

Interactive comment on “Impact of the Hoa Binh Dam (Vietnam) on water and sediment budgets in the Red River basin and delta” by D V. Vu et al.

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1. Does the paper address relevant scientific questions within the scope of HESS? Yes. The paper presents a model for water and sediment flux through the complex channel network of the Red River Delta. Given the lack of data in this region and the importance of channel siltation to the Vietnamese economy, this is a valuable contribution to HESS.
2. Does the paper present novel concepts, ideas, tools, or data? No. Although the question is important, the ideas, model, and forcing data are standard and readily available. However, I do not see this as an impediment to the important question being answered.
3. Are substantial conclusions reached? No. The main conclusion of the study, that

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reduced flood discharges are responsible for siltation in delta estuaries due to reduced competence, is not well founded. Sedimentation is dependent on spatial gradients in sediment flux, not absolute water or sediment flux. Tidal pumping was mentioned as a method to add sediment to estuaries, but this mechanism of deposition was not studied here. The authors even note a lack of pre-dam data to relate estuary sedimentation to dam building (page 353, line 3). Although the modeled water and sediment flux data is valuable, it is not enough to answer questions of estuary siltation on the coast.

4. Are the scientific methods and assumptions valid and clearly outlined? The MIKE11 model and boundary conditions were clearly outlined. However, one boundary condition bears further discussion. The authors force SSC to be 50 mg L⁻¹ during flood tides at the mouths of estuaries. There is no justification of this number given, and it is clearly of essential importance to the siltation of estuaries.

5. Are the results sufficient to support the interpretations and conclusions? The model results quantify discharge through each of the distributary channels on the Red River Delta before and after dam impoundment. This is valuable information for understanding the effect of the dam. However, the conclusion that the dam has increased siltation of Red River Delta estuaries cannot be tested with the above data. If tidal pumping was indeed explicitly modeled, the authors need to quantify the resulting suspended sediment fluxes, and prove that tidal pumping can increase siltation even when the suspended sediment supply is reduced.

As second issue with model results is that they quantify suspended sediment only. Bed material such as sands is neglected. If there is minimal sand in the delta, it should be noted. If there is indeed bed material transport, then it must be treated explicitly, because it may prove an essential part of sedimentation.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes. Although I am not an expert in this type of modeling, I believe I could conduct this work again.

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7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Proper attribution is given to previous studies.

8. Does the title clearly reflect the contents of the paper? The title clearly reflects the contents of the paper.

9. Does the abstract provide a concise and complete summary? The abstract serves as a confusing introduction to the paper. While it is clear what analysis was done (a hydrological model of the Red River Delta), I would prefer that the drop in suspended sediment flux be quantified as a percentage reduction, rather than just a number without context. It is also unclear where results end and inferences begin. Tidal pumping was not directly investigated in the paper, so it should be stated that the results lead to a new hypothesis.

10. Is the overall presentation well structured and clear? The Introduction through Results are clear. In the Discussion and Conclusion section, several things are unclear. When discussing specific distributary channels, it is unclear which channels constitute the “northern,” “middle,” or “southern” distributaries (pg. 352, line 22). Are these groups of distributaries? If so, it was never mentioned. Midway through the discussion, tidal pumping is introduced (pg. 353, line 5). This is an entirely separate process from the one being modeled, and at least deserves its own paragraph.

11. Is the language fluent and precise? For the most part, yes. I have several technical comments that are listed below.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Sections 2.5 and 2.6 discuss tides and morphology of the Red River Delta shoreline. None of this information is used in the paper, so I think it is unnecessary.

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14. Are the number and quality of references appropriate? Yes.

15. Is the amount and quality of supplementary material appropriate? No supplementary material was provided.

Specific comments:

Tables 1 and 2. It should be clearly stated that these are measured values.

Tables 3 and 4: It should be clearly stated that these are model results.

Figure 2. This figure is essential, but it is very hard to find what one is looking for. There are many labels which are not used in the paper. Removing them would add to readability.

Figure 4. “Annual water and *suspended* sediment discharge...” Abstract, lines 12-13. It would be helpful to have these magnitudes of suspended sediment flux written as a percentage decrease.

Section 2.1 Geomorphology: This section should carefully reference Figures 1 and 2.

Section 2.4 Dams: This section appears unnecessary. The first paragraph (page 339, lines 14-19 discusses floods and should be appended to the previous section. The second paragraph contains information about the HBD that was already included, and information about a second dam that was not included in the study.

Sections 2.5 and 2.6: these sections appear unnecessary tides and fluvial influences at the coastline are not important in this study. If the sections are included, they need to carefully reference the figures.

Section 4.1 (page 346, line 6) correlation should be quantified by a correlation coefficient, not by r^2 values. Line 9: “at each” instead of “per”

Page 349, line 14: The decrease in suspended *sediment* concentration.

Page 353, line 21: please quantify the tidal amplitudes on the delta.

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