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Interactive comment on "Spatio-temporal patterns of the effects of precipitation variability and land use/cover changes on long-term changes in sediment yield in the Loess Plateau, China" *by* Guangyao Gao et al.

Anonymous Referee #1

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The authors investigated the effects of precipitation variability and land use/cover changes (LUCC) on sediment yield in the Loess Plateau (LP), China. The author presents a detailed examination of the relationship between precipitation/LUCC and sediment yield in different catchments in the middle part of the LP during three periods. However, there are quite a few issues in this manuscript, hence I suggest some major revisions.

My major concerns are:

1. About the linear regression model for attribution analysis, nearly half of the catch-

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ments do not show statistically significant relationship between precipitation and sediment load during the reference period (Table 3). Therefore, it is very questionable to apply these linear regression models to the validation period for detecting the precipitation-induced (or LUCC-induced) sediment load change.

2. Even though this is just a "preliminary" study, as the author mentioned, I do not feel it is a complete work presented in this manuscript. There is a need for further discussion or analysis at some places. If the focus of this paper is on both spatial and temporal pattern of precipitation/LUCC-sediment relationships, there is lack of discussion on possible reasons for the spatial variability. Also, is it possible to investigate the effect of intra-annual variability of precipitation (or precipitation extremes) on sediment load since the authors have noted the effect is important (L328-330; L369-385)? Additionally, what are equation 6 and 7 for?

3. As the spatial pattern is the focus in section 3.4-3.6, I suggest to present the precipitation/LUCC-sediment relationships in maps rather than grouped scatter plots.

Specific comments:

P1, L22-23: Is the "70%" and "30%" a part of the conclusion in this study? If yes, I didn't see any of them in the results (section 3.3). Figure 5 does not support this statement either. If not, where are the numbers from? It would be better to also include it in the introduction.

P5, L106: The introduction above is mainly about the whole TP, why is only the middle part of LP investigated?

P6, L129: Any reference?

P7, L139-140: It would be better to describe the data first, then show the figure.

P7, L146-150: The whole sentence is a little bit confusing. SSY, SC, and Cs were estimated based on P, Q, and A?

P8, L158: What does vegetation cover mean? The vegetation fraction in each grid cell?

P13, L287-301: I am very confused that the authors proposed this “framework” but didn’t show any results of it. What is its purpose here?

P15, L313-316: It would be better to describe the grouping at the beginning of this paragraph.

P17, L355-356: Does this indicate that the precipitation-sediment relationship gets stronger in some regions but weaker in some other regions? Is the strengthened (or weakened) relationship related to the SWCM or vegetation change in these catchments?

P20, L425: The same issue as (P13, L287-301). What is k0 and k1?

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