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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Three-decadal dynamics of mid-channel bars in downstream of the Three Gorges Dam, China" *by* Zhaofei Wen et al.

Anonymous Referee #1

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This study focuses on the morphological dynamics of mid-channel bars (MCBs) downstream the Three Gorges Dam (TGD) in China. The authors extracted the size and shape of MCBs from three decades of Landsat images and identified them to follow their temporal dynamics. MCBs are classified depending on their size, from small (< 2 km2) to extra-large (> 33 km2). While small MCBs are equally distributed all along the Yangze river downstream the TGD, large and extra-large MCBs are mainly located in the lower reach (downstream the Jiujiang gauge station). The authors then evaluated the impact of the TGD closure in 2003 on the temporal dynamics of MCBs. Main results are: 1) a decreasing number of small MCBs after the TGD closure, mostly in the lower reach, 2) an increasing trend of all MCB classes, slightly impacted by the TGD closure, 3) an opposite change in shape for small and large MCBs, the latter being more stable

and less impacted by the TGD closure. Overall, the study is well conducted and the paper well organized. Although English is not my first language, I would suggest to the authors to have the manuscript reread and corrected by an English native speaker. Apart from that, I found the paper very interesting and well suited to HESS, and I only have a few minor remarks.

P5L25. Banks of MCBs may have quite a small slope and MCBs area could then be very sensitive to water level. Do the authors have characterized this sensitivity?

P7L14. Is there a quantification of the bimodal characteristic of each image? In other words, did the MHBM work well for all images?

P8L16. Is the length L of MCBs defined as the length in the flow direction or is it simply the longest dimension?

P9L12-13. Change Fig 3 to Fig 4.

P9L20-22. Do percentages correspond to the total number or total area? It seems from the conclusion (P15L7) it is percentages of the total number.

P10L4. The authors mention the density of MCBs in the text, whereas they use the term "frequency" in Fig. 5. Please be consistent.

P10L6-8. The average interval is 15 km for the middle reach and 10 km for the lower reach. I understand that the density of MCBs is higher in the lower reach, but for consistency I would have kept the same averaging length.

P10L7. "upper reach" should be "middle reach", given the definition provided in P4L18.

P10L7. The authors stated that there are twice more MCBs in the lower reach than in the middle reach. But given than the lower reach is twice longer it is not clear to me if the density is that higher in the lower reach. The authors should choose a proper metrics to conclude on this.

P11L22. Please define mu.

P11L23. “with the increasing MCBs size” seems confusing (section 3.4.2 and Fig 9a show increasing MCBs size, but in terms of positive area trends). Please rephrase.

P12L20. Which type of vegetation do the authors refer to? Is it mostly grass with shallow roots or trees with deeper roots?

P13L3. Change Fig 12 to Fig 13. Same P13L6.

P13L4-5. Could the authors add a figure showing seasonal averages over pre- and post-TGD closure periods?

P13L10-15. An expected impact of TGD operations is the flood peak reduction. Could the authors show a graph depicting the evolution of extreme discharges before and after the TGD closure?

P13L21. Could the authors expand a little bit on the analysis by Wang et al. (2013) and Yuan et al. (2012)?

P13L29-30. Fig 14b shows sand mining activities downstream of TGD, it is not shown that “those sand mining activities mainly focused on the lower reach”.

P14L11. Could the authors provide a quantification of the error due to water level variations, or at least give an order of magnitude?

P14L20-22. What is the uncertainty related to Landsat spatial resolution? Could this be approximated by computing the impact on the area of adding/removing 1 pixel on the MCB boundary?

Fig 3. Please remove the last sentence of the figure caption (“Steps 1-5 are detailed below”).

Fig 5. Please define frequency (or density to be consistent with the text) in this context. Also, does each dot in Fig 5c represent a single MCB? If yes, this should be said.

Fig 11. I would suggest to keep same y-axis bounds on each graph for a better com-

parison (at least for each line).

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