

Interactive comment on “Impacts of Three Gorges Dam’s operation on spatial-temporal patterns of tide-river dynamics in the Yangtze River estuary, China” by Huayang Cai et al.

Matt Lewis (Referee)

m.j.lewis@bangor.ac.uk

Received and published: 26 March 2019

A very interesting study, with applications to all "downstream consequences from land management practice (e.g. reservoirs, hydro-electric, flood risk mitigation). I think the article is great and worthy of publication, but I have some concerns – listed below. Applying an analytical model to find the downstream change to volume of a river due to upstream water collection (the three gorges dam) is neat – but I am unsure how this can be used to assess impact to biology. 1. Inter-annual variability I think some effort to resolve inter-annual variability would have been nice. Standard deviation could be added to the mean values in Figure 11 - and then a conclusion of "significant change

C1

between months 7 to 11" can be made with confidence. At present such a statement cannot be made: Significant compared to what? Where is the test of significance? At best the authors can say "the change in the mean is clear for months 7-10". If Table 2 had more data added, i.e. how the monthly mean changes each year – it would be nice. Certainly the data is sufficient (it spans multiple years), and so the inter-annual variability can be added to Figure 11. That said, perhaps the authors can defend my comment here?

2. Sub-monthly variability impact Another concern I have is the resolution of the model. Is the frequency of boundary forcing information sufficient to resolve extreme events? For example, daily-averaged flow rates were found to be insufficient to resolve flood risk and water quality within estuary hydrodynamic models (e.g. Robins, P.E., Lewis, M.J., Freer, J., Cooper, D.M., Skinner, C.J. and Coulthard, T.J., 2018. Improving estuary models by reducing uncertainties associated with river flows. *Estuarine, Coastal and Shelf Science*, 207, pp.63-73.) I guess I am simply asking: you have monthly means, but how does this down-scale to hourly means, which are likely to be important for impact to wildlife and estuary impact? For this second comment, perhaps a sensitivity test is needed to prove to the reader that you can take coarse river data and resolve estuary impact. However, perhaps this can also be defended by the authors?

3. Assumptions of river geometry variability For the analytical solution method - how is river width treated for application to volume temporally variance? Is an assumption made about the river being canalised? i.e. constant bank full width? Or is there an associated flood plan? How is river depth calculated? If so, how does this effect your results?

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-138>, 2019.

C2