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Hydrology and Earth System Sciences Discussions

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 #3: 1) the paper misses some fundamental information. The introduction misses at least a short description of the Yangtze discharge and sediment

flow regime, including controlling factors as climate, relief. The text mainly describes or resumes the figures provided, but these findings could not always be reproduced by the referee. Response: The fundamental information is described in detail in literatures such as Chen et al. (2001), Liu et al. (2006), and Yang et al. (2006b), particularly on the TGR storage in Chu and Zhai (2005). This sentence is added to the revised manuscript. 2) The results are lacking a subsequent discussion that could largely corroborate the findings. Such a discussion has to include remarks on the tributaries entering the Yangtze, and potential further sediment traps such as Lake Dongting and Lake Poyang, between the outlet of the TGR and Datong station just before the estuary, 1 800 km downstream (such as the sediment budget presented by Yang et al. 2006 b). As the paper aims to highlight effects of TGR on sediments entering the estuary, using data from only 2 stations (at TGR and downstream at Datong) leads to highly speculative results that have to be underpinned. It is probably difficult to discern all controlling factors when looking at data on a daily basis as one would have to collect data on reservoir operation on at least the most important reservoirs on the tributaries of the Yangtze. Other papers have now started to evaluate direct effects of TGR storage on the Yangtze delta (e.g. Yang et al. 2005, Gong et al. 2006). Response: The data of middle stream tributaries from Donting Lake, Poyang Lake as well as the Han River between the TGR Dam and the estuary in 2003 have been examined to corroborate the conclusion in the revised manuscript. 3) Additionally, it would be highly interesting to include comparisons to different river basins impacted by big reservoirs, in similar or different climatic and geomorphologic conditions, also during initial operation stages of the reservoirs, if such data is available. Response: Indeed, it would be highly interesting to include comparisons to different river basins impacted by big reservoirs, in similar or different climatic and geomorphologic conditions, during initial operation stages of the reservoirs, if such data is available. However, such literatures of other river dams during initial operation stages are seldom formally published, i.e. often as reports just within the department, making comparisons unlike on longer time scales are difficult to be done. 4) The title could be more careful (what

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about the remaining river stretch between TGR and Datong; including Lake Dongting and tributaries), e.g. Yangtze River's Three Gorges Reservoir (TGR) water storage in June 2003 : possible effects on sediment entering the estuary Response: During and at the initial stages of the TGR storage, the water and sediment between TGR Dam and the estuary, including lakes of Dongting and Poyang, and Hanjiang River, have been examined in the revised manuscript. Together with the referee's suggestion, the title has modified to "Yangtze River's Three Gorges Reservoir (TGR) storage in June 2003: observed short-term effects on Yangtze sediment entering the estuary". 5) Abstract (and similarly in the main text), what is the meaning of 'stored water' (before, after dam closure), absolute retention volume in June ? Response: 'stored water' has changed to "completed the storage", which is after the dam closure. The information of "elevating the pool level from 85 m to 135 m and impounding ˜100Œ108 m3 of water" has been added. 6) What does 'pre-water storage' mean - does this mean 'pre-storage phase', 'with water discharge increasing' (can't be seen in Figure 2, and why 'increasing') ? Response: 'pre-water storage' has changed to 'pre-storage phase'. During pre-storage phase from 15 May to 25 May, the water and sediment discharges entering the estuary are increasing (can be seen in Fig.2b, c and d). During this phase, the water and sediment discharges entering the estuary were not affected by the storage, and tend to increase due to entering in wet season of the Yangtze. During and at the initial phases of the storage, the unnaturally clear waters were true compared to those at pre-storage phase, also corroborated by Fig.3c. 7) When (in June ?) and where (Datong ?) have the unnaturally clear waters have been observed ? ("TGR sedimentation" not "resulted" by, but "caused by the", add "temporary (!) water storage). Response: During and at the initial phases of the storage, the unnaturally clear waters in terms of SSC downstream from the TGR Dam were true compared to those in pre-storage phase (Chu and Zhai, 2005), also corroborated by Fig.3c. This words has been deleted in order to emphasize other results in the abstract of the revised manuscript. "resulted" has changed to "caused by ", add "temporary " has been added. 8) The sentence "The results show ..." can be shortened, as the results only show expected outcomes (or

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delete the sentence). Then "As to be awaited, the temporary water storage brought ... during the TGR water storage ..." the follow-up "and in the second half year of 2003" doesn't seem to be corroborated by the data shown in Figure 3 ! Response: The sentence "The results show ..." has changed to "As to be awaited, the temporary storage in June 2003 brought the Yangtze markedly decreased SSC and sediment load entering the estuary during the TGR storage.", although the data between TGR and Datong have been used to explain the relatively large SSC and sediment load at Datong in July and September of 2003 in Fig.3. 9) Before last line in the abstract (line 23, page 1554) : the last word in the line ("than") makes the whole sentence unclear : meant was (?) "the real" (below TGR ?) sediment load" - which, where, for which lapse of time ? (27 May - 2 July ?) compared with the estimated normal total sediment load ? The number presented at the end of the abstract (2 456 x 104 t) is based on a very rough estimation and should thus not be treated as a result. Response: "than" has changed to "compared to " in the text. The number presented at the end of the abstract on a rough estimation was deleted in the revised manuscript, although other two methods have been used to estimate the reduced amount of sediment load entering the estuary during 27 May - 2 July. 10) Main Text: Missing very much (at least a short description and references should be provided) : description of the flow and the sediment that is transported with it, between the dam and Datong, over 1 800 km, at an average flow velocity of ??, where does the river deposit sediments (clear water where ?) when the sediment supply suddenly ceases. Response: The natural features of the Yangtze drainage basin and the Yangtze flow and sediment regimes are described in detail in literatures (such as Chen et al., 2001; Liu et al., 2006, and Yang et al., 2006b, the background of the TGR storage in Chu and Zhai, 2005). Between the TGR dam and Datong, over 1 800 km, at an average flow velocity of ˜1.5m/s (Chu et al., 2006, in AOS). During and after the TGR storage, a great part of upstream suspended sediment deposited in the TGR. 11) One would like to know more about the "buffering and hysteresis processes" (page 1561, line 4). Figure 2 (comparing curves a and b) seems to indicate that the propagating river wave is practically not existent, i.e. clos-

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ing the water supply upstream reduces the water arriving downstream (over a 1 800 km distance) almost instantly (within 14 days), whereas the (immediate, see Figure 2) opening effects can be observed in Datong after 14 days only, over about another 14 days (continuous increase). Section 4.1.1. should clarify and discuss this, but doesn't. The numbers stated in this section should be more clearly and completely be observable in the Figure (Graph A of the discharge shoes neither pre- nor post- values). And most important: the comparison of the events 'upstream' with those 'downstream', the discussion of possible causes of the delayed effects 'downstream', doesn't happen. Crucial is - and should thus be stated clearly - that nearly the whole sediment transport of the Yangtze concerns suspended sediments (only $<$ 0,05 % not). As a result, the volume of sediment transported depends decisively upon the volume of water transported. More interesting is thus the concentration of suspended sediment in the water (especially since the total suspension volume is a derived / calculated number from sediment concentration and water volume - this should already be stated earlier, i.e. section 3, page 1557 line 13, and not only in the first sentence of section 4.1.2.). Why does the sediment concentration increase / decrease with the water volume, depending on which factors (flow velocity, degree of turbulence, ...). A paragraph should state if this is all trivial, known since long, or could this be new, or new evidence for something not very well known. Response: As to "buffering and hysteresis processes", one example is that it takes about 14 days for the Yangtze water from the TGR Dam to Datong under natural conditions, i.e., without the impact of the TGR storage (Chu et al., 2006, in AOS). We very appreciate the referee's profound point that "Figure 2 (comparing curves a and b) seems to indicate that the propagating river wave is practically not existent, i.e. closing the water supply upstream reduces the water arriving downstream (over a 1 800 km distance) almost instantly (within 14 days), whereas the (immediate, see Figure 2) opening effects can be observed in Datong after 14 days only, over about another 14 days (continuous increase)". It seems that the time of TGR's closing and opening effects beginning to significantly affect the water discharge at Datong is 5 and 20 days, respectively. The delayed time of closing and opening effects is different. As

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to the delayed closing and opening effects of the TGR Dam on downstream sediment, it is also interesting to see from Figs. 2a, c and d that the time of TGR's closing and opening effects beginning to significantly affect the daily sediment load and SSC entering the estuary is about 1 and 18 days, respectively, which is also reflecting the buffering and resultantly hysteresis processes of the 1 800-km stretch between TGR Dam and the estuary. There are many factors such as flow velocity and degree of turbulence affecting suspended sediment, making the mechanisms of delayed closing and opening effects of the TGR Dam on downstream sediment very complicated. Nearly all sediments entering the Yangtze estuary are suspended materials. As a result, the volume of sediment transported depends decisively upon the volume of water transported. The mechanisms of the delayed closing and opening effects of the TGR Dam on downstream water and sediment also need further study. Fig2 A of the discharges at the outlet of TGR were collected only during the storage, so " neither pre- nor post- values". Because of equivalent water discharge in and out of the TGR during pre- and post- storages, the absent data were presumably not very important in this study. "elevating pool level to 135 m" has changed to "elevating the pool level from 85 m to 135 m". 12) A striking (= clear water ?) discrepancy (over-proportionate increase of water volume with relatively slow increase of sediment transport and concentration) can (Figure 2, C vs. C and D) only be observed between the Ÿ27.06. and the Ÿ3.7. and again from the 14.7. on. Is this distinctive feature significant or mere coincidence ? Does an explanation for this behavior exist ? Similar question for the period of May 15 to May 22 in the pre-dam phase (what has been done by the engineers during that period ?). Concerning the whole section 4.2. : interesting are not necessarily the numbers only (they can be observed from the Figures), but the connection / correlation between water discharge and sediment concentration, resulting in the total sediment transport. The supply (water as well as sediments) of the tributaries between TGR dam and Datong is mentioned too late, only in the last part of the concluding remarks. After all they supply as much water as the Yangtze at TGR, but nearly no sediment. This sounds doubtful and these statements should at least be corroborated by some source

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material. Some material is mentioned in the specific remarks. Some HESS readers might not be familiar with engineering terms such as 'dispatching stage', 'diversion bottom outlets / deep outlets' etc. - can they be clarified somehow ? Response: A striking discrepancy (over-proportionate increase of water volume with relatively slow increase of sediment transport and concentration) can (Fig. 2B vs. C and D) only be observed between ˜27 June and ˜3 July and again from 14 July on. This distinctive feature is presumably coincident and within normal daily oscillations. Similar answer for the period of 15 May to 22 May in the pre-storage phase, because generally the engineers carried out no activities during this period. 'dispatching stage' means normal operation of the temporary TGR. The names of the outlets as mentioned above are engineering terms, and they are simply described as follows. There are 77 outlets in the TGR Dam, including 67 in the central part of the dam from the top down: 22 overflow surficial outlets with 8 m wide, 23 flood discharge deep outlets with 7 m wide and 9 m high, and 22 diversion bottom outlets with 6 m wide and 8.5 m high. Other 10 outlets are located near powerhouses, which flanked on the central dam part, including 7 sediment discharge outlets and 3 floater discharge outlets. The diversion bottom outlets are the only passages for upstream water through the TGR Dam before deep outlets opening, and they all were submerged when the pool level reached 135 m in June 2003. Besides, they will be blocked up when the pool level reaches 156 m after the flood season in 2006. And then, more and more flood discharge deep outlets will be opened in the future especially in flood season. 13) Specific remarks - p.1555 line 5-6: "Pearce 1991". More recent data is available: (the interesting figure is the sediment trapping by reservoirs, not only the discharge trapping; Beusen et al. 2005 estimate 13 % of sediment trapping by reservoirs, Syvitski et al. 2005 global trapping of sediment load by reservoirs is 20 %, including small reservoirs it rises to 26 %, Vörösmarty et al. 1997, 2003 : 40 % of river discharge dammed and 30 % of sediment discharge , several large basins such as Colorado and Nile are completely trapped - p.1555 line 8-9: deltaic degradation could possibly be compared to the outcomes by Ericsson et al. (2006), this part could then also be part of the discussion. Following Ericson et al.

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(2006), primary determinants of effective sea level rise in 70 % of world-wide deltas are probably decreased accretion of fluvial sediment due to reservoir sedimentation and runoff loss from irrigation. Response: Most of this part has been added to the introduction section. 14) p.1555 line 10: "... in China ..." - "continent" is not needed as China is no 'continent' Response: "continent" has changed to "mainland", which means without Taiwan Province. 15) - p.1555 line 14: impounded sediment as a problem is obvious, but needs explanation / or inverse sentence - Response: Impounded sediment as a problem is obvious, such as reservoir's decreased capacity and river delta's degradation. 16) p.1555 line 17-18: the ranking numbers of the Yangtze (3rd longest etc.) - for water discharge and sediment load - are these values at natural or anthropogenic state ?

Response: the ranking numbers of the Yangtze for water discharge and sediment load are at natural state. 17) - p.1555 line 23-24 (geochemical composition and related effects): elaborate on that or drop - Response: The Zhoushan fishing ground located in the SE direction offshore the estuary, for instance, is the largest fishery in China, which is significantly affected by the Yangtze input. 18) - p.1556 line 2: "... project should be given up" (delete : "or be put off") - Response: "or be put off" in the sentence should be remained, which means they agree to construct the TGR Dam, not present but in the future. 19) p.1556 line 7: "TGR, sedimentological studies" ... + line 8 "... and are still ..." - p.1556 line 8: "Many scientists and departments ..." needs to be underpinned with references - p.1556 line 9: "... sediment problems ..." "prototype observations" is a bit diffuse and very general, but understandable and acceptable in the context. - p.1556 line 10: "... model experiments ..." (plural) - p.1556 line 10: "... what on earth..." is awkward scientific writing - p.1556 lines 22-23: "(above mean sea level at Wusong located in Shanghai)" should be moved to line 18, after "...pool level of 175 m)" - p.1556 line 24-25: what is the meaning of "adjusting" and what are "diversion bottom water outlets" ??? - p.1558 line 8: "...than..." is not understandable, should be replaced by "compared to" or "as against". The same happens more often later (p.1559 line 9 + 10, p.1560 line 22) Response: The awkward scientific writings

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as above and follow-up mentioned have been modified in the revised manuscript, and they are not listed in the following responses one by one due to limited pages for author's comment. Some literatures or comments have been added to the text. 20) - p.1558 line 22-23: this is an example of missing discussion. These numbers (stated here as results only) should be discussed more profoundly in the missing discussion section. What are the causes for these variations (other tributaries, dam operation, climate variability) ? - - p.1559 line 8: total sediment load: this is another example of potential discussion later in the paper. How does this number compare to contributions from other tributaries ? Response: During the TGR storage, the difference between the lowest water discharge (32 800 m3 s-1 on 12 June) and the highest (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, although the upstream water supply accounted for 10-20% of the water discharge entering the estuary during the storage (Figs. 2a vs. b). 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 3200Œ104 t by different methods. This decreased load must be attributed to the TGR storage as relatively smaller supply by three large inputs (lakes Dongting and Poyang, and Han River) between the TGR Dam and the estuary (Fig. 4b). 21) - p.1559 line 10-11: "Actually, according to historical data..." sounds contradictory, although in the context it is clear what the authors want to say. One would only like to know which period is covered by "Actually", and which by "historical data" ? Response: "Actually" has been deleted, and "according to historical data" still remained, but added covering 1953-2000 (Fig. 3b). 22) - p.1559 line 12-13: estimation method very rough. This is another example of potential subject for discussion. 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 (R2=0.85, n=12, p=0.01),

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the calculated load during 27 May - 2 July would be 5604.39Œ104 t, increased by 3200.39Œ104 t compared to the observed load during this period. Secondly, considering no significant tendency (R2=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 4109Œ104 t (the variations of daily load on 1-2 July and 27-31 May compared to those in June were presumably offset), increased by 1705Œ104 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 3200Œ104 t by different methods. 23) - p.1559 line 16-17: The first part of the statement "Similarly to the tendency of sediment load, the SSC at Datong naturally increased ..." (why "naturally" - what does this mean here ?) doesn't make much sense, as the sediment load is calculated here using the SSC. - p.1559 line 21-22: again: why ? At least give tentative explanation in discussion section. Response: The three phases (pre-storage phase, storage phase and post-storage phase) have been added in this part of the revised manuscript in order to explain the changes in SSC as the following. Similarly to the tendency of sediment load before and after the TGR storage (as sediment loads were calculated by SSCs and water discharges), the SSC at Datong naturally increased in pre-storage phase due to entering the wet season, from 0.176 kg m-3 on 15 May to 0.309 kg m-3 on 26 May, and since then, it dramatically decreased to 0.108 kg m-3 on 10 June in storage phase. In post-storage phase from 11 June on, the SSC basically remained at a low value ranging from 0.11 to 0.22 kg m-3 until the end of June (Fig. 2d). From the beginning of July, the SSC gradually increased, reaching 0.455 kg m-3 on 13 July. 24) - p.1560 line 14: shouldn't it read "... when compared with that in June 2002 and the ..." ?? - p.1560 line 16: should read "... in 2002 and 2001 and especially in 2003..." - p.1560 line 18: The beginning of the sentence is not really understandable. Response: "... when compared with that in June 2002 and the ..." has changed to "... compared to that in June 2002 and the ...". The first sentence of this part has modified as follows. Because the TGR Dam completed the closure and the storage

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in 2002 and 2003, respectively, the monthly sediment loads entering the estuary in 2002 and 2003 were markedly smaller compared to that in 2001 and the corresponding months averages from 1953 to 2000 (Fig. 3b). 25) The unpublished data should be explained in more detail (compare the general comments for the text and the question concerning the events in the pre-dam phase (Figure 2, first time period) - p.1560 line 19 (and p.1561 line 3): unpublished data -> possibility to include here as otherwise cannot be verified ? Response: “unpublished data” has changed to “Chu and Zhai, 2005” in the text together with more descriptions concerning the events in the pre-dam phase. 26) - p.1560 line 22: it is not "the real total sediment load" that was reduced, this value is based on a the crude estimation described above ... Response: This sentence has changed to “s mentioned above, the amount of observed load entering the estuary was reduced by 1705˜3200Œ104 t compared to cursory estimations during 27 May - 2 July of 2003”. 27) - p.1560 line 23: "... which also explained..." doesn’t make sense: 2 parallel cases without any further explanations or additional information don’t explain one each other, if not one of the 2 is explained further. Response: these words of "... which also explained..." have been dropped. 28) - p.1561 line 8: this observation only really holds for August 2003 at Datong, September to December are at least in the same range as 2002 (see comments for Figure 3) Response: “within the wet season” has been added as follows. Generally, the Yangtze monthly SSCs entering the estuary within the wet season in 2003 and 2002 are somewhat smaller compared to the corresponding months averages from 1953 to 2000 (Fig. 3c). 29) p.1561 before section 5 (concluding remarks): Missing discussion. Such discussion could include discussion of the sediment budget downstream of TGR (as done by other authors, e.g. specifically as on Lake Dongting by Dai et al. 2005, or more general on the whole Yangtze as by Yang et al. 2006 b), comparisons with other rivers, from same / similar climates, other climates, ... Comparisons may be possible with papers by e.g. Lu & Siew (2006) on the Mekong (although available data seems more sparse for their study), their study mentions more studies that could be used for comparisons, although they seem to be more on smaller rivers. Sklar (2000) also resumes some

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studies of dam effects (before and after closure) on ecohydrology of large scale river basins. Dai et al. (2005) reports on the importance of Lake Dongting (downstream TGR): sediment flux would be 26 % higher at Datong for the 1956-2003 period if without Lake Dongting, but values dropped after completion of TGR in 2003. In 2003, the amount of sediment deposited in Lake Dongting was 10 % of the sediment discharge at Datong. Influence is supposed to be even lower in the future. Dai et al. (2005) also mentions that Chen et al. (2003) studied potential TGR effects on Lake Dongting, but following the title, it should also cover potential effects on the estuary, so please use these studies for comparison! Response: The discussion section, mainly including the sediment budget downstream of TGR, has been added before Conclusions. Comparisons with other large river dams have not conducted, because there have been few literatures (including those as mentioned above) illustrating short-term effects of large dam storage on sediment entering the estuary during the storage. As to longer-term effects of dam storage, this is not the scope of the manuscript. 30) p.1561 line 16-25: just restates the abstract - Response: This part of conclusions is summarized from the results, and is expected with no large unseemliness if mostly restated in the abstract. Whereas, more details have been added to this part in conclusions. 31) p.1562 line 3-5, and lines 10-12: these statements are critical for this article and should be examined and discussed. Response: the buffering and resultantly hysteresis processes by the 1800 km-long stretch between the TGR Dam and the estuary and the three large inputs (Lake Dongting, Han River and Lake Poyang) have been examined and discussed in the revised manuscript. 32) - p.1562 line 7-9: the reduction is mainly visible in August only (from the figure supplied, if other data available please supply in revised version). Response: Generally, although the Yangtze monthly runoffs entering the estuary within wet season (May - October) in 2003 did not change largely, the monthly SSCs and sediment loads after the TGR storage were clearly reduced, when compared with those in the corresponding months of 2002 and 2001 as well as the corresponding months average from 1953 to 2000. The relatively large runoff caused by strong rainfalls in July and September led to relatively large sediment load and SSC

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entering the estuary. As we know, strong rainfalls would increase sediment yield in the river drainage basin. 33) the word "regulation" seems erroneous here, meant is (?) "despite the buffer effects along the 1 800 km between the TGR dam and the estuary entrance at Datong". This outcome can be doubted based on the observations from this paper alone. Much more discussion is needed (see above). Response: "regulation" has changed to “buffer effects”, which is discussed in the revised manuscript. 34) Figures: - Figure 1: * Add a scale ! * Gezhou Dam (just downstream of TGR, is ‘Gezhouba’ in other papers - is this the same reservoir ?) and Qingxichang station are missing and should be added in the figure. Response: The scale of the map and the names of Gezhou Dam, Qingxichang, and other gauging stations mentioned in Fig.4 have been added in Fig.1. The Gezhou Dam is the same as Gezhouba in Chinese. 35) - Figure 2: * The terms ’pre-water storage’, ’preparation for ...’, ’normal ...’, ’post-water storage’ apply to all 4 curves - this should be made more clear graphically. What do these terms mean for the through-flow of water at the dam itself ? Shortening of water supply, part-closure / damming ?, complete closure, then part re-opening, after ... These questions are answered, though not very clearly, in the text (p.1556, line 24, to p.1557, line 8). What are ’diversion bottom water outlets’, what ’deep outlets’. What is the significance of the position of these ’outlets’ with regards to the sediment transport ? - Response: The four terms have been modified to pre-storage phase, preparation phase, storage phase and post-storage phase, respectively, which mean natural water supply, shortening water supply, nearly no water supply, and then reopening to natural water supply, respectively. The four phases are divided in terms of the water supply from the TGR Dam before, during and after the storage. “diversion bottom water outlets’ and ’deep outlets’ have been explained as above mentioned. 36) Figure 3: * Why are the curves not shown, as far as possible, for whole years (January - May data are missing), so that the entire discharge and sediment flux regimes can be observed ? At least May should also be placed on the figure (that’s where the storage starts!) * Comparison of (1953 - 2000) 47-year means with only two normal (??) years (2001, 2002) doesn’t allow many observations on the probably great variability of the 3 data

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sets (water, sediments, SSC) - i.e. the curves are not very meaningful. Yang et al. (2006 a) provide an analysis of annual time series of sediment supply (1951-2004). They observe obvious fluctuations of annual sediment load at Datong, consistent with water discharge and precipitation in most cases. Construction of other reservoirs upstream TGR will decrease sediment load entering TGR and thus also the load entering the sea. * What about trends in the average data (construction of many reservoirs in the time period depicted)? E.g. Yang et al. (2006 b) have well described the history of the sediment flux in the Yangtze river, distinguishing different historical phases of decreasing sediment flux over time. If these periods cannot be distinguished in Figure 3, then at least variation bars (showing standard deviation and / or quartiles / percentiles of the flux distribution should be shown for the monthly averages from 1953 to 2000 in order to get an idea of the flux variability) should be added. See also comments above. Response: In order to emphasize the data after the TGR storage, the monthly data at Datong in Fig.3 has modified from June-December to May-December. Other monthly data are expected unnecessary in this study, and can be seen in Chu et al. (2006, AOS). Actually, the monthly data from January to April are very small compared to other monthly data, and therefore not illustrated in the figure. Since the Yangtze sediment load entering the estuary tend to decrease in the past several decades despite slightly increased runoff, the monthly data at the estuary are mainly compared to those in 2001 and 2002 as well as the averaged data during 1953-2000.Certainly, readers can see literatures by Yang et al. (2006a, b) if they are interested in interannual variability of the sediment flux entering the estuary in the past five decades, which is not the scope of this study. 37) Following Figure 3, 2002 had a relatively wet 'wet season', but below average sediment load, why ? * Following the figure, in 2003 only August was significantly lower than the other months (for sediment load and concentration) when compared to 2001 and 2002. How can this behavior be explained ? Response: These questions have been answered as above mentioned. It must be pointed out that the TGR closure in May 2002 led to lower sediment load within the wet season in 2002. 38) Technical corrections (typing errors etc.) - Typing error in scale of Figure 3 ('Aug'

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instead of 'Auc') - Missing references (listed in the text but not in the reference list): * p.1555 line 6: Milliman & Syvitski (1992) is missing in the reference list * p.1555 line 21: Yang et al. 2003 is listed as from 2002 in references list (or are these 2 distinct papers ?) * p.1556 line 4: Nof (2001) is missing in the reference list * p.1556 line 7-8: Hu (2000) is missing in the reference list Response: 'Auc' has change to 'Aug' in Fig.3. The mistakes about references have been corrected in the revised manuscript.

Sorry for the awkward format, due to Internet submitting system.

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