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Discussions

Interactive comment on "Effects of cultivation and reforestation on suspended sediment concentrations: a case study in a mountainous catchment in China" *by* N. F. Fang et al.

Anonymous Referee #2

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The topic of this paper is of particular interest not only in China but also in many places where land use changes have occurred as a result of socio-economic development. This paper by Fang et al., is well written and based on a vast number of paired Q-SSC samples collected over 30 decades. Such dataset is usually difficult to find and this is one of the strengths of the paper. However, some changes should be made before publication of this manuscript, which I specify in the following points.

- I would change the units used in the paper. Consider using tons/year (or kg/year) for the SSY and mg/l (or g/l) for the SSC. - If you mention the Du basin before specifying that the station's name in this basin is Zushan, I would use the sub-index D in the

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subsequent variables (i.e. QD,SSYD,etc). I think that would help the reader which is not familiar with the names. - Be consistent and use Figure or Fig. throughout the manuscript.

Data acquisition

Comment 1. P7585-L15-16. Could you provide more details on the sampling frequency? What do you mean by "the sampling measurement frequency was increased several times each day"?

Comment 2. P7558-L15-16. You compute the variable Di, which is correct since this allows the comparison of runoff volumes in both basins regardless of their different area. The units of this variable is in mm (l/m2), however it is computed as Q/A (with Q being the mean discharge during the period i). I think this variable should be specified as R/A; with R being the mean annual Runoff for each period (in hm3 -or dm3 for the computation of Di in mm-). I assume that each "period" refers to the three periods (1980, 1990 and 2000). I think the same should be done for the suspended sediment yield (SSY). In this case it would be the Specific Sediment Yield (SSY=SY/A). For clarity, instead of using SSY for the Suspended Sediment Yield, I would use SY (in tones/year) and SSY for the Specific Sediment Yield (in tones/year/km2). Results

C3. Figure 3. I would use colors in this Figure as it's confusing as it is. I would also consider using lines for indicating the temporal trend in SSY in both basins. Maybe just two lines with different colors (one for each basin) joining the annual values would be enough.

C4. P7591-L1. Add the values of Q variations that you are referring to in this part of the text. This would help the reader.

C5. Figures 4 and 5. The captions are interchanged.

C6. P7591-L9. You mention that a Mann-Kendall was applied to annual Pi, Di and SSYi data. However in Figure 5 the results of Di are not shown. Instead Qi trends are

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shown. Clarify this and use Di in the Figure.

C7. P7591-L12. How do you apply the Mann-Kendall test? Using annual data for the 30 year period? Hence you get one value of the test indicating the trend for this period. What are the values shown in Figure 5? A space is missing in “and_Q and SSY”

C8. Tables 4 and 5. I would also include a line at the bottom of the table indicating the mean annual values of Q and SSY for each period. Also, specify in Table 5 what C1 and C2 mean (as in Table 4).

C9. P7591-L25. I would not say the Table shows the “dynamics” of SSC, but only the monthly mean SSC values.

C10. P7592-L3-5. Why is the “monthly SSC calculated by SSY and Q”? Why you do not use the actual SSC from the samples collected? Specify in the methods section how monthly values are computed.

C11. Is there any explanation for the intra-annual variability of the results? Q and SSC decrease in some months while they increase in others?

C12. P7592-L7-8. The number of samples should be part of the methods section, not the results.

C13. P7592-L8-9. The scatter in the Q-SSC relationship seems to be higher for low discharges (<1000 m3/s), while for larger values of Q the scatter seems to be smaller.

C14. P7592-L11. Include here the values of the maximum SSC in both stations.

C15. P7592-L12. How do you evaluate the stability in the Q-SSC relationship?

C16. I would merge sections 3.2 and 3.3 into a single one under the name of “Q-SSC” dynamics. Also, I would explain first the contents in section 3.3, which are quite descriptive of the values found during the study period, and then move to the contents in section 3.2.

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C17. P7592-L18. You mean Figure 7?

C18. Figure 7. I would specify the years for each period in the x-axis as well. Original (1980); Cultivation (1990) and Reforestation (2000). Also use colors in the lines of the Figure, not only in the symbols. Do not use curves for joining the points, use straight lines.

C19. P7593-L3-6. Could you explain the classification of flows in detail? What do you mean by minimum 25% , middle 50% and maximum 25%? Do you refer to the values that are equalled or exceeded 25%, 50% and 75% of the time respectively? Why such thresholds?

C20. P7593-L18-24. How to you perform the mean comparisons in the ANOVA test? You say you perform 6 one-way anova, but the table shows 18 values.. Did you perform a one-way anova or a two-way anova (using the cultivation period and the flow category as categorical variables?) or did you perform individual anovas for each flow category and period? The way you performed the anova tests is not clear, you specify this on the footnote in Table 6 but I think all the information should be on the text to help the reader. Also, I think it would be worth doing the same analysis for Q values. Last, I would include a table showing the anova results (statistic and p-value) instead on only adding a * in the table showing the mean SSC and Q values.

Discussion

C21. P7594-L7. I don't see why the authors mention here the effects of impoundment in runoff and sediment yield when impoundment is not mentioned either in the results section. Is there any reservoir or dam in the studied basins that can affect the results? This statement is very general, and out of the context of the paper if this is not mentioned earlier in the previous sections.

C22. P7594-L19. For the first time in the manuscript the term "water yield" is used here, do you mean the mean annual runoff volume (in hm3/year) or what you specify

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as Discharge Depth (in mm). The use of different terms throughout the manuscript is confusing.

C23. P7594-L19-20. From the Study Basin section I understand that both basins are nested, and thus the Xinzhou is a nested basin within the Du basin (Zhushan station). Hence, I don't understand how the combined water yield of the catchment (the Du?) and the sub-catchment (the Xinzhou?) are nearly half of the total catchment output.. Do you mean that the water yield at the Xinzhou station is nearly half of the water yield in the Zhushan station? That half of the water yield is produced in the sub-basin? This paragraph is not clear. Could you explain this further?

C24. The last paragraph of the discussion talking about the model is interesting; however, I don't think this is a discussion of the results found in the paper and an objective of the paper. This part of the discussion related to broader scale geomorphic processes, involving area and basin properties, which are not analysed in this manuscript. The manuscript aim is to analyse the trends in the SSC-Q relationship over a 30 year period and under different land covers. If the authors want to explain the importance of such model for their results, they should expand this section and explain further the relationship between the model and their results and why this is relevant for their case study.

Conclusions C25. I don't think these are the main conclusions, this should be part of the discussion section.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7583, 2015.