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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Emergent stationarity in Yellow River sediment transport and the underlying shift of dominance: from streamflow to vegetation" *by* Sheng Ye et al.

Anonymous Referee #2

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General comments: The authors quantified the annual impacts of discharge and vegetation density on the sediment concentration at dozens of gauges over the Yellow River basin. The conclusion is that the dominant controlling factor of sediment shifts from discharge to the vegetation resistance with discharge increasing, which is interesting. Besides, the manuscript was well written. However, some problems about the details of the assumptions and method used (i.e. wavelet coherence analysis and regression fitness) are expected to be explained more clearly, as these details are very critical to the reliability as well as reasonableness of results associated with main conclusion.

Several detailed comments are listed as follows: (1) "The sediment concentration fol-

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lows a bell shape with NDVI at annual scale" was summarized throughout the text (e.g., Line 12/193/253), while the log-transformation was used to sediment concentration data in Figures 2 and 3. As we know, the log transformation is non-linear, thus the bell shape in Figures 2 and 3 may depend on this transformation approach. (2) In Figure 3, the authors should give the mathematical expression of the fitted curve with bell shape. Is it of a polynomial form or something else? Moreover, the goodness of the fit is expected to be presented. (3) It's doubtable that the so-called emergent stationarity is attributed only to vegetation resistance. The physical connection between vegetation condition and sediment concentration is not as explicit as that between discharge and sediment concentration. In addition, the discharge and the vegetation were separately incorporated to consider the impact to sediment condition. So, the conclusion in this study is under very strong assumption, i.e., the sediment condition in a basin is only controlled by discharge and vegetation. However, this assumption was not listed clearly. On the other hand, was it reasonable? In addition to vegetation, resistance of sediment to erosion may be related to other property of the basin, such as soil properties. Authors said sediment concentration follows a bell shape with vegetation index. I guess that the mean sediment concentration also follows a bell shape with the mean runoff. According to literatures, the discharge of 1982-1986 in many sub-basins of Yellow River was much larger than that in 2008-2012, how to compare the decreased discharge contribution with the increased NDVI contribution to the concentration? Can the authors add the plot of mean sediment concentration against annual discharge with the same period and gauges in both Figure 3a and 3b? (4) On line 92-96 about the NDVI data used, how area-specific NDVI was obtained from the spatial imagery? Since the downloaded imagery was global, why only NDVI at 44 gauges not the maximum 68 gauges was estimated. (5) Why not use the mean NDVI, but the maximum (daily?) NDVI, when you investigated the relationship between the NDVI and mean concentration at annual scale? How much uncertainty for the maximum NDVI exists? (6) In Figure A1, the text in legend is inappropriate, because there were not 68 green triangles plotted (maybe 68-44=22 gauges). (7) On line 120, "annual scale . . . is when

the coupling from wavelet coherence analysis is strongest", why? (8) On line 141-142, "slope in the Q-C regression (aQC) declines exponentially with Qm (p-value < 0.0001)". From the Figure 1b, it looks like log-transformation used to aQC. If so, then the text expression and plot were inconsistent. And the authors should give the mathematical equation of exponential decline trend and its fitted curve.

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