

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## **Comment on hess-2021-567**

Anonymous Referee #2

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Referee comment on "Agricultural intensification vs. climate change: what drives long-term changes in sediment load?" by Shengping Wang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-567-RC2>, 2021

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### General comment

Language not well written for the most part but with well written sections. Lots of od sentences. Lots of missing "the"'s (I am not a native English speaker).

The structure of the paper is good. But with some short comings. The introduction needs to be more informative and more relevant to the rest of the paper. The is some information lacking about the sediment and water flow data.

The paper spans 72 years of data but only actually utilizes 25 of these, which is a pity. I think the paper would be stronger with for example 6, 12 year periods instead of 9 year in the beginning and 16 in the end.

### Detailed comments

27-28 it is a 36% increase, i would say that, that is a significant increase.

30-31 have these been shifted? Wont this give the highest yields in period 1? Number of decimals is probably too high.

36 medium?. <Q20% is low not medium. (or state that Q20% is the highest 20%?)

39 increasingly important?

36-41 consider rephrasing

40-41 is 7day/year = extremely high, I think it is just high.

41 in period 2 or between period 1 and 2?

41-43 rephrase, consider deleting the last part. Unfavorable? = increased erosion => increased suspended sediment transport?

44 explain "land consolidation" and "parcel structure"

54 soil erosion is a process or a phenomenon not a risk.

61-63 do you mean the effect of LULC change on soil erosion?

63-65 what did they find?

66 consider using LULC

68 References needed

71 Wet or moist? A climatic period is usually considered to be 30 years, I guess that this refers to a shorter period, consider using "weather" instead.

71-73 rephrase. Does this mean that increased sediment loads were only found as a result of prolonged/more severe drought periods? Is this in contrast to earlier periods? And please explain why.

73-77 In what direction was the contributions? Consider rephrasing

75 sediment reduction? Do you mean reduction in sediment load?

78 and engineering measures

78-79 during "the period" instead of over?

84-86 In what way? Make relevant.

86-87 please explain "land consolidation", "landscape structure" and what it has to do with land use policies.

84-91 consider splitting sentence

93 land uses and land units? What does this mean? Is it that field edges/margins usually has permanent vegetation and therefore some trapping capacity, and therefore smaller fields will have smaller soil losses than larger fields because they have more field edges?

100 studies not authors (they are "et al.")

92-101 what did they find beside that parcel structure matters. Are small better than large, long better than round...? You should enlighten the reader.

101-105            what did they find? Anything the reader should know about, otherwise consider deleting

108            <suggestion> showing that the same land structural changes have different impact in different landscape and agricultural settings?

114            what practical perspective?

115            is this the first time land use and land cover change is mentioned

121            parcel structure change? Is the change made with the intention of reducing erosion?

122            sediment concentration? And yield/load calculated from these? Is it suspended sediment or total load, including bed load?

126            I see that the two ends of the period are interesting to compare, but the inter long period in between is also of interest and could/should act as kind of validation period. What if you find differences between the end periods, and draw conclusions on these but these conclusions might not explain what happened between 1954 and 2002. Why 9 years between 1946 and 1954 and 16 years between 2002 and 2017. I guess 9 years is a relatively short period could be influenced by "extreme years".

55-114    The introduction mentions many relevant subjects and lots of references but does not really make them relevant for the study. The reader does not get much better prepared for reading the paper, by reading the paper. Consider focusing on fewer and the most relevant subjects and let the reader know what all/some of the studies referred to found and why this is relevant to the present study/paper.

133            is there a map somewhere?

146            suspended sediment (or suspended matter, thus including the organic part). Please be more precise here.

150            "at" not "by"? and using some water level/stage measuring devise and calculating flow using a stage-flow relationship ( $Q/h$ )?

152 measured "manually" meaning that samples were collect manually? Through bottle dipping?, surface/depth integrated?

153 automatic method, meaning? ISCO samplers/turbiditymeter? What is the additional manual sampling used for and how often is it collected, and what is the time resolution of the unspecified automatic method?

156 what is "the vegetation period"?

Fig 1 a) Ok to zoom in a bit. b & c) the gauge looks like it is in the same place in both maps. I guess it should be moved down stream for 1946? In the text "paved" or "roads and settlements (line 159)" is used rather than "sealed", please chose one and correct throughout. What are the lines within the catchment, roads? I don't think they are part of the "symbol key" or "legend"

175 This is the kinetic (potential erosive power) of rain events. You cannot say what the effect of rainfall is quantified by this measure as it also depends on the erodibility.

184 event precipitation?

184-186 please explain why

189 but wouldn't you expect that this is the period where it is most relevant? As there are no/less crops/vegetation in the fields.

198-192 how good/bad is this relationship ( $R^2=0.xx$ )? Is it validated against other periods?

192 show some number that indicates that the erosivity is low, in contrast to some higher numbers.

195 the transport capacity of suspended sediment is usually not used to its full limits (the stream/river is capable of transporting much more than it actually transports), due to a limited supply of suspendable matter.

201 assumed? Didn't you test this?

215 delete "the other studies". But did these studies also have data on a much better resolution than months? I think you are missing a chance to see shorter term sediment dynamics here. Don't you have data on 3-4 days intervals in period 1 and even better (but still unspecified! (I see now)) for period 2? Why not utilize this better resolution. (by reading on I see why a monthly resolution is chosen. But here it sounds like it is something you need to do because of the different sampling resolution. Consider just stating that the further analysis does not require the individual samples but an aggregate of these. Still it might be possible to use a smaller time resolution.

216-218 but you will also have months that are dry in one end and wet in the other end, how will the approach work in such a case. And cases where the precipitation is normal in a month, but the past two months have been either very wet or dry, which will give very different responses in flow and maybe in sediment load in the month in focus.

225 does a power function has "a slope"?

229 do you expect that the different sampling strategies and sampling equipment bias the measured concentrations? Wouldn't it "identify" more than "exclude"?

231-264 consider if this, or all of this, is necessary.

283 why is landscape structure affecting the runoff in the dormant period? The evaporation won't be much affected? And is low anyway.

287 it is therefore also assumed that the majority of the sediment in the stream origins from the fields (or the landscape) in contrast to originating from bank erosion and drainpipes etc. It would therefore be good if you could provide a sediment source apportionment, if possible.

198-302 well written section. Having read this I think that it is a pity that you don't use the whole data set, 1946-2018ish. You claim in the abstract that you span 72 years but actually only about a third is used. Why not split the whole period into for

example 6, 12-year periods? It would make the analysis more robust and interesting.

305 "climate change" or "variations in weather"

306-308 how do you find out if climate (variation/change) affects the variation of/in sediment regime by comparing erosive density and monthly precipitation?

309-310 I guess that 2,4 is period 1 and 1,8 is period 2, but it is not mentioned.

310-311 rephrase

311 in contrast? For the growing season ED also decreased

319 sediment load (you don't measure the availability)

Fig 3 what does the box-whiskers represent? Are you sure that the precipitation in May period 2 is correct? It seems unlikely that it will have so little variation as period 1 has the largest variation of all months (and where are the whiskers?).

324-325 please give a mean annual flow in mm for the different periods

326-327 in fig 4 it looks like both are between 2 and 3 l/s at Q70. Q50 and Q10 also looks wrong. Q10 looks like it is certainly above 10 l/s. Please check.

327-331 rephrase

324-331 it is surprising that the stream flow is found to decrease as the precipitation is shown to increase. Does the change in evaporation seem credible if  $\text{evap} = \text{precip} - \text{runoff}$ , in the two periods? It wouldn't be the first time if either the precipitation timeseries or the Q timeseries or both) were not homogeneous through time and led to bias'es.

340 grassland decreased to? Are the changes statistically significant?

344-345 is that relevant?

345-346 rephrase, and why. The catchment is very small. Larger fields will in it self lead to less variation, and the variation wont be important in itself (explain if I am wrong), it is the properties of the crops that matters?

350 what does agricultural industrialization mean in this context

Table 1 please add Parcel (n)

Section 3.2 Try to make the results in this section more relevant to the sediment load results. What does the findings mean? What are the physical processes that change as fields becomes larger and how does it affect the sediment load?

379-380 as you look at the data on a monthly scale you can't state that there is a faster response to increasing flow.

383 delivery instead of availability?

404 is it log10 or Ln? (statisticians often use log for Ln, which make it difficult for the rest of us..)

422 just land cover, the statistics does not change erosion  $\delta \square \square \square$

Fig 7 the text is not very clear in my pdf version.

433 at Q70% they are the same, therefore higher not considerably higher at >Q70%

436 this is a very large increase. Are you sure there are no biases in e.g. the sampling technique? It has been seen that for example ISCO intakes placed at/close to



the bottom in small stream yielded much larger values than bottle samples. Have you looked into this?

467 the row crops are not erosive they are "prone to erosion" or apply a high degree of erodibility to the soil.

Sec 3.4 I think this need a little more introduction. It is not clear to me how you arrive at the results in fig 8.

487 reverse periods

489 it needs to be more clear what effects land consolidation has in this particular area, in other corners of the world it will have different effects. In my corner, it probably won't lead to larger fields. Larger fields are only a problem if the terrain is sloping and there are substantial physical barriers restricting flow and erosion/sediment transport between the fields, that will disappear when creating larger fields.

507 Which  $Q_{xx}$  is 15 l/s

526-533 is this a general discussion or related to the results of this paper?

549-559 If you want to include these new data it should be included in the results and method chapter. Consider deleting.

566-568 conclude on the findings of the paper. This belongs under discussion.

576-577 rephrase