Q&A: 2D and 3D Sediment Transport and Morphological Modelling

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#	Question	Answer(s)	
1	As a client receiving sediment transport modelling, usually for river or lake entrance opening, I note the models usually have to have their depth of scour limited to achieve observed lateral scour, any insights into why?	There can be a number of complex processes going on with the formation of a breach. This includes the interaction of sub-aerial sediment slumping with bank toe undercutting. There can be a lot going on at quite a fine scale which can challenge the processes that are represented in the numerical scheme. Limiting the scour depth may be a way to "help" the model but ultimately we should be trying to achieve a better representation of the processes in our numerical models.	Thanks for the question. Most of the emperical formulas used in sediment tranport models are very sensitive to the local depth and velocity. When depth changes from deep to shallow, some basic assumptions, e,g, logmatice vertical velocirty profile in those emperical formulas, may or maynot hold any more. We also sometime find it frustrating, but sometimes this type of limiter is needed to prevent unrealistically high bed shear stress or sediment erosion at shallow cells.
2	Thanks AWS and TUFLOW. Where I am going with this is "is it reasonable to simulate an extreme flood (say 1%AEP) in a natural channel and NOT do a morphological assessment?". That is, in my opinion the sediment movement is important to most flood assessments in that it controls peak levels that are attained - often the subject of an analysis.	Great questions. It was one of the hotest topic in the ISRS conference I attended last year. I believe it really depends on the type of catchment/river you have. If the catchment runoff contain high concenration of sediment and it has been observed in the past that the sediment deposit in downstream creeks to elevate the river bed significanlty, then the answer is yes. While major river such Brisbane river has enough 'energy' to carry the sediment and the deposition could be relatively small comparing to the total river depth. So you probably donnot need to consider morphological change in the later case.	
3	Can you explain more for dredge issue in the TUFLOW? How to collect data, how to set up model and how to analyse appropriate solution?	This topic is elaborated on in the following paper: https://downloads.tuflow.com/_archive/Presentations/2015/2015_Coast_Ports_ITeakle.pdf	
4	In Indian Rivers mostly in the north and east there are lots of sediment. with time there is raising of river beds leading to more floods and higher HFL. is dredging a solution? can it be modelled for decision making?	Dredging would be one potential solution but of course has many constraints that would need to be assessed to determine if it was feasible or preferred. Modelling can help answer various questions, such as effectiveness of dredging and environmental impacts of plumes as well as in-fill rates.	
5	For the last example you showed looking at different breakwater options, what approach was selected?	live answered	
6	Thank you for nice presentation, I have a question regarding the sub-surface flow(seepage and infiltration) effect on sediment transport? and also the impact of wetting drying on sediment erosion particulary the fine sand, can we still consider fine sand 0.5mm and below as uncohesive	Hi, you have flexiblity to define discrete fractions and then can independantly assign non-cohesive or cohesive equations or characteristics for each fraction. So you have some flexibility to work with (I'm talking about TUFLOW atm because that's what we know).	

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7	how can you calculate recharge to aquifer ?	Hi, TUFLOW FV is not directly connected to ground water model at the moment, but we're definitely consideing expanding to this feild. Cheers	
8	Mitch, can you discuss what a modeller should do if they don't have detailed calibration data or information from neighbouring areas/catchments available to help tune in the model parameterisation? What do you recommend? Qualitative verification? Sensitivity testing?	*live answered*	There will be many who use empirical methods who may challenge any modelled outputs - Shuang covered this in his response...
9	Thanks for an excellent overview. There is a great deal of uncertainty in sediment transport parameters. Would you like to comment on the need to run model uncertainty analysis vs the amount of computational time to run sediment transport models?	*live answered*	
10	Thank you AWS organization this webinar thank you so much for presenter very nice, In Nepal We have high soil erosion with river bank erosion, can you recomment the best model for sediment transport	*live answered*	
11	When inputting sediment data tranport of a river system specifically, is it just the median grain size (d50) for the suspended and bedload sediments which are used or can multiple percentiles e.g. d16 and d84 be specified? Would this improve the results/reliability?	Hi, yes it is recomanded to use multiple sediment fraction to represent difference materials. And difference transport parameters can be assisged to each fraction.	
12	Semarang has a main watershed that have a rapid growth of residential. So the impact is raising the detergent contaminant on the river. I think the detergent contamination has a strong correlation with the sensitivity of the riverbank to easy to eroded. What do you think about this?	*live answered*	Many thanks. Look forward to have Eco-Environmental-Sedimentary Transport models.
13	Can you comment on non-Newtonian fluids and the sensitivity of modelling results to the adopted viscosity, and any special considerations/pitfalls when simulating mud/slurry/debris flows?	*live answered*	
14	The scouring and deposition constantly changes the river slope, cross sections, flood plains during floods when most of sediment is transported. these changes must be further affecting future flow and transport. is it captured in the model? does the model runs and re runs with modified parameters like cross section etc?	Hi, yes a 2d model can look at velocity distrubutions and sediment transport/morphology across the floodplain.	ok, thanks so much.

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15	i have one more question, in case of non-equilibrium sediment transport, what will be the best approach to deal with from numerical modelling point of view	when you have high erosion under supercritical flow over steep slope	
16	Hello, i have a question, could we use tuflow to modelling sediment in reservoir?	Hi there, yes TUFLOW FV offers full capability of modelling sedimentiation resevoir. You can apply 3D modelling with vertical mesh, do heat modelling to assess the impact of thermal stratification, and etc.	how about add paralel checkdam for reduce sedimentation, could we also add in modelling?
17	Do you believe this modelling would be useful in determining Average Material Transport Rate in a River	Do you believe this modelling would be useful in determining Average Material Transport Rate in a River	Hi, yes it can, particularly if looking at smaller study areas and events. However, for long timeframes and long river reaches a 1d model may still be better.
18	Can you comment on the design of training walls in the era before modelling. Presumably, some worked well and some didn't. Training walls at river bars, eg: Macquarrie Harbour in Tasmania	*live answered*	
19	In the first example with the low energy mangrove and high energy wave sections of the project area, it seems there is a option to vary the sediment transport or base sediment equations spatially over the project area. Can this option vary the equations temporally as well as spatially to account for changing hydraulics or energy?	For some equations you can vary that paramters on a material (or spatial) basis.	
20	Can TUFLOW be used for long-term morphological change of landform with a rain on grid approach?	*live answered*	
21	Can TUFLOW model sediment load and transport in overland runoffs?	*live answered*	
22	Many of the tropical streams with channels to the sea, have significant mangroves which would presumably impact the flow pattern and type of sediment that is left dominating the mix of materials need to be carried to the channel opening. What allowance is built into your models to cope with this eventuality?	*live answered*	