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Hydrology and Earth System Sciences Discussions

Interactive comment on "A study of the climate change impacts on fluvial flood propagation in the Vietnamese Mekong Delta" *by* V. P. Dang Tri et al.

Anonymous Referee #2

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The manuscript by Dang Trie et al. wants to analyze possible effects of climate changes on Vietnamese Mekong Delta flood dynamics. In detail this study focuses upon likely effects of the combination of different components: sea level rise, changes of Mekong discharge regime in a specific upstream cross-section (Kratie) and future development of the Upper Mekong Basin. I really appreciated the authors' choice to address these important issues, but I personally suggest a major revision of this manuscript before it can be accepted for the publication. To the questions already raised by Anonymous Referee 1, I would like to add some critical points that need to be clarified. Here below I will provide an itemized description of my comments.

- 1: In the description of the study area, the authors highlight that the Mekong

River has a highly complex hydraulic nature and in the abstract it is stated that this paper aims to demonstrate the particular complexity of the flood dynamics. If I understood well (line 6 at page 7240) the ISIS model, that is applied for this study, is a 1-D hydrodynamic model and it describes the Vietnamese Mekong Delta making use of 5502 nodes. Moreover, to the best of my knowledge, the Vietnamese Delta is highly regulated and the anthropogenic influence is heavy (Dung et al, 2011). I think that the number of nodes chosen for the flood model is quite low if one wants to meet the aim of representing the complexity of the such an area. Dung et al (2011), for instance, studied the same area making use of a different 1-D flood model with more than 25000 computational nodes. Comparing the hydraulic network modeled by the two studies (Fig. 5 in Dang Tri et al. and Fig. 1 in Dung et al. (2011)) it is possible to see a good agreement in the representation of the eastern side of the network, that one which comprises the largest branches of the delta, while it is not the case for the rest of the hydraulic network and particularly it is not the case for the smaller rivers and channels network. The southern side of the "Coastal Area", the "Ca Mau Peninsula" and also the northern side of the Vietnamese Delta are depicted in the manuscript by Dang Trie et al. with much less detail. Furthermore I think that there is a high degree of subjectivity adopting a hydrodynamic model with a low number of nodes as most depends on the way that the different cross-sections are connected one another. On the other hand I understand that it is probably not so easy to have access to more data than those already adopted in the presented study. Can the authors please explain the rationale behind their choice? And, can they please give more details regarding also the trade-off between assuming a limited number of nodes and giving a satisfactory representation of the complex dynamics of the Delta? Did they try to use a more complex model, a model that uses more nodes?

- 2: At page 7235 line 2 the authors make distinction between the upstream and downstream section of the Vietnamese Delta, and this same distinction is re-

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flected in the figures as well (Fig 5 and Fig 6 for instance). I probably missed it, but I did not find any explanation for the reason why the authors made such a separation and, to me, it was difficult to follow the line of reasoning of the manuscript. Do the flood simulations in the downstream section (see paragraph 3.1.3) consider also the tidal/future sea rise effect, while the representation of the upstream section doesn't? What are the different conditions that force the model in these two configurations? Can the authors add some clarifications? And, if the authors will maintain this difference, it will be better to specify it in the figure captions as well; for instance Fig 5 refers to the upstream section, while caption of Fig 6 will state that it is depicting the simulation results for downstream section, and so on for all the other figures.

- 3: Page 7233 line 16 – Are the hourly sea level measures available for a single location or for different locations?
- 4: At page 7233 line 22 it is stated that "the discharge was projected according to the adjusted regional climate model". Can the authors add same more details about the adjusted regional model? Any reference?
- 5: At page 7233 line 24 it is stated that Scenario 2 considered the future development of the Upper Part of the Mekong Basin as well. Can the authors add some details in order to let the reader, who is not familiar with this area, know how is the basin expected to develop? And can they add any reference?
- 6: At page 7237: If I understood well, figures 10 to 13 show the results of the simulations obtained referring to scenarios 1 and 2, that do not take into account the sea level rise. But few lines later, starting from line 10, the authors refer to the fact that the sea level rise would affect the coastal area. And at line 17 the authors refer to figure 14, which I understand only from line 24 of page 7240, shows the results of a simulation made considering the sea level rise and changes in the upstream discharge according to scenarios 1 and 2. I think that it would be

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better to give a broader explanation of this transition between considering only scenarios 1 and 2 and adding the sea level rise as well.

- 7: Figure 2 is too small and the same are the labels of figures 4, 16, 17 , 18, 19, 20. The legend of many figures results hardly readable.
- 8: Sometimes the authors refer to the climate change scenarios as CC (page 7237 line 9, page 7240 for instance) some others as CLC1 and CLC2 (figure 2d). It would be better to choose between the two.
- 9: Sometimes the authors refer to the 30th of August (legend of fig 5 for instance) and sometimes to the 31st of August (caption of figure 5, for instance); it would be better to choose between the two.
- 10: In figure 16 it would be better to refer to the date of the simulation always in the same way, for instance 04 July, 30 August, 23 September and 01 November.
- 11: In the caption of figure 21 it would be better to explain the meaning of L1_2000, L2_2000 and so on.

Dung, N. V., Merz, B., Bardossy, A., Thang, T. D., and Apel, H.: Multi-objective automatic calibration of hydrodynamic models utilizing inundation maps and gauge data, Hydrol. Earth Syst. Sci., 15, 1339–1354, doi:10.5194/hess-15-1339-2011, 2011.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 7227, 2012.