

Interactive comment on “Trends of streamflow, sediment load and their dynamic relations for the catchments in the middle reaches of the Yellow River in the past five decades” by Z. L. Gao et al.

Anonymous Referee #3

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My overall comment is that this paper needs a substantial re-write to clarify the methods, the units of measure, and the interpretation of coefficients and changes in coefficients. Figure 2, which is critical to the analysis is virtually unreadable. The scales have no labels, the data are terribly crowded into a small part of each graph. Making them log-log plots and scaling them appropriately would go a long way towards making the paper more understandable. Also, the idea that these relationships (shown in figure 2) are actually changing, is the heart of the paper's hypothesis, and yet no statistical

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test was done to demonstrate that there really are differences among the three periods (analysis of covariance would provide such a test).

Page 5495, line 5-6, the units don't make sense. They have dimensions of $L^3 \cdot L^{-2} \cdot L^{-1} \cdot T^{-1}$. The net result of this is dimensions of T^{-1} . I think the mm^{-1} is extraneous.

Page 5495 and Table 3. The streamflow records are evaluated for monotonic trends (Mann-Kendall) and change point (Pettitt), but the authors don't seem to suggest which one of these is a better characterization of the changes. Presentation of time series graphs for these data sets would be very helpful and the authors need to suggest their preferred interpretation. The methods section explains the Mann-Kendall test but not the Pettitt test and yet both are used in table 3. The authors need to explain their methods.

Page 5514. Figure 2. These plots are very hard to read. They would be much improved streamflow and load were both plotted on a log scale. Even better than that, if the y-axis would show flow-weighted mean concentration (that is, monthly load/monthly flow). Most of the variation in load is due to flow itself, so the plots make it very difficult to discern the differences between the three periods. It is not clear why the x-axis always ends at 1400. In several of the graphs the data are all bunched up at the left edge of the graph, making it very difficult to see the spread. As they are, the plots really do not convey the information that the authors want to convey. Conversion to a log-log scale is crucial to making them useful. The units on the x and y axes of these graphs needs to be shown either on the graphs or in the caption. The equations shown on the figures are all linear, and yet the graphs show curves. I suspect that this is because the equations were fit on logarithms (but I'm not sure). Where are x and y defined? The authors seem to want to show that these relationships are different for different periods. The standard way of doing that is to use analysis of covariance. I see no indication that there was any effort to demonstrate in a statistical sense that the periods are different.

Page 5497, lines 21-22. The statement about the changes being larger for sediment

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load as compared to flow need to be put in context. Because load is generally a non-linear function of flow we would expect that load trends would be larger than flow trends (expressed in percentage terms). The key question is, are the load trends simply a reflection of the flow trends or is the relationship between flow and load changing?

Page 5498, line 3, use the words "correlation" not "correlative".

Page 5498, lines 4 and 5. The logic is not explained. Why does poor correlation between load and flow indicate that the "periods were largely influenced by human activities." This seems to be a very important conclusion, but no logic is presented to justify it.

Page 5498, lines 7-11, I really don't understand this paragraph at all. What are the numbers (1400, 1000) intended to represent? What units do they have? Is this difference just a reflection of basin size or climate? What is the importance of this observation?

Page 5498, lines 12-23, there is a set of interpretations made here about the regression coefficients. What are the units of these coefficients? What do they represent (stated in words)? Without this background it is impossible for the reader to understand the interpretation made.

Page 5499, lines 4-14, What is the basis for the interpretation of the meaning of the intercept? What are the units?

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