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Hydrology and Earth System Sciences
Discussions

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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The authors thank the referee for agreeing with the general line of reasoning of the manuscript, for his 5 suggestions (items 1-5) and his specific comments to improve the paper. Please find below our replies to the 5 items.

Item 1: The measurements provided by the Ministry of Natural Resources and Environment (MONRE) were conducted following the standards of the IMHEN (Institute of Meteorology, Hydrology and Environment) belonging to MONRE, which apply all over Vietnam, in each gauging station, with the same protocols. The uncertainties of discharge and sediment concentration measurements are not provided by the MONRE. Regular calibrations of the water depth-discharge rating curve have been conducted

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(up to several times a month) at key stations of the Red River, using reels and now an ADCP. MONRE specified that the data we used were quality-controlled by its Hydrometeorological Data Center (HDC). Biases thus apply to all our measurements in the same way. However, these data enable revealing the trends and especially the main information concerning a reduction of more than 50% of the sediment flux by the Red River after the Hoa Binh dam settlement. We agree to reduce the number of significant figures in Tables 1, 3 and 4 according the referee's suggestion.

Item 2: River sections (depth measurements across the river) are measured in the Red River system by several organizations belonging to the MONRE. To implement our model, 783 river sections provided by the MONRE were used: 51 sections of the Da River, 27 sections of the Thao river, 19 of the Lo River, 156 of the Red River, 44 of the Thai Binh River, 34 of the Luoc River, 31 of the Duong River, and 421 of other rivers or channels of the network (see Fig. 2). This information will be included in the revised version of the paper.

Item 3: Calibration provided values of the Manning's roughness coefficient from 0.035 m-1/3s upstream to 0.02 downstream. These values neither decrease linearly nor exponentially. We did not make any assumption on the type of decreasing in the calibration process. Calibration was performed between sections, so as to obtain locally the best fit between measurements and simulations. A sentence will be added in the revised version.

Item 4: Tidal mechanisms are key processes on water distribution in estuaries (Sassi et al. 2011 - a reference will be added in the revised version-). Tidal mechanisms are also key processes of sediment transport in estuaries (e.g. Dyer 1986, Allen 1980, Dronkers 1986). Explicit evidence of their influence in the Cam/Bach Dang estuary was given in Lefebvre et al. (2012) where, in particular, tidal pumping was shown to be much higher in dry season that in wet season. Furthermore, tide is taken into account in our numerical model through the boundary conditions. At the end of the paper, after showing the decrease of sediment delivery and the increase of siltation in the estuary,

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we state as a hypothesis that the enhanced siltation could result from the combination of new water regulation and of tidal pumping. This is only an assumption, opening up new perspectives of research. Therefore, we think that tidal processes should not be removed from the paper. The authors agree to revise the introduction to clearly state the original contributions of the paper (study of the long-term variability of river discharge and sediment delivery, evidence of decrease in sediment delivery and water regulation after Hoa Binh dam settlement, information on recent changes in sediment deposition and erosion within the system -along the delta coastline and in estuaries-, first estimates of the deliveries by each of the 9 mouths of the Red River system).

Item 5: Previous estimates by Pruszak et al (2005) and Luu et al. (2010) were very informative ; in the same way, we hope that our results could also be helpful for other researchers working on the Red River system. Therefore, we think that the Tables should be kept in order to bring information (1) for the decision makers (harbor authorities, ministry of environment, ministry of transportation etc), (2) for researchers who will improve these estimates with new tools in the future. We agree to include new pie charts in a revised version of the paper that illustrate Tables 1, 3 and 4. We also agree to break the discussion in subjects so as to improve the readability.

Conclusion: The authors warmly thank M. Sassi for his review. The authors agree to revise the paper accordingly, as mentioned above, and to integrate all the specific comments.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 333, 2014.