Response to Reviewer's Comments on

Large-scale quantification of suspended sediment transport and deposition in the Mekong Delta.

By Nguyen Van Manh

General Comment

A fairly extensive modeling effort has been presented in this paper to develop a sediment budget (of a sort) for the MD. For the paper to become worthy of publication a significant amount restructuring and some additional explanation of cohesive sediment transport is required. The grammar is below par; please have an English speaker redo the language. I have suggested some corrections (and likely missed many) up to p.4320 as a guide.

AUTHOR REPLY: Thanks for the constructive comments and suggestions. We restructured the manuscript accordingly.

A sub-section on suspended sediment characteristics has been included in section 3 "Model setup and data" describing the basic properties of suspended sediment in the MD. The model description has been improved by correcting the errors in the equations, providing more details generally, and adding explanations of the approaches and assumptions taken with respect to settling velocities, deposition and erosion. By this the crucial processes of the cohesive sediment transport is explained in more detail. The sediment model is re-calibrated using W_0 value range specifically derived for the study area (Hung et al.,2014b). The new results are almost identical to the previous results due to the low sensitivity of the floodplain deposition modeling to the settling velocity in the main channels, where W_0 was prescribed. This is a consequence of the high flow velocities in the channels preventing deposition of the fine suspended sediment. Additionally, a brief description of the general hydraulics has been added to the 'Results and discussion' section describing the flood distributions between the sub-systems and flow velocity patterns in sub-systems prior to the results of the sediment dynamics.

Overall, the manuscript has been shortened by removing too detailed descriptions in the sections "Study area" and "Approach for hydrodynamic and sediment transport modelling in the MD".

However, the modeling effort for a large-scale and complex system as the MD has to deal with many other issues besides the model description. And these also require explanation, thus the options to shorten the manuscript are limited if a balance between just explanations for all parts of the manuscript is maintained. We also argue that the calculation of the nutrient input by the floodplain sediments is a crucial and outstanding information for scientists and stakeholders in the Mekong Delta. And because this part does not make up for an individual publication by itself, we would strongly argue to keep it in the manuscript. The revised manuscript is thus structured as outlined below.

We also strive to improve the language, although it must be noted that the judgment of the reviewers differ in this point.

New structure of the manuscript:

Abstract
1. Introduction
2. Study area
3. Model setup and data
    3.1. Suspended sediment characteristics in the MD
    3.2. Description of the 1D hydrodynamic and sediment transport model
    3.3. Hydrodynamic and sediment transport modelling in the MD
    3.4. Model parameterization
    3.5. Measurement data
    3.6. Definition of the sediment model boundary conditions
4. Model calibration and validation
    4.1. Model calibration
    4.2. Model validation
5. Results and discussion
    5.1. Sediment transport in the Mekong Delta
    5.2. Sediment dynamics in the VMD floodplains
    5.3. Sedimentation and nutrient deposition in the VMD floodplains
6. Conclusions
Acknowledgements
References

Restructuring

1. The manuscript is a bit too long. The initial description of the hydraulic system is quite interesting but perhaps too detailed; the simple model is not quite capable of simulating the system to the extent described. Include description that is mainly relevant to the model.

AUTHOR REPLY: Yes, we agree. We shortened the section to a certain extent, but we kept a fair amount of detailedness, because we believe that the reader needs to know the peculiarities of the complex hydraulic system in order to understand the assumptions taken and results presented.

We also agree that the sub-section of model description is quite short and has some errors. That subsection is upgraded and the equations are modified, and the erosion equation has been added. The updated sub-section 3.2 reads as presented below.

Also, as mentioned above, a new sub-section "Suspended sediment characteristics" has been added. This new section is also given below.

3.1. Suspended sediment characteristics in the MD

The suspended sediment in the MD is fine-grained. The dispersed grain size was studied by Wolanski et al. (1996), who quantified the grain size by $d_{50} = 2.5 \div 3.9\ \mu m$ in the freshwater region of the estuary of the Hau River. MRC/DMS (2010) detected a $d_{50} = 3 \div 8\ \mu m$ in the Tonle Sap River and an even finer distribution in the Tonle Sap Lake. Manh et al. (2013) analyzed sediment deposition at 11 sites over a large area of the VMD and found that the deposited sediment grain size and nutrient content are uniformly distributed over the study sites, with a dispersed grain size distribution of 41% clay (grain size $< 2\ \mu m$) and 51% silt (grain size $2 \div 63\ \mu m$). Similarly, Hung et al. (201b) found a median grain size $d_{50} = 10 \div 15\ \mu m$ of deposited sediment in over 12 sediment traps on floodplains of the Plain of Reeds, VMD. The reported dispersed grain sizes of $\mathrm{d}_{50} = 2.5 \div 15\ \mu m$ are equivalent to free settling velocities of $W_0 = 1.10^{-5} \div 2.5.10^{-4}$ ms^{-1} using Stoke's law assuming an average measured water temperature $t \cong 30^0 C$, which is representative for the floodplains of the MD (Hung et al. 2014b).

However, as the sediment is cohesive (Hung et al. 2014b), the grain size of sediment flocs is of higher importance, particularly for the modeling. Wolanski et al. (1996) used image analysis for the measurement of flocs sizes, and observed a floc size of $\mathrm{d}_{50} \cong 40\ \mu\mathrm{m}$ of suspended sediment in the freshwater region of the estuary of the Hau River. Hung et al. (2014b) performed intensive measurements of SSC, sediment deposition, water temperature and water depth in the PoR and derived a floc size of d_{50} = 35μm by inverse deposition and erosion modeling. MRC/DMS (2010) measured a floc size of $d_{50} \cong$ 29.4 μm in the Tonle Sap River using image analysis. The free settling velocity of the reported floc size range $d_{50} = 29.4 \div 40\ \mu m$ are equivalent to free settling velocities $W_0 = 9.10^{-4} \div 1.7\ 10^{-3}\ ms^{-1}$ based on Stoke's law (Hung et al. 2014b).

Suspended sediment concentrations SSC in the MD show maximum values smaller than 500 $mg.l^{-1}$. Given this SSC range a hindrance of sediment settling is unlikely, because it is much less than the SSC threshold for a hindered sediment settling of SSC > $10^4\ mg.l^{-1}$ (Krone, 1962).

3.2. Description of the 1D hydrodynamic and sediment transport model

The Mike11 hydrodynamic model (HD) is based on one-dimensional hydrodynamic equations and solves the vertically integrated equations of conservation of continuity and momentum (the "Saint Venant" equations). The solution is based on an implicit finite difference scheme developed by Abbott and Ionescu (1967).

The sediment model focuses on the suspended sediment transport and deposition. The cohesive sediment transport module of Mike11 is based on the mass conservative 1D advection-dispersion (AD) equation:

$$\boldsymbol{\frac{\delta(A.SSC)}{\delta t} + \frac{\delta(Q.SSC)}{\delta x} - \frac{\delta}{\delta x}\left(AD\frac{\delta SSC}{\delta x}\right) = -A.K.SSC + C_2.q} \qquad \textbf{(Eq.}\ 1)$$

Where SSC is the suspended sediment concentration, D is the dispersion coefficient, A the cross-sectional area, K the linear decay coefficient, C_2 the source/sink concentration, q the lateral inflow, x the space coordinate and t the time coordinate. The main assumptions are: (1) the considered substance is completely mixed over the cross sections implying that a source or sink have an instantaneous effect over the cross section; (2) Fick's diffusion law applies, i.e. the dispersive transport is proportional to the concentration gradient.

The falling velocity of sediment flocs mainly depends on the sediment concentration:

$$\boldsymbol{W_s = kVC^m \text{ with } k = \frac{W_0(1-VC)^\gamma}{VC^m}} \qquad \textbf{(Eq.}\ 2)$$

Leading to

$$\boldsymbol{W_s = W_o(1-VC)^\gamma} \qquad \textbf{(Eq. 3)}$$

Where W_S is the settling velocity of flocs ($m.s^{-1}$), VC is the volume concentration of suspended sediment ($m^3.m^{-3}$), W_0 is the free settling velocity, m, γ are empirical coefficients.

W_0 (m. s^{-1}), is the free settling velocity based on Stoke's law, which is determined by the sediment grain or floc size (d):

$$W_o = \frac{(s-1)gd^2}{18\vartheta}$$

with ϑ = kinematic viscosity coefficient as a function of water temperature (for $T = 30^{o}C$ it is $\vartheta = 8.3\ 10^{-7}$ (m^2s^{-1}) (Hung et al., 2014a)), s = specific gravity of sediment particles (s = 2.65), and g = acceleration of gravity (g = 9.81 (ms^{-2}))

The deposition process is described as:

$$S_d = \begin{cases} \frac{W_s\, SSC}{h_*}\left(1 - \frac{\tau_b}{\tau_{c,b}}\right) \; for\, \tau_{c,b} \geq \tau_b = \rho g \frac{V^2}{h^{\frac{1}{3}}\left(\frac{1}{n}\right)^2} \\ 0 \qquad\qquad for\, \tau_{c,b} < \tau_b \end{cases} \qquad \text{(Eq. } \mathbf{4}\text{)}$$

Where S_d is the deposition rate (kg.m^{-3}.s^{-1}) describing the source/sink term in the advection-dispersion equation. W_s is the floc settling velocity (m.s^{-1}), SSC is suspended sediment concentration (kg.m^{-3}), h_* is the average depth through which the particles settle (m), $\tau_b\ and\ \tau_{c,b}$ are bed shear stress and critical bed shear stress for deposition ($N.m^{-2}$), ρ is the fluid density ($kg.m^{-3}$), g the acceleration of gravity (m.s^{-2}), n is the Manning number, h the flow depth (m) and V the flow velocity (m.s^{-1}).

The gradual erosion process is described as

$$S_E = \begin{cases} E_o\left(\frac{\tau_b}{\tau_{c,e}} - 1\right)^n \; for\, \tau_{c,e} \leq \tau_b = \rho g \frac{V^2}{h^{\frac{1}{3}}\left(\frac{1}{n}\right)^2} \\ 0 \qquad\qquad for\, \tau_{c,e} > \tau_b \end{cases} \qquad \text{(Eq. 5)}$$

where S_E is the rate of erosion, E_o the erosion coefficient, $\tau_{c,e}$ the critical shear stress for erosion and n is the erosion exponent.

The mass in grid point j is given as: $M_j = vol_jSSC_j$ (Eq. 6)

Where M is the mass at given time at given grid point j (kg), SSC is suspended sediment concentration (kg.m^{-3}) and vol is the volume (m^3) at grid point j.

2. The focus should be limited to sediment; the nutrient bit is best described elsewhere, since in any case it is not covered well. Please delete all references to nutrient transport.

AUTHOR REPLY: Thank you for the comment, but we regard this part as one of the major results of this study and would thus keep it in the MS. Nutrients deposited with the sediment are crucial for the high aqua-agricultural productivity of the Mekong Delta. The annual floods and the nutrients are the main reasons for the Mekong delta becoming the "rice bowl" of Southeast Asia. However, this natural nutrient was never quantified in a scientific study, thus quantifying the nutrient input was one of the main motivation and focus of this study. Also, because the nutrient input is derived from the sediment input and not simulated separately but derived from nutrient fractions measured in a previous study, the relevant part is not excessively long. Thus we would strongly argue for keeping this part in the manuscript.

3. In results and analysis, describe hydraulics first then describe sediment transport. To avoid confusion do not leap-frog as far as possible.

AUTHOR REPLY: Thank you for the comment, this part has been added to the section of 'Results and discussion' in the revised manuscript as presented below:

"The Table 3 shows the distribution of flood volumes into hydraulic sub-systems of the MD. In the extreme event 2011 12% of the flood volume is distributed to the TSL and Cambodian floodplains, while during a normal flood event this portion amounts to 6÷8% only. The flood discharge in the Tien River is about three times higher than in the Hau river until the Vam Nao junction connecting Tien and Hau river, after which the discharge of the two main branches of the Mekong is almost equalized (Table 3).

The hydraulic characteristics of the sub-systems of the MD are illustrated in Fig. 6. The tidal influence is found in the entire VMD up to Tan Chau and Chau Doc, while no influence is observable at the Mekong-Bassac diversion around Phnom Penh. The tidal magnitude at Chau Doc (Hau River) is higher than at Tan Chau (Tien River) due to the lower distance to the coast. However, the situation is reversed in the coastal zone, because the semidiurnal tide of the South China Sea mainly influencing the Tien branch is distinctively higher than the amplitude of the diurnal tide in the Gulf of Thailand, which dampens the tidal magnitude at the river mouth of the Hau river compared to the Tien river. The flow velocity in the main river from Kratie to the

Vietnamese border is almost always greater than $1\,m.s^{-1}$, while in the VMD channels flow velocities less than $1\,m.s^{-1}$ can occur, particularly during high tide. Very low flow velocities can be observed under the ponding conditions of the TSL and the floodplain compartments in VMD. Typical floodplain flow velocities are in the range of $0 \div 0.05\,m.s^{-1}$. The flow velocities on the Cambodian floodplains vary between the river and VMD floodplain velocities, because the flow is less restricted by dikes (Fig. 6). Flow velocities in this area are thus governed by the distance to the main river and the topography. These highly differentiated flow patterns determine in combination with the water depths the sediment transport and deposition dynamics in the MD.

Table 3: Total sediment load, relative sediment load, flood volume (with reference to Kratie) at key locations in the MD for three flood events.

Subsystem	Flood volume (%)			Sediment load (mil.ton)			Sediment load (%)		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
Kratie	100%	100%	100%	78.4	43.4	104.2	100%	100%	100%
Cam floodplains	11%	9%	16%	21.4	10.3	27.3	27%	24%	26%
Overflow to VMD	6%	4%	9%	3.5	1.5	7	4%	4%	7%
Tonle Sap Lake	8%	6%	12%	5.2	2.1	10.6	7%	5%	10%
Vietnamese MD	92%	93%	86%	51.8	31	66.3	66%	71%	64%
Tan Chau	67%	70%	60%	41	24.7	50.3	53%	57%	48%
Chau Doc	19%	19%	18%	7.3	4.7	9	9%	11%	9%
Vam Nao	26%	28%	23%	14.7	9.3	18.7	19%	21%	18%
VN floodplains	21%	17%	24%	10.9	5.6	17.6	14%	13%	17%
Coast (Sea)	-	-	-	42	25.9	50.5	55%	60%	48%

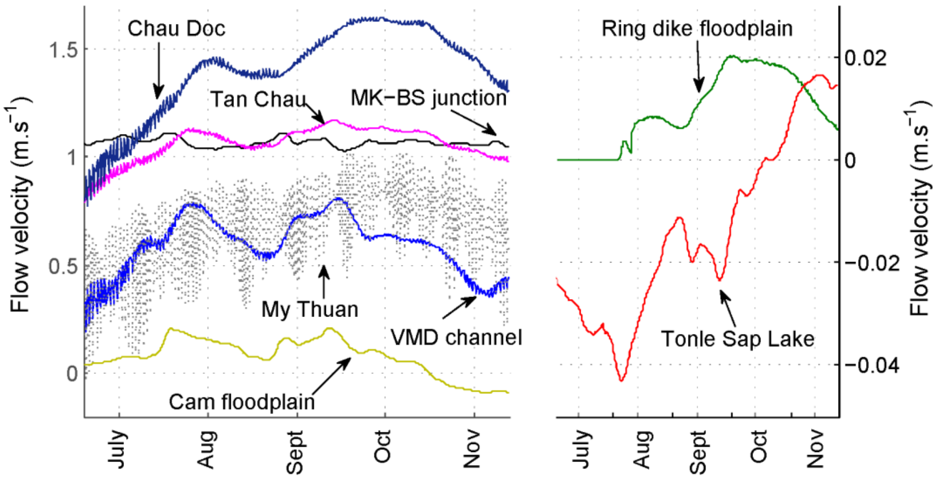

Figure 6: The velocity time series with 6-hour time steps of all the sub-systems in the MD. Left: flow velocities of some key location in the main rivers and in a VMD channel in the PoR (Hong Ngu channel). Right: flow velocities in the center of the TSL and a floodplain compartment in the PoR.

Sediment transport

1. My main concern is that even though the paper is about sediment, it is not described adequately, and I believe there are major errors in the description as well.

AUTHOR REPLY: Many thanks for the comment and for highlighting the errors in the description. Following your comments we have restructured the method part including a dedicated section for the sediment characteristics. We also corrected the errors and extended the description of the sediment transport model. The new sections were already posted above.

2. Equation (2) is a bit confusing. If k is not independent of C, why is it defined as a seeming constant?

AUTHOR REPLY: We admit the mistake in the equation, which has been corrected

$$W_s = kVC^m \text{ with } k = \frac{W_0(1-VC)^{\gamma}}{VC^m} \qquad \text{(Eq. 3)}$$

3. When flocs are free-setting it means that they do not experience hindrance, which occurs at high values of C.

AUTHOR REPLY: Thanks for pointing this out and we included a remark on this effect in the new chapter 3.2 (see above). However, this effect is unlikely to occur, as the observed SSC in the MD is much less than the reported concentration threshold (SSC > 10 kg.m^{-3}) for the hindrance effect.

4. Free-settling of flocs is not quite related to the settling of dispersed (i.e. deflocculated) particles. Dispersed clay particles do not settle well, or settle at all, and are usually (and appropriately) ignored in cohesive sediment transport modeling. I do not believe W0 is the settling velocity of dispersed particles; it is the settling velocity of free-setting flocs described by Stokes law.

AUTHOR REPLY: You are right, W_o is the free settling velocity of suspended sediment in flocs, not deflocculated grains. The presented description did not differentiate correctly between free settling velocity of flocs and free settling velocity of dispersed grains. The relevant equations and descriptions have been corrected (see the new section 3.2 above). In this context it has to be mentioned that the parameterization of the model was appropriate and according to the new revised equations. This is reflected in the new section on model parameterization given below.

3.4. Model parameterization

The model parameters to be defined are the roughness coefficient (n) for the HD model, andthe longitudinal dispersion coefficient (D), the free settling velocity (W_0) and the critical shear stress for deposition (τ_d) for the AD model. In order to reduce the degrees of freedom in the parameter estimation, the MD is divided into eleven parameter zones (Table 1). Within these zones the calibration parameters are assumed to be constant. This zonation is a refinement of the zones used by (Dung al et., 2011), taking into account the different characteristics of main rivers, channels and floodplains in terms of hydrodynamics and sediment transport. In order to reduce the complexity of the calibration even further, not all calibration parameters are calibrated in all eleven zones. Depending on parameter sensitivity and flow characteristics, some parameters are fixed in some zones based on region-specific literature values (Table 1).

The Manning roughness coefficient n is calibrated in ten zones. The range of n in the calibration is set to $0.016 - 0.10$. In the coastal zone where the flow is governed by ocean tides n is set to 0.016 (Chow 1959). The longitudinal dispersion coefficient D controls the dispersive sediment transport. It represents the effect of the non-uniform flow velocity distribution on suspended sediment concentration.

The dispersion coefficient is determined as a function of the mean flow velocity: $D = a|V|^b$, with flow velocity V and coefficients a, b. Model sensitivity runs showed that the suspended sediment moving with the velocity of water (advection) is orders of magnitude higher than the spreading due to non-homogeneous velocity distribution (dispersion). Thus, to reduce to complexity of the calibration, we fix $\mathrm{b} = 1$ for the whole MD, i.e. assume a linear dependency of D on V, and calibrate a (dispersion factor) for the areas with high variability of flow velocity (channels in the VMD and coastal zone, Table 1). The a values in other areas are fixed based on equivalent mean flow velocities and dispersion coefficients of 81 measurements in 30 US rivers (Kashefipour al et., 2002).

The selection of fixed zones for $\tau_d \; or \; W_0$ are based on a model sensitive analysis. 300 Monte Carlo runs were performed with the AD model fixing the dispersion coefficient D and $\tau_d \; or \; W_0$ to determine the sensitivity of W_0 and τ_d in each zone. In zones with low sensitivities of the parameters W_0 or τ_d, this parameter was fixed (mainly the large river branches, Table 1) and in zones with high sensitivities W_0 or τ_d were calibrated (mainly the channels in the VMD and the floodplains, Table 1). The fixed value of the free settling velocity (W_0) was calculated using Eq. 4 based on measured sediment sizes reported in sect. 3.1. For this we used the average floc size determined for the Mekong Delta of $d_{50} = 35 \; \mu m$ by Hung et al. (2014b). For calibrating W_0 we used an extended range of reported dispersed and flocculated grain sizes, $D_{50} = 2.5 - 80 \; \mu m$, which evaluates to a calibration range of $W_0 = 1.10^{-5} \div 7.10^{-3}$ ms^{-1}.

Furthermore, Hung et al. (2014b) estimated the deposition shear stress $\tau_d = 0.021 \div 0.029 \; N.m^{-2}$ for simulating sediment deposition on VMD floodplains. The median value $\tau_d = 0.025 \; N.m^{-2}$ of that range is used for the fixed τ_d parameters, while an extended range of $\tau_d = 0.01 \div 0.2 \; N.m^{-2}$ is used for the model calibration. All the fixed and optimized parameter values (result of sect. 4) of τ_d and W_0 for the specific zones are shown in Table 1.

5. The sediment is described as clay or silt based (correctly) on the dispersed (deflocculated) size. However, flocs typically contain both clay and silt particles, and floc densities are considerably lower than material (mineral) densities. For inorganic materials "clay" indicates a particular type of crystalline mineral considered to be below 2 microns. Silt particles by themselves are not very cohesive. So please include a brief discussion of why you feel a single equation with a single set of coefficients is adequate to describe the settling of a heterogeneous particle population. Justify by using appropriate citations.

AUTHOR REPLY:

Literature states that the dispersed grain size of suspended sediment in the MD is $d_{50} = 2.5 \div 8\ \mu m$ (Wolanski (1996), MRC/DMS (2010)). The dispersed grain size of deposited sediment on the floodplains is $d_{50} = 10 \div 15\ \mu m$ (Hung 2014b) with a dispersed grain size distribution of 41% clay and 51% silt (Manh 2013). Thus it is reasonable to conclude that the suspended sediment in the MD is cohesive due to the high clay content. Cohesive sediment transport typically occurs in flocculated/aggregated as stated in many publications (e.g. Droppe 2001). In the flocculation process clay and silt grains form flocs. The floc formation is a complicated process and depends on a number of factors (Manning 2011), possibly leading to a distribution of different floc sizes. Thus a single mean or median settling velocity is unlikely to adequately represent an entire floc spectrum. Thus Dyer et al. (1996) recommended that the best approach for accurately representing the settling characteristics of a floc population was to split a floc distribution into two or more components, each with their own mean settling velocity. Also Eisma (1986) and Manning (2001) suggest that a more realistic and accurate generalization of floc patterns can be derived from the larger macrofloc and smaller microfloc sized fractions.

However, the recommendations require an intensive field measuring effort, which is not feasible in this presented large scale study. With detailed information on floc size distributions absent it is quite common to approximate the integral sedimentation process by a median settling velocity, although this can produce a misleading representation of the actual settling behavior of individual floc populations (Manning 2011). However, it has to be noted that this simplification is just one of the many necessary simplifications in large scale modeling.

Thus, a single value $W_{o_{50}}$ for the free settling velocity is defined based on d_{50} floc size by Stoke's law in this study. The actual settling velocity in the model $W_{s_{50}}$varies in time, as it is a function of SSC (Eq. 2). By this the variability of floc size is indirectly considered, although not measured. Moreover, by calibrating W_o for the target areas of the study, the channels and floodplains, different settling velocities and thus flocculation environments are also indirectly considered. Thus we argue that the presented approach is well justified for the scale of the study.

6. At one point erosion shear stress is mentioned. However, the erosion function is not defined.

AUTHOR REPLY: Thanks, the erosion is now given in section 3.1 (please see our reply to the first comment (Eq. 5))

7. If you keep the critical shear stress for erosion high, when the bed shear stress is above the critical deposition shear stress, you get neither erosion nor deposition. What in your view does this mean in the modeling and how realistic it is? Should we just take the word of the specific model manual and accept it? Did you consider the critical deposition shear stress as well to have a large value and permit deposition over the entire range of bed shear stresses?

AUTHOR REPLY:

In order to answer this comment we have to recall the main objective of the study: we want to provide a model based estimation of the amount of sediments brought into the Mekong Delta from the upstream basin and how they are distributed within the Delta. Thus we decided to explicitly neglect the local erosion and redistribution of sediment already deposited. This was achieved by deliberately setting the critical shear stress for erosion to a high value. Of course, this also means that we do not simulate the possible re-mobilization of new sediment, but we regard this effect as rather small compared to the possible mobilization of old sediment occurring during the initial floodplain inundation, when erosion is most likely to occur, but deposition not yet. This approach is thus not aiming at a closest representation of the reality, which is almost impossible due to the large interference of human activities on local sedimentation processes, but rather aiming at the quantification of the annual sediment and nutrient input and spatial distribution in the Mekong Delta. And fro this purpose we believe that the assumption taken with regard to erosion processes, resp. the critical shear stress for erosion is justifiable.

The critical shear stress for deposition is a completely different story. This is of course not set to high values, but either set to a value determined by field experiments in the Delta and inverse modeling of deposition (Hung et al., 2014b), or it is calibrated, thus adapted to experimental floodplain deposition data (Manh et al., 2013). Thus the critical shear stress for deposition is parameterized directly or indirectly based on studies conducted in the study area. This is, in comparison to other large-scale sediment transport studies, a major benefit of this study, at least from our point of view.

8. You have given Ws and D values. What values of mineral density and floc density would you use to relate one to the other?

AUTHOR REPLY: The equations and related sediment properties for determining W_o and W_S are given in the new sections 3.1 and 3.2. The particle density is $\rho_s = 2650\ kg.m^{-3}$.

9. Only partial justification has been provided for parametric values listed in Table 1. In every case include a citation for the value, or mention model-based calibration, whichever it may be.

AUTHOR REPLY: The Manning value (n) for roughness parameterization is now cited (Chow, 1959).

Model-based calibration values were already shown in the Table 1, where ‘O’ indicates optimal values derived by the calibration processes.

Fixed (F) parameter values are indicated ‘F’ in Table 1, and the values adopted are explained and referenced in section 3.3 “Parameterization” of the original manuscript:

The dispersion factor (a) was already introduced and referenced (Kashefipour al et., 2002) (p 4324, line 2), and the critical deposition shear stress (τ_d) was taken from Hung (2014b) (p 4324, line 21). Additionally the revised section 3.4 “Parameterization” now provides more information on the parameters and justifies adopted values.

Minor comments

10. Use of SSC and C for the same quantity is confusing.

AUTHOR REPLY: Thanks, SSC will be used in the entire manuscript instead of C.

11. Total sediment load (e.g. Table 3) implies the sum of bed load and suspended load. I believe in your case it is really total suspended load only.

AUTHOR REPLY: Yes, this work focuses on suspended sediment only, so total sediment load means suspended sediment load. This is clarified in the revised MS.

12. Rho is used both for water density and a correlation coefficient. Who is Spearman?

AUTHOR REPLY: Spearman's rho is Spearman's rank correlation coefficient. It is a rank correlation, which does not rely on the assumption of a linear relationship between the assumed correlated variables. In this respect it differs from the standard Pearson (linear) correlation coefficient. The rank correlation coefficient is also robust against outliers. Charles Edward Spearman, b.t.w., was a British psychologist known for his statistical work (c.f. http://en.wikipedia.org/wiki/Charles_Spearman).

In any case we will distinguish between the density and the correlation coefficient in the revised MS.

The maps look smudged due to too many details. Try to cut down the number of drawings.

AUTHOR REPLY: Thanks for the hint. We removed the complete river network and show the main rivers only for spatial reference. This should increase the clarity of the figure.

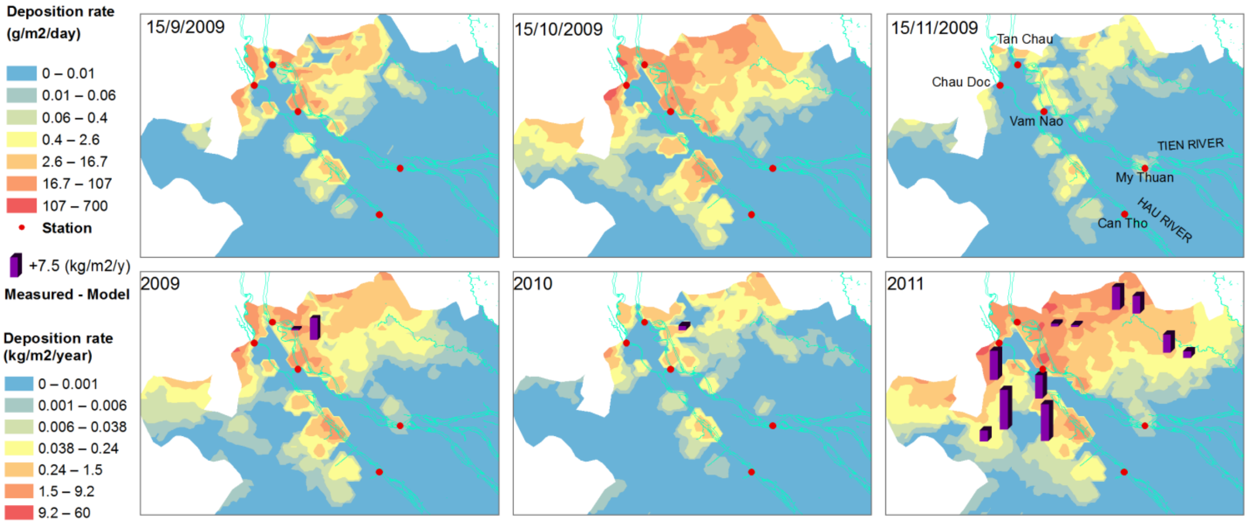

Figure 10: Map of sedimentation in the VMD floodplains. Top: Sediment deposition rate (g.m^{-2}.day^{-1}) during the period of compartment opening (left), during flood peak discharge (center) and during the period of compartment closing (right). Bottom: Cumulative sediment deposition (kg.m^{-2}.year^{-1}) in 2009, 2010 and 2011. The bars show the differences of cumulative sediment deposition between measurements and simulation (kg.m^{-2}.year^{-1}), the values are in figure 5c.

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