statistic results. Further, PCA is a technique for reducing the dimensionality of complex datasets, increasing interpretability. I can’t see the necessity to perform PCA in this paper in its present form. I would suggest authors try to 1) explain the first two components 2) combine PCA with PERMANOVA to examine how do measured variables differ between slope positions. Then reconsider the necessity of using PCA.

3. §3.2 Authors presented the variation of 137Cs and soil physicochemical properties for selected hillslope at different soil depths. It is not clear which slope position you selected for such comparison? Only shoulder position or plus foot slope? Why?

4. §5 In conclusions (Line 295), authors mentioned that “on the shoulder and backslope, the maximum of 137Cs appears in the soil subsurface layers, whereas at the footslope, the maximum appears in the topsoil parts “. I will doubt this conclusion unless the SD value can be reported in Fig. 2. Its important because what I can see from Fig. 2 is that there might be no difference (if high SD) between 0-5 cm (topsoil) and 5-10 cm (subsurface) at backslope and footslope. From my point of view, it’s reasonable that no difference of 137Cs values between 0-5 cm and 5-10 cm because of the mixed effect of tillage practice.

5. Please report the slope gradients in Table 2, then we can see the rationality of your explanations for the factors driving erosion rates (§Conclusions, Line 297).

6. This paper showed that soil erosion was greater in either upper and lower hillslope parts than in the middle one (Line 235), and authors attribute these patterns to the

slope gradient. I think another possible reason is that the coexisting of tillage erosion and water erosion. Typically, tillage erosion is the main cause of soil loss at the concave position (ref. to Lobb D.A. 1999), i.e. shoulder position (upper parts), while water erosion leads to serious soil loss at lower slope position (these areas received maximum runoff concentrations).

Technical comments:

7. Line 23: "……play the most important role in WHAT?

8. Line 113: is there inorganic C from the soil samples? If so, how did you remove it?

9. Line 160: add SD to 137Cs concentration.

10. Line 175: Fig.2 rather than Fig.3?

11. Line 242: please add a reference

12. Line 245-246: what you mentioned here is not correct according to Fig. 2. Please check it carefully.

13. Line 261: please add ref. here to show where is this data from

14. Line 297: check spell of letters.

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