Dear Editor Prof. Huthnance,

Thank you for sending me the revised manuscript "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. for review.

The authors investigate changes in the water level dynamics in the upper Yangze estuary by means of a linear regression model due to construction of the TGD. They separate the changes into geometrical induced by scouring and hydrodynamically induced due to discharge modulation by the TGD. They show that on average, water levels in the TGD dropped.

The results seem plausible and I like the idea to separate the effects. The authors also responded to my comments to the first version in detail and improved their manuscript accordingly. Therefore, I recommend to publish the manuscript with minor clarifications. My comments can be addressed without another review round.

Kind regards,

Reviewer

Comments

95 2.2 Dataset In the study both discharge and water level at the upstream station is used, which implies that there is are continuous measurements of both the stage and flow velocity. Yet measurements methods can change over time, and even if they do not change, they require frequent recalibration to account for morphological changes at the gauging station. Therefore, it would be insightful to provide some information on how discharge at the Datong station is measured, if the method of measurement changed during the study period, and most importantly, if it was regularly updated to account for scouring of the bed, after the TGD had been constructed.

120 "daily averaged water levels observed at the DT hydrological station are not uniform for identical river discharge"
→ There is no unique stage-discharge relation at the Datong hydrological station

120 "due to the influence of external forcing [...]"
A potentially important factor, the stage-discharge hysteresis, is not mentioned. Is it not relevant at Datong? I suggest to provide a rough estimate of the stage-discharge hysteresis.

116 standard deviation function → standard deviation

139 variance function → variance

176 Note that Gezhouba is also a run-of-the-river dam, and therefore should not considerably influence the discharge regime.

212 increased → increasing

215 The standard error [...] represents the standard deviation
→ The error-bars [...] represent the standard error
The standard error and standard deviation are related but not the identical ($s_{err} \propto s_d/\sqrt{n_{sample}}$).

215 is robust → is fitting well
"Robust" in statistics implies that a method to suppress outliers was employed, which is not the case here.

215 "[...] the standard error [...] suggests that the proposed triple linear regression model is [fitting well] with limited uncertainty"
Remove the qualifier "with limited uncertainty", as as a good fit does not imply low uncertainty. In general, the goodness of fit to the measured values improves when more more parameters are added, but the reliability of predicting values at moments for which no measurements are available decreases (overfit). (See also my recommendation in the previous revision to validate the model through bootstrapping.)

310 constant value of local mean sea level → constant mean sea level

310 "[The] channel deepening [...] tend[s] to increase in the landward direction [..]. This phenomenon can be primarily attributed to the constant value of local mean sea level or the ultimate base level that the topography tends to approach due to erosion."
I cannot follow this argument, as the constant sea level in combination with the seasonal discharge variation promotes, not prevents, scouring c.f. theoretical work by (*Lamb et al.*, 2012) for the Mississippi and measured longitudinal river profiles of the Mahakam (*Sassi et al.*, 2012) and Kapuas (*Kästner et al.*, 2017). I propose two alternative hypotheses: First, reduced sediment supply initially just results in scouring downstream in the vicinity of the dam, after which the scour slowly propagates further downstream with time. Second, the reduction of seasonal discharge variation by the TGD reduces the overdeepening near the sea.

294 Conclusion: Since the TGD continues to deprive the Yangtze of sediment, it is reasonable to assume that the scouring will continue. Can the authors hypothesize how the water levels will evolve in future?

This also points to a potential methodological limitation of the study, as the mean conditions are treated as if they were stationary before and after the dam construction, while the geometric influence has likely gradually increased since construction of the dam due to ongoing scouring.

References

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