

Interactive comment on “Effects of Three Gorges Reservoir (TGR) water storage in June 2003 on Yangtze River sediment entering the estuary” by Z. X. Chu and S. K. Zhai

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The authors are grateful to three anonymous referees especially the one with 15-papes reviews for providing valuable suggestions and remarks during the stage of interactive comment on Hydrol. Earth Syst. Sci. Discuss., which undoubtedly contribute appreciably to the quality of this paper.

Based on the comments and requests, we have made changes on the original manuscript. Here are our responses to the interactive comments.

Anonymous Reviewer #2:

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Interactive Discussion

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1) Water discharge from upstream (Yichang or Huanglingmiaodou) is only 45% of total discharge in lower stream (Datong). If the author can provide more data of middle stream tributaries from Dongting Lake, Poyang Lake as well as the Han River, the comparison between Huanglingmiaodou and Datong would be more reasonable. In other words, the author should eliminate the possibility of discharge decreases in middle stream.

Response:

The data of middle stream tributaries from Dongting Lake, Poyang Lake as well as the Han River have been examined to corroborate the conclusion in the revised manuscript. During the TGR storage, the difference between the lowest water discharge of 32 800 m³ s⁻¹ on 12 June and the highest of 48 900 m³ s⁻¹ on 29 May entering the estuary is 16 100 m³ s⁻¹, approximately equivalent to the amount (18 700 m³ s⁻¹) of decreased water discharge from the TGR Dam during the period. This indicates that the water supply from the TGR Dam dominated the Yangtze water discharge entering the estuary during the TGR storage.

2) The calculation about reduced sediment load (2456.07 t) in section 4.1.2 is based on the data on 26 May. This calculation can be improved by constructing a rating curve in 1953-2003 or 2000-2003.

Response:

Following the simple calculation about reduced sediment load in section 4.1.2 based on the data on 26 May, other two methods were added in the revised manuscript. Firstly, assuming a simple linear regression with daily load data during 15 May - 26 May ($R^2=0.85$, $n=12$, $p=0.01$), the calculated load during 27 May - 2 July would be 5604.39 t, increased by 3200.39 t compared to the observed load during this period. Secondly, considering no significant tendency ($R^2=0.0002$, $n=17$, $p=0.01$) of monthly loads in June during 1986-2002, the calculated load during 27 May - 2 July assuming the averaged monthly load in June during 1986-2002 would be 4109 t

(the variations of daily load on 1-2 July and 27-31 May compared to those in June were presumably offset), increased by 17050E104 t compared to the observed load during the same period. In short, the estimated amount of decreased sediment load entering the estuary during 27 May - 2 July of 2003 given without the TGR storage ranges from 1705 to 32000E104 t by different methods.

3) Although TGR is one of the major contributors in reducing sediment load, it seems that some other forcings happened before the impoundment of TGR in 2003 judging from Fig. 3c. Sediment concentration in 2002 is already VERY low compared with 1953-2000 average. Upstream dams and reforestation, spatially above TGR and temporally earlier than TGR impoundment, might be potential reasons.

Response:

The TGR completed its closure in May 2002, together with other previous minor factors such as upstream dams and reforestation, resulting in very low sediment concentration in 2002 compared with 1953-2000 average. This information has been added to the revised manuscript. 4) A related paper author should read and cite: Xu K., Milliman, J.D., Yang, Z., and Wang H., 2006. Yangtze Sediment Decline Partly From Three Gorges Dam, EOS, Vol 87. No.19. page 185, 190.

Response:

The papers by Xu et al. (2006), Yang et al. (2006a and b), and Liu et al. (2006) have been read carefully and cited in the revised paper.

Yours sincerely,

Zhongxin Chu

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1553, 2006.

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