

***Interactive comment on* “Sedimentation in the Three Gorges Dam and its impact on the sediment flux from the Changjiang (Yangtze River), China” by B. Q. Hu et al.**

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The authors highly appreciate the anonymous Referee #1 for his valuable suggestions and comments, which will substantially improve the quality and science of this paper.

Overall comments:

1)The structure of the paper is fine as it is. However, normally the papers are clearer if discussion is separated from the results. Now those have put together for one chapter. The authors have done this well and it is rather easy to distinct their results from the other results. The authors could, however, consider of separating the discussion from

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the results if they feel that it would enhance the quality of the paper. Further, the self-critical discussion of the own results is missing from the paper. This should be added (e.g. possible shortcomings of the method and data and the implications of those on the final results; the very short period of data for the post-TGD time, etc.)

Author Response: Thank you for your valuable suggestions! All of the comments were accepted in the revised manuscript. The Results and Discussions have been separated from each other to provide a clearer presentation. Moreover, the self-critical discussions have been added in the Discussion, please see the last paragraph in the section 5.1 in the revised manuscript: “Due to the short-term data of the post-TGD period, as well as the uncertainties of the linear regressions and the roughly sediment budgets, the rigorous upstream limit of the TGD backwater region cannot be obtained at present. Furthermore, the sedimentation rate of the TGD calculated herein reflect only the suspended sediment load, undoubtedly all of the bed loads coming from the upper reaches of TGD is trapped as well, though the amounts of bed loads is unclear. These bed loads most likely deposited in the backwater region of the TGD, owing to the reduced current velocity and sediment carrying capacity. Otherwise, the landslides and debris flows, taking place around the margins of the new TGD-induced high Lake, will also contribute large amounts of sediment into the TGD, especially when the water elevation of TGD fluctuated during the floods and drawdowns. Both of the mentioned above would increase the sedimentation rate of the TGD, and thereby more in-situ investigations are required for future studies. These investigations should include repeat bathymetric surveys and/or coring at key locations as suggested by Snyder et al. (2004), which may provide a detailed depositional processes and history of the TGD.”

2)The language of the paper is fine and understandable. However, I would encourage the authors to use native English speaking professional to check the language as there are various sentences that are difficult to understand (I tried to comment few of them in the attached pdf but was not able to go the article through in details in sense of the language). Further, some of the sentences are very long and those should be cut in

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pieces (see attached pdf in more detail comments). Some of the paragraphs are also rather long and the paper would benefit of dividing those into two. Authors could also give attention to the tense used in different parts of the paper: normally present tense is used when referring to other work and past tense is used when describing own.

Author Response: Thank you for your kindly comments! We will carefully check and improve the language through the manuscript. The long sentences and paragraphs will be cut into two or more small pieces to keep fluent. Please also see the response to the specific comments below.

3)Abstract should be re-written in a way that it would presents the following issues in logical order: introduction to the overall theme of the paper, what has been done and what are the main objectives of the paper (why the paper is important) and the main results. Now I found the abstract not well structured and I had difficulties to get an overview of the paper.

Author Response: Thank you for your suggestions! The Abstract in the revised manuscript has been re-written to provide more information.

4)The introduction could be slightly reorganized. See more detail comments in the attached pdf. Further, the introduction could include a statement why this work is important and what new information does it provide to well studied issue, i.e. some kind of motivation for the work.

Author Response: Thank you for your comments! In the revised manuscript, we re-organized the Introduction according to your comments as suggested here and that attached in PDF.

5)Results are well documented and compared to other results. There are, however, some smaller comments on the results parts in the attached pdf. Further, the table 3 and 4 are rather difficult to understand. The Table 3 could be turned into a figure. The Table 4 is really difficult to read and I would urge the authors to make a figure(s) out of

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it or in some other way to make the results more understandable.

Author Response: Thank you for your kindly comments! In the revised manuscript, the Table 3 has been changed into Figure 3. The Table 4 was reorganized to provide a clearer and more understandable style.

6)The TE calculations provide just an estimate to the trapping rates. However, author reports the results as they would be very accurate (e.g. page 5190, row 8: ...sediment load at Datong will decrease to...). I would ask the authors to use more conservative ways of expressing the results (e.g. SL at Datong is subject to decrease below 100 Mt/yr). The same applies on the conclusions (avoid using 'will' when expressing estimated results or predicted impacts). Further, the authors are giving precise estimations on the decreased SL in Datong although there might happen severe erosion along the mainstream, as the authors are stated in the conclusions, due to the "sediment hungry water". Therefore, I would, at least, add this to the discussion and ask authors to be careful of giving such detail estimates for the future sediment load several hundreds km below the dam sites.

Author Response: Yes, these comments were accepted in the revised manuscript. The discussions of downstream erosion were added in the section 5.3 in the revised manuscript.

7)Conclusion is compact and addresses the main issues. However, as stated on the previous point, I would ask the authors to consider how to express the estimated TE and future potential changes downstream from the dam site.

Author Response: Thank you for your comments! In the revised manuscript, these strong statements were modified according to your suggestions.

Specific comments

1)Page 5178-Line 7: "...the lower Jinshajiang. ...." was changed to "the upstream of TGD"

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- 2)Page 5178-Line 12: this sentence was changed to “Consequently, the sediment discharge from the Changjiang to the sea is expected to continuously decrease below 90 Mt/yr in the near future, or only 18% of that in the 1950s.”
- 3)Page 5178-Line 19: “huge” was changed to “large amounts of”
- 4)Page 5178-Line 26 and Page 5179-Line 1: “was” was changed to “is”
- 5)Page 5179-Line 3: “significantly decreased” was changed to “has decreased significantly”
- 6)Page 5179-Lines 17-19: the sentence “After the TGD, the mean annual sediment load at Yichang declined to 67 Mt/yr in 2003–2007 of the post-TGD period, or 16% of that in 1986–2002” was deleted.
- 7)Page 5180-Lines 17-23: this long sentence was divided into two parts: “However, Chen et al. (2008) argued that these above estimates appear to overestimate the sediment discharge entering the TGD in the post-TGD period. Xu et al. (2007) also indicated that the sediment correlation between Yichang and Datong during the post-TGD period has been fundamentally changed. ”
- 8)Page 5180-Line 24: the lower Jinshajiang. ....” was changed to “the upstream of TGD”
- 9)Page 5181-Line 10 and 16: “1 810 000 km<sup>2</sup> and 100×10<sup>4</sup> km<sup>2</sup>” were changed to “1.81 106 km<sup>2</sup> and 1.00 106 km<sup>2</sup>”
- 10)Page 5182-Line 24: “Yichang station, located 44km downstream .....” was changed to “Yichang station is located at 44 km downstream from the TGD site, and thus it can act as the output station of TGD. The water and sediment discharges of Yichang are mainly fed by Jinshajiang, Jialingjiang, Minjiang and Wujiang (Fig. 1).”
- 11)Page 5183-Lines 13-20: this long sentence was changed to “Accordingly, two methods can be used to estimate the sedimentation in the TGD: 1) We first established the

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correlation between sediment load at Yichang and that from the four major tributaries during the pre-TGD period (1986-2002) (Fig. 2b). This correlation was used to restore the scenario of sediment load at Yichang in the post-TGD period. The differences between the restored and the measured values at Yichang in 2330-2007 are assumed to be equal to the annual reservoir sedimentation; 2) the other one is.....”

12)Page 5185-Lines 24-29: this long sentence was changed to “In 2003-2007, sediment load increased from 63 Mt/yr at Huanglingmiao (just 13km downstream of the TGD) to 67 Mt/yr at Yichang (44km downstream of the TGD). Since there are no small tributaries join in the mainstream between the TGD site and Yichang, this increased 4 Mt/yr of sediment can be ascribed to the riverbed erosion between the two stations, with a sediment erosion rate of 0.12Mt/km/yr.”

13)Page 5186-Lines 1-2: are there no small tributaries between the TGD and Yichang station where the sediment could originate? Yes, there are no small tributaries join in the mainstream between the TGD site and Yichang. We have indicated this point in the revised manuscript “Since there are no small tributaries join in the mainstream between the TGD site and Yichang, this increased 4 Mt/yr of sediment can be ascribed to the riverbed erosion between the two stations, with a sediment erosion rate of 0.12Mt/km/yr.”

14)Page 5189-Line 8: “will” was changed to “is subject to”

15)Page 5190-Line 1: “gave” was changed to “given”

16)Page 5190-Line 15: “will” was changed to “may potentially”

17)Figure 1: we have redrawn the Fig. 1 to provide a higher resolution.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5177, 2009.

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