

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

Anonymous Referee #3

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Review of manuscript: “Flooding in the Mekong Delta: Impact of dyke systems on downstream hydrodynamics”

The study aims at evaluating the impact of high dykes on the hydrodynamic behavior of the Mekong river. The analysis is based on a 1D-2D model that reproduces the topographic characteristics of the river, as well as different dyke ring configurations. The work does not infer specific research questions but it is aimed at increasing the knowledge of the river dynamics and its behavior in the light of the recent construction of a complex dyke system. The manuscript is in general well written, even if it results sometimes heavy and difficult to follow due to many details regarding the study area. I have some doubts concerning the scientific contributions of such kind of studies, even though the publication could be justified by the importance of the study area and the

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relevance of the river dynamics investigated. That said, the current manuscript fails in specifying what are the added knowledge provided compared to previous investigations performed in the same area, and with the same objective (see e.g. Tran et al., 2018). Hereafter some major and minor comments that need to be addressed before considering the manuscript for publication.

Major comments:

- One of the most relevant concern regarding the study is that it refers to only one year of data. The model has been calibrated and validated considering the 2000 and 2011 floods, respectively. After that, all the considerations regarding the river dynamics have been carried out referring to the event used for the calibration. However, Figure 5 clearly shows that the 2000 flood is different from the average condition. Thus, the question is: how representative is this event of the behaviors of the river network? The behavior of the different river branches and the way they interact depend on the specific contributions of the different basins. This to say that this analysis evaluates only a specific event, which might (is?) not be representative of the general river condition. As a matter of fact, previous studies investigating the same aspects (dyke effects) considered longer periods.

- The difference relative to the study of Tran et al. (2018) is sometimes cited in the document. However, the Authors should better specify the differences and the added knowledge ensured by this study. Also, are the results in line with previous findings? If not, how do you justify the difference? Does this study provide new information and knowledge relative to what was already known?

- Differences in terms of water elevation are in most of cases very minimal and of the same magnitude of the error of the model. What is the representativeness of such results. How can you exclude that those limited variations obtained among different configurations do not depend on the model itself, or on the way it reproduces the interaction between river and dyke rings?

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- The overall model description should be improved. The model structure covers a key role in the overall study and additional details should be reported. The distinction between high and small dykes is not clear unless you are familiar with the study area. Please provide additional explanation about the model structure.

- Following all the hydrological details reported in the manuscript is sometimes difficult. Please always remind that a reader might not be familiar with the cited locations. All the cited locations should be identified within a Figure. For example, I would recommend adding a figure explaining the different geometric configurations and the dyke systems considered in the different cases. For example, what are the dyke system considered for the configuration LXQ, PoR, etc.?

Minor comments:

- P2L9: which kind of hydraulic structures?

- P3L15: please put the figure in relation to their citation order. Figure 4 is cited in the text before figures 2 and 3.

- P4L7-16: consider adding a scheme to better explain dykes interaction.

- Figure 2 and 3: why the number of dykes is significant? Probably reporting their overall length is more relevant.

- P7L24: I think here you should refer to “dike ring”. How do you manage, within the model, areas partially protected with high dykes and partially not?

- Section 2.3: I would suggest using the term “configuration” instead of “scenario”. Scenario is usually referred to identify different hydrological conditions (e.g. events of different return periods), while configuration sounds more appropriate for taking into account different topographic characteristics of the river network. Please make those locations clear using a map.

- Sometimes the structure of the paper is “heavy”. Please consider to simplify it by

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removing some sub-subsections, such as 2.4.1, 2.4.2. . .etc.

- P11L8: any discussion about the calibrated Manning coefficients: are they reasonable? Are they in agreement with those of previous studies?
- P13L31: Is it relevant reporting a difference of 0.6 cm? How reliable is this estimation? See also my previous comment on that.
- Figure 1: green areas should be reported as “high dyke protected areas”. The same in Figure 4.
- Figure 7: check the unit of measure: m a.s.l. ?
- Figure 10-11: is the arrow dimension proportional to the flow? In case specify or add a legend.
- Figure 13: I was not able to find some of these stations in a map. Please add a reference to a map where those stations are visible.

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