

## ***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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This manuscript presents a study of water and sediment budgets in the Red River delta, based on model simulations and data analysis of long-term water and sediment discharge time-series. The main conclusion drawn from this study is that the construction of the Hoa Binh Dam has lead to a long-term reduction of sediment fluxes to the delta and a reduction in the seasonal variability of water discharge. The latter, in turn, has affects for sediment transport at the downstream branches of the delta. I tend to agree with the general line of reasoning of the manuscript but I feel the supporting evidence is not properly presented. I provide some suggestions for improvement below.

General comments:

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1) Quantitative analysis: the findings heavily rely on results obtained from an analysis of time-series of water and sediment discharge, however, more information is needed on the data sources and methods besides those provided in Section 3.1. For instance, what is the uncertainty associated with the discharge and sediment concentration measurements? Generally, water discharge measurements carry an uncertainty of about 10%, whereas for sediment concentrations the uncertainty can be much higher. How significant are the findings given that the reported differences are often lower than a 10%? This also has consequences for the reported values in the tables. I suggest decreasing the number of significant figures in reported concentrations and discharges to reflect accordingly on these uncertainty levels.

2) Model implementation: section 3.3.1 is rather vague and requires streamlining concerning the particular setup of the Red River delta. Additionally, figure 2 is not very illustrative regarding model implementation. For example, very little information is provided about the model domain and/or the bed level soundings employed to describe the river sections. This information needs to be thoroughly presented.

3) Model calibration: the calibration procedure should be described in more detail. For instance, how are the resulting roughness coefficient patterns throughout the delta? do they decrease linearly, exponentially? A linear decrease in roughness gives good results when comparing with water levels at the outlets, however, water discharge division at the bifurcations may slightly be impacted by azimuthal variations in roughness (see Sassi et al., 2011, Tidal impact on the division of river discharge over distributary channels in the Mahakam Delta, December 2011, Volume 61, Issue 12, pp 2211-2228). Does this also play a role in your case?

4) Tides: much is being said about tidal processes throughout the manuscript, however, very little or no information is provided. I suggest to either remove any reference to tides or to include explicit evidence of tidal mechanisms at stake. Also, I think the introduction reflects too much on general issues of sediment delivery to the coastal zone but very little on the processes being described in the manuscript. There has been much work

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on tidal processes in river deltas from which this manuscript may be benefited to clearly delineate the original contribution of the paper.

5) Structure and presentation of the paper: the discussion section is too long and contains elements of a summary. I think the discussion needs to be broken in subjects so as to improve the readability. I also suggest a separate conclusion section is needed. The presentation of the results requires more figures and less tables. My experience is that tables convey little information and do not help in properly visualizing the main results. If the authors choose to retain the tables, I'd suggest including some more figures supporting the results that are being derived from the tables.

Specific comments (page and line numbers are based on the printer-friendly version):

p334, l9 'simulated' instead of 'calculated'

p334, l18-12, the sentence is too speculative for an abstract

p336, l12, please remove the brackets

p336, l26-on, suggest to rephrase/break the sentence

p337, l2, the section presents a geographical description of the area, suggest to re-name accordingly

p336, l3, 'at' instead of 'with'

p338, l18-20, please consider moving 'before and after HBD impoundment' right after 'gauging station' / consider replacing the symbols before the quantities with 'about'

p338, l24, 'was delivered/issued' instead of 'flowed'

p340, l6, consider removing 'a' and 'type' surrounding 'diurnal'

p340, l14-16, it is unclear whether the water levels vary due to the tides or the river discharge, please clarify

p340, l22, 'funnel' instead of 'tunnel'

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p343, l13, please remove 'of'

p343, l14, please specify these specific parameters

p343, l21, 'by' instead of 'from'

p344, l3-4, it is unclear why this particular value is chosen, please clarify

p345, l1-4, is it a linear decrease? Does it drop uniformly in the azimuthal direction? Please specify

p354, l8, suggest to replace with 'the critical shear stress for erosion'

p346, l9-14, here and in other sections (see general comment #1) the authors should be more careful when reporting relative changes in the physical quantities, particularly given the typical uncertainty in both water and sediment discharge estimates

p346, l16, 'in' instead of 'of'

p347, l3, it shows

p348, l10, consider removing 'quite'

p348, l3-5, it is unclear what is meant here, please clarify

p351, l24-25, unclear to me how the interannual variability was determined

p352, l13, consider replacing 't' with 'tons'

p352, l15, why is the sediment necessarily lost in the delta? Please clarify

p353, l14-17, please break this sentence as it is too long

p353, l21, please move 'there' after 'higher'

p354, l11, please specify what is compared?

P354, l16, do you mean 'delta progradation' ?

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