

Interactive comment on “Flooding in the Mekong Delta: Impact of dyke systems on downstream hydrodynamics” by Vo Quoc Thanh et al.

Anonymous Referee #1

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The authors use a 1D/2D hydrodynamic model that covers the Mekong Delta including its rivers, major canals and extending into the continental shelf in the surrounding ocean, to investigate the impact of protecting agricultural areas with high-dykes on the river hydrodynamics. They found that (a) High dykes (particularly those in Long Xuyen Quadrangle (LXQ), Plains of Reeds (PoR)) have wide-spread impact on the flow downstream (b) has impact on inland tidal effects. Recent literature is well covered. Reasonably well-written introduction. Language use is generally adequate (though there are a number of technical issues that need correcting.) However, the paper is not easy to read as it is organized in such a way that a lot of (seemingly unnecessary) material is mixed with the main narrative of the paper. Following are some of the major issues:

1. What is the benefit of modelling the continental shelf? This is not an oceanographic/coastal engineering study. Your focus (as stated) was to investigate the impact of construction of high-dykes on the flow regime of the river system. You are also not considering highly dynamic ocean impacts like storm surge. What is the drawback of stopping the model at the river mouth and providing tidal boundary conditions with sea level there? You might have good reasons for this approach. If so, they need to be explained.

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2. One year of simulation is a short period to obtain meaningful results. I think it is important to cover at least several years of flow data as such data for this case study is available. Is there a barrier to doing that?
3. The point of departure (and justification for the methodology) of this paper seems to be the fact that previous studies could not able to predict the water level at the river mouth. If this is the sole justification to use a numerically expensive 2D model that includes continental shelf, the importance of obtaining those figures should be explained.
4. The point of doing a tidal harmonic analysis is unclear to me. Just testing the impact on the tidal range (amplitude) would have covered all the matter that is relevant to the central theme of the paper. Removing the tidal harmonic analysis part would shorten the paper - definitely would contribute to making it more readable and to the point.
5. The authors should discuss the performance of the model. This is particularly important as many previous studies have used (much simpler) 1D modelling approach to arrive at similar results. How much is the computational effort? How does it compare with those reported in previous studies? What is the justification to use this modelling approach despite its expense (if that is the case)?
6. So many figures and many descriptions on model validation performance. This is an important topic to cover, but it is overdone in this case. Just one paragraph on

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how the model performed during validation and if absolutely necessary, one map showing validation results. Much of this can be moved to an appendix. In fact, it's best that they are presented as an online supplement rather than an Appendix, so as to keep the paper succinct and to the point.

7. Scenarios need a better explanation. For example how much is protected with high dykes in "Dyke VMD" scenario? What is the basis?
8. Water balance diagrams and descriptions are hard to understand. Please check the literature for much clearer ways of presenting these.
9. Lastly, it is important to place the findings within the context of other changes. Are these significant for example impact of climate change on upstream Mekong flow, dam construction, sea-level rise etc.? Some discussion on such issues is warranted.

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