Response letter

We thank the Editor for the careful consideration of our work. In the revised paper, we have addressed all the comments formulated by the Editor by replying (in black) to their remarks (in blue). The lines numbers in this rebuttal refer to the revised version of the manuscript.

Editor's comments

Comments to the author:

Thank-you for your (re-)revised manuscript. I think there are still a few points that need clarification; please see specific comments below. Please also remember that on final publication all these comments and responses will be available to readers who will be able to see whether comments have been responded to appropriately. Accordingly I am asking for Minor Modifications.

Our reply: We very much appreciate all the comments and suggestions raised by the editor. In the revised manuscript, we have completely addressed all the comments.

Specific comments

Line 202. Please either omit "," before "and an increase" or add "," after "parameter" in line 203. ["after the construction of the TGD" in line 203 applies to all the parameters, not just γ.]

Our reply: You are right! In the revised manuscript, we have add "," after "parameter" in Line 203 (see Line 203).

Lines 219-220. The text now reads ". . The error bars in Figure 3 represent the standard deviation of the estimated linear regression coefficients . ." Do you mean "standard deviation" or "standard error"? The reviewer suggested "standard error". "standard error" seems more likely to me because I suppose that: you only have one estimated value for each regression coefficient; there is no standard deviation which would need many values; you are estimating the uncertainty (possible error) of the coefficient from the residual error in the regression.

Our reply: Yes, it should be "standard error". In the revised manuscript, we have corrected this mistake. (see Line 220)

Lines 268-270. "while it remained more or less constant during May to June (increasing slightly by 0.01 m), and it generally decreases during the rest of the year by approximately 0.54 m" does not correspond with the appearance of figure 6a. There is much variation during May and June (more than earlier in the year) and 0.54 m must be some sort of average of values that differ greatly with time and location. In line 310 you have 0.46 m not 0.54 m.

Our reply: Actually, these values are the monthly averaged alterations, which are presented in Table 2. In the revised manuscript, we have explicitly mentioned that: "*From January to March, the total alteration Δ_{TOT} increased by approximately 0.28 m* ***on a monthly scale over five different gauging stations along the upper YRE****, while it remained more or less constant during May to June (increasing slightly by 0.01 m), and it generally decreases during the rest of the year by approximately 0.54 m (****see Figure 6a and Table 2****)*" (see Lines 270-274).

In addition, we have corrected the values of alterations in Lines 309-310.

Lines 340-341. Please explain "due to the gradually increased geometric influence caused by the TGD" by reference to "ongoing scouring".

Our reply: In the revised manuscript, we have explicitly mentioned that: "*It is also worth noting that in this study we assumed a more or less stationary condition before and after the TGD's construction for the regression model, which is not completely true due to the gradually increased geometric influence (such as ongoing scouring) caused by the TGD (e.g., Yang et al., 2022)*". (see Lines 345-348)

In lines 135-139 you write "It should be noted that the imposed downstream water level Zdown also implicitly accounts for other nontidal factors, such as wind, ocean temperature and ocean salinity, which are assumed to be negligible in the regression model when compared with the tidally induced water level fluctuations featured by a typical spring-neap cycle (see Figure S2 in the Supplementary Material)." I think you should follow this up in the last paragraph of the Discussion section 4; are these other factors really negligible? [How much uncertainty do they introduce to the regression?]

Our reply: Since the potential impacts induced by nontidal factors (such as wind, ocean temperature and ocean salinity) on the regression model are not trivial things, thus we suggest that further study is needed in the manuscript. In the last paragraph of the Discussion section 4, we have explicitly mentioned that: "*Here, it should be noted that the contribution p_t implicitly accounts for both tidal and nontidal factors (e.g., wind, ocean temperature and ocean salinity), hence further study is required to quantify the potential influences due to nontidal factors*". (see Lines 303-305)

Figure 5. From your present text I infer that the plotted slopes are quadratics deriving from the cubic splines used in the interpolation of elevation between gauging stations. Clearly the splines give continuous values of elevation and slope at each station; however, is there any basis for the variation of slope between stations? The plots of slopes look like over-fitting. Could you get continuous values of elevation and slope at each station using only quadratic splines for elevation?

Our reply: We very much appreciate the comments raised by the editor. Actually, the over-fitting of water level slopes is closely related to the cubic spline interpolation of the linear regression coefficients along the upper YRE (see Figure 3 in the manuscript) since the elevations are directly computed using the triple linear regression model. However, since only the first derivatives of two quadratic splines are continuous at the interior points, the performance of quadratic spline interpolation is generally not as good as the cubic spline interpolation. As we can see from Figure R1 below, the interpolated curves for both Z_0 and α are much more fluctuant when compared with those using cubic spline interpolation. Thus, we would prefer to adopting the cubic spline method. In the revised manuscript, we have explicitly mentioned that: "However, cautions should be taken when interpreting each spline going through two consecutive observed data points owing to the overfitting of the linear regression coefficients using the cubic spline interpolation method". (see Lines 246-248)

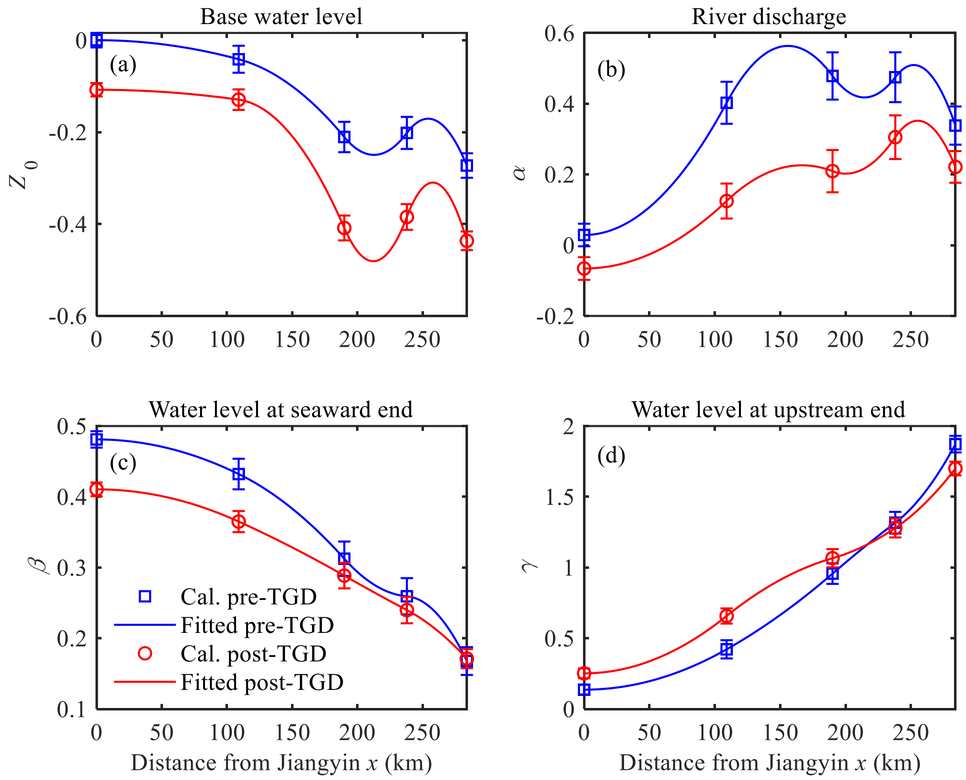

Figure R1. Interpolated linear regression coefficients Z_0 (a), α (b), β (c), γ (d) using the quadratic spline interpolation with error bar along the upper YRE (upstream of the Jiangyin gauging station) for both the pre-TGD and post-TGD periods. The vertical error bar was estimated using the Matlab 'regress.m' function with 95% confidence intervals.

Figure 6. The labels at the top and the caption suggest that the thick blue curve is ΔTOT at DT in (a), ΔBOU at DT in (b). I think you want "DT ΔQ" –> "ΔQ at DT" in the labels at the top.

Our reply: Corrected as suggested (see Figure R2 below).

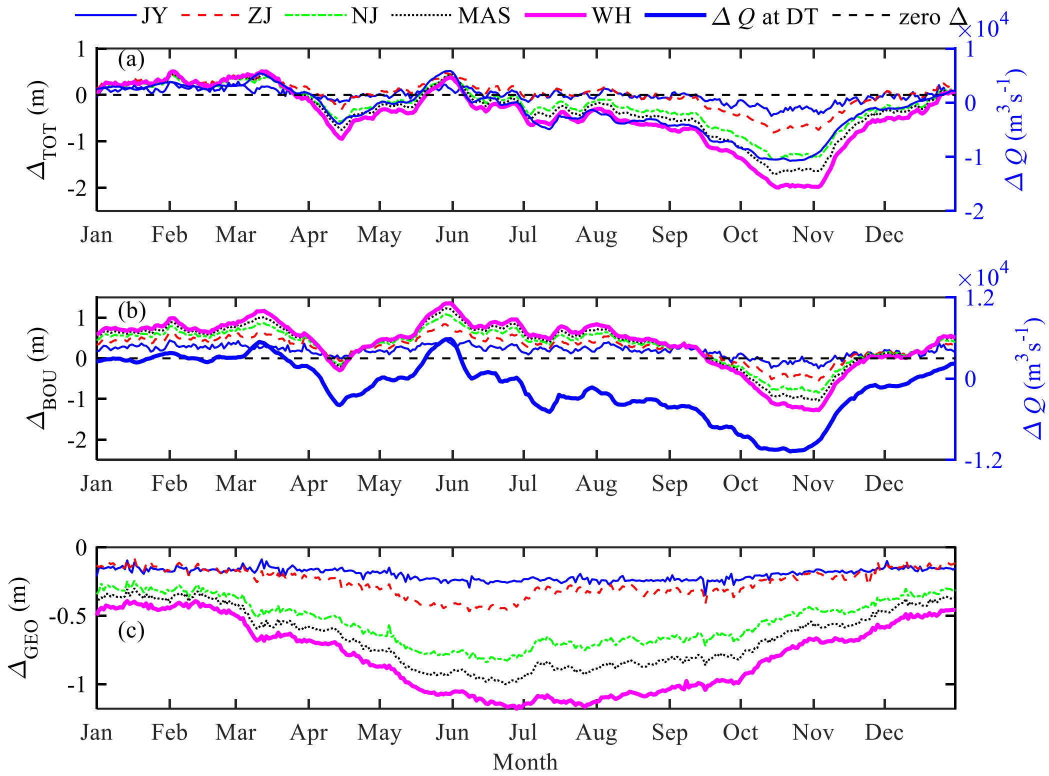

Figure R2. Alterations in water levels induced by the combined impacts of natural and anthropogenic changes Δ_{TOT} (a), boundary condition changes Δ_{BOU} (b), and geometric changes Δ_{GEO} (c) at different gauging stations along the upper YRE.

Lines 321-322 and figure 9. I am happy with |ΔZ| etc. but Z1 as original and Z0 as new is still strange; usually 0 comes before 1.

Our reply: In the revised manuscript, we have updated this figure by defining Z_1 as the new profile, while Z_0 being the original profile (see Figure R3 below).

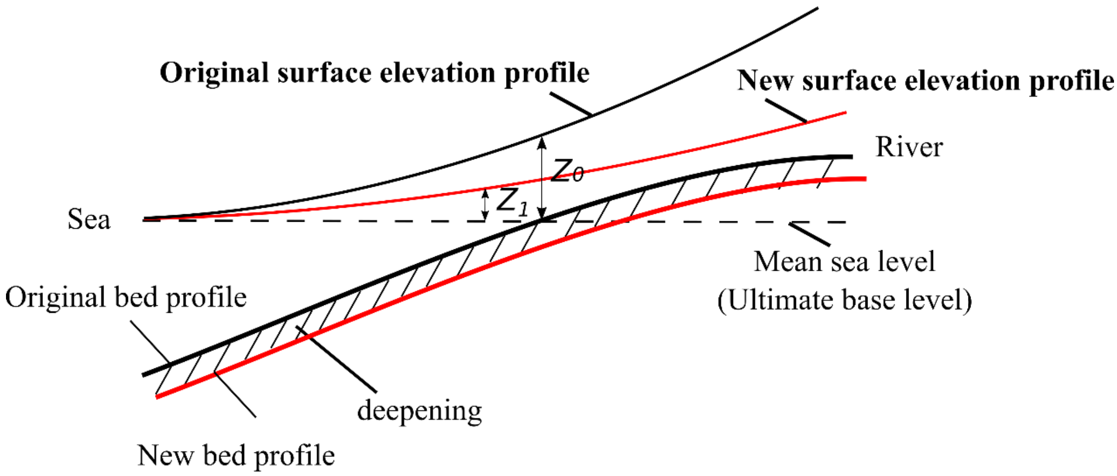

Figure R3. Illustration of the effect of riverbed deepening on the water level dynamics along the channel.

References

Yang, Y., Zheng, J., Zhu, L., Zhang, H., Wang, J., Influence of the Three Gorges Dam on the transport and sorting of coarse and fine sediments downstream of the dam, Journal of Hydrology (2022), doi: https://doi.org/10.1016/j.jhydrol.2022.128654.