



EGUsphere, referee comment RC2
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Comment on egusphere-2022-175

XI FENG (Referee)

Referee comment on "Quantifying the impacts of the Three Gorges Dam on the spatial-temporal water level dynamics in the upper Yangtze River estuary" by Huayang Cai et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-175-RC2>, 2022

In this study, the authors investigated the spatial-temporal water level dynamics along the main stream of the Yangtze River estuary by means of a triple linear regression model accounting for both the upstream and downstream boundary conditions. The model was subsequently used to quantify the influence of the Three Gorge Dam's operation on the water level dynamics. Results showed that the alteration in water level dynamics are mainly controlled by the variation in freshwater discharge owing to the Three Gorge Dam's operation, while the influence by geometric changes are minor when compared with that of the river discharge alteration. The first reviewer already provided many constructive comments on the manuscript, which I mostly agreed, especially concerning the validity of the proposed triple linear regression model. Generally, the paper is well organized and written. However, there are still some concerns which should be properly addressed before the paper can be accepted in the Ocean Science.

Major concerns:

- The authors assumed that the alteration in water level dynamics can be primarily attributed to the geometric change (caused by the combined influences of both natural and anthropogenic modifications) and the boundary effects (induced by the changes in upstream and downstream conditions, primarily due to the TGD's freshwater regulation). Since the authors proposed a triple linear regression model to quantify the impacts of the Three Gorges Dam (representing the intensive human intervention) on the water level dynamics, how did the authors account for the potential impacts due to the climate change (such as intensifying precipitation, global sea level rise, etc.)?
- It was mentioned by the authors that the proposed model is particularly useful for determining scientific strategies for sustainable water resources management in dam-

controlled estuaries worldwide. Actually, as far as I see, the proposed method can also be used to quantify the influence of climate change on spatial-temporal water level dynamics since both the upstream and downstream boundary conditions are closely related to the climate change even without the construction of large dams. Further comments with regard to the applicability of the proposed method can be clarified.

- The geometric effect in this paper is mainly referred to the bathymetric changes in the estuarine system, which should be the primary factor dominating the geomorphological changes in the Yangtze river estuary. However, for other estuarine systems, the geometric effect could also be due to the lateral boundary changes. Could the authors give some comments on the applicability of the proposed method to such cases?
- Finally, I would suggest the authors to clarify the implications of this contribution.