

Webinar: Sediment Transport Modelling Applications - 13th September 2023

#	Question	Answer	Answer Name
1	Can you use different sediment fractions and vary them spatially through the model?	Hi Anon, yes you can have multiple sediment fractions. It's common to have silts, sands, gravels and sometimes bigger aggregates modelled in the same run. Typically you'll want to vary this spatially to account for the natural observed variation in sediment distribution. Typically these models also allow you to vary sediment type with depth in the bed material.	Mitchell Smith
2	during sensitivity analysis which factors effect the model reults?	live answered	Mitchell Smith
3	Hi, can we determine sediment data of a river, like bedload using water quality data such as TDS, TSS and Turbidity. Is there any equation.	TSS and turbidity data can tell you how much sediment is in suspension but you will also need to measure (or model) flow rate to calculate the suspended sediment transport rate. Measuring bed load transport rate is more difficult and will often require indirect methods.	Ian Teakle
4	What was the approach to estimate the sea level after a rainfall?	live answered	Mitchell Smith
5	What are the preactical implications of this modelling?	Hi Rana, during contruction the modelling was used to set the height of the exit bund so that if a flood happened during construction it would not flood the town any worse than during construction. For the design process, the morphological model was run during flood events to ensure that the development would not increase flood levels. Because there is significant scour during floods, if you didn't run morphology then you would overestimate the flood levels.	Mitchell Smith
6	Can you give us more information about: the model applicability: regarding the temporal and spatial scales.	live answered	Mitchell Smith
7	any reason why not assessing a frequent event, 10% AEP?	live answered	Mitchell Smith
7	any reason why not assessing a frequent event, 10% AEP?	We assessed a large number of different events, from extreme flood to normal or "low flow" conditions. I only talked about the 1%AEP event as this was the flood condition required. But the overall design, including dredging assessments, relied on many other modelled scenarios.	Mark Pennington
8	What if you keep both channels? I mean not closig the original channel as well?	Hi Anon, the original channel is closed to ensure the new channel remains navigable. If you left both channels open there would be potential for sedimentation in the new channel and additional dredging costs etc.	Mitchell Smith
9	Does the new channel alignment increase tsunami risk?	Hi Angela, good question. Yes, it's possible that the new alignment could increase tsunami or storm tide risk. Tonkin and Taylor did some comprehensive work on this however Mark's scope today is to discuss the flood risk from riverine flooding. I've had a look online and there's some more info on the coastal aspects as follows (although notably they don't appear to discuss tsunami): https://www.odc.govt.nz/repository/libraries/id:2bpcqtp1b1cxy3k9b0b/hierarchy/sitecollectiondocuments/our-services/property-and-rates/natural-hazards/Tonkin%20and%20Taylor%20Report%20-%20Opotiki%20Coastal%20Hazard%20Zone%20as%20a%20result%20of%20harbour%20re-development%20-%20May%202021 and https://www.coastsandports.org/papers/2021/151_beetham_finalpapers.pdf	Mitchell Smith
10	Can you add more points about the essential model inputs (spatial and temporal data requirements)?	Hi Tesfa - here are the typical boundary condition requirements for the type of morphological modelling that Mark presented... Hydrodynamic boundary conditions: * River flow timeseries to define flood hydrographs. * Ocean tailwater timeseries. Sediment data: * Particle size distributions * Upstream sediment load (sediment rating curve)	Ian Teakle
11	i have got discharge data, water quality data , stage and cross section data . can i do sediment modelling in HECRAS	Hi Anon, I haven't used HEC-RAS all that much so it will be best to also check with the HEC-RAS team. However, with inflow data, cross sections, stage data you can certainly do sediment transport and morphology in HEC-RAS.	Mitchell Smith
13	Was any long-term simulation done for the re-siltation rate of the dredging channel i.e. maintenance dredging requirement?	We had a multi-disciplinary team working on this. There was extensive assessment done on coastal processes such as this - just not covered in this presentation.	Mitchell Smith
14	Just wondering on the time it took to run the 1% AEP model - i.e. computing time etc?	live answered	Mitchell Smith
15	Thanks, Mark, for an interesting presentation. Why haven't we used a gate at the existing river mouth to control or pass the flooding? Potentially, if we use a gate (which could be geopolymer or a floating gate), that could increase the flow of floodwater during peak periods.	live answered	Mitchell Smith
16	Sediment deposition normally occurs at river mouths. I was wondering why there was no sediment depostion shown in Figure 5.4?	In that figure I only plotted erosion - I did not colour the deposition areas. Had I done this we would have seen both erosion and deposition, but the focus of these figures was to assess scour.	Mark Pennington
18	what was the source of satellite images used to derive the bathymetry	live answered	Mitchell Smith
19	How has climate change been incorporated into the modelling and what have the results shown regarding the impacts. What timeframes and scenarios have been adopted? Any surprises?	For the Bribie Island study, the immediate management questions following the breakthrough were focussed on the short term. Climate change hasn't been considered in this particular study (yet).	Ian Teakle

20	What would you say are the main differences between CFD and numerical modeling?	<p>CFD are a type of numerical model. They estimate water motion with approximateions of the full Navier Stokes Equation. A CFD model can model acceleration of flow in x, y and z directions. They can be used to capture fine scale eddy behaviour and mixing and mixed phase (air and water for example) interaction with structures. They can be computationally intensive and thus are typically run over small model domains and temporal periods. This will likely change as computers get faster.</p> <p>The models presented at the webinar take the full Navier Stokes Equation and simplify it in the z direction by making the hydrostatic assumption. They are called shallow water equation solvers. This assumption allows mass to move in the z direction but it is assumed not to accelerate. These models and can be run over much longer timeframes and spatial areas and are typically very good at representing floods, ocean tides, storm surges and tsunamis etc.</p>	
21	The tidal current is not large so the key coastal morphological process is wave-driven longshore sediment transport?	Currents in Pumicestone Passage are significant (>1m/s), so they are certainly significant. Wave-driven longshore transport is still important but probably not as strong as the current driven sand transport (at Bribie Bar).	Ian Teakle
22	How have you verified the results?	Results have been verified using bathymetric changes derived from satellite derived bathymetry data.	Ian Teakle
22	How have you verified the results?	Could you provide link to source of data, if it's possible?	Tomasz Dysarz
23	does this model result shows any long term solution for navigation and sedimentation in this area?	The modelling did highlight the risk of undertaking dredging of new navigation channels in such a dynamic and unstable coastal environment.	Ian Teakle
24	Would this be possible to consider the future climate change into the model?	live answered	Mitchell Smith
25	Can this model predict bank line shifting?	live answered	Mitchell Smith
26	Any possibility to use TUFLOW in academic/student scheme ?	Yes, we have academic licenses available for TUFLOW. Please contact support@tuflow.com if you are interested and we can help you.	
27	Mark did the increased efficiency of the entrance result in more oceanic flooding	live answered	Mitchell Smith
28	knowing the amount / volume of sediments how can we manage to minimize this? for us to lower the cost for dredging.	live answered	Mitchell Smith
29	can you tell us some limitation of this study?	The primary limitation to any modelling study is data availability. For morphological modelling have good pre and post event bathymetry, sediment concentration data is typically hard to get. Also water level or current data to calibration models to can reduce uncertainty.	
30	Howmuch boundry area did you take for modelling?	The offshore ocean boundary was tens of kilometers long.	
31	Question for Alex - Sounds like dredging would be expensive and ineffective. What other options are you looking at if any?	live answered	Mitchell Smith
32	How it works under extreme events.	<p>These papers may be of interest</p> <p>https://www.coastsandports.org/papers/2021/151_beetham_finalpapers.pdf</p> <p>https://www.coastsandports.org/papers/2021/247_clarke_finalpaper.pdf</p>	
33	From how many locations did you collect water sediment for modelling?	live answered	Mitchell Smith
34	How much is the cost for purchasing your tuflow model?	Please contact sales@tuflow.com and we can send you through the pricing information for the type of modelling you're trying to complete.	
36	What are the common methods for morphological model calibration/validation based on your experiences?	live answered	Mitchell Smith
37	what was the procedure to collect water samples, did you collect water samples at various depths. and how did you determine the sediment load of that sample	I'm sorry, I don't have any answer for you yet but please send me an email at support@tuflow.com and I'll get in touch with Alex and Mark to confirm this for you.	
38	Will there be further assessment in terms of extreme waves behind the post breakthrough scenario and what this may mean in terms of inundation risk?	live answered	Mitchell Smith
39	Mark, was the tsunami risk to Opotiki assessed (both before and after the river mouth works)?	<p>Tonkin and Taylor did some comprehensive work on this however Mark's scope today is to discuss the flood risk from riverine flooding. I've had a look online and there's some more info on the coastal aspects as follows (although notably they don't appear to discuss tsunami):</p> <p>https://www.odc.govt.nz/repository/libraries/id:2bpcqtp1b1cby3k9b0b/hierarchy/sitecollectiondocuments/our-services/property-and-rates/natural-hazards/Tonkin%20and%20Taylor%20Report%20-%20Opotiki%20Coastal%20Hazard%20Zone%20as%20a%20result%20of%20harbour%20re-development%20-%20May%202021 and</p> <p>https://www.coastsandports.org/papers/2021/151_beetham_finalpapers.pdf</p>	
40	any mechanism for sediment dredging?	live answered	Mitchell Smith
41	Alex - do you think it's possible that the northern section of the Pumicestone Passage essentially becomes an ICOLL in the long term?	live answered	Mitchell Smith