Nat. Hazards Earth Syst. Sci. Discuss., author comment AC1
https://doi.org/10.5194/nhess-2021-284-AC1, 2022

Reply on RC2

Usman Khalil et al.

Author comment on "Investigating compound flooding by using hydrodynamic modelling under mesh resolution and future storm surge events in Brisbane River Estuary, Australia" by Usman Khalil et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-284-AC1, 2022

Reviewer 2 Comments Reply

Title: Is ‘mesh convergence’ a well known term? I understood there are two directions (mesh resolution, and compound events in future) in this manuscript, but I believe there should be a ‘meeting point’, and reflected in title.

Response: Thanks for your valuable comment. We have changed the title to “Investigating compound flooding by using hydrodynamic modelling under mesh resolution and future storm surge events in Brisbane River Estuary, Australia”

Abstract

L16 , ‘investigate the flooding processes …’ is it from sea side?

L20, There is a ‘jump’ here. I do not believe N-S coefficient is well known parameter.

L23, ‘with 2.7% with estimated discharge’? It sounds like the error is between peak discharge and estimated discharge. It should be the error between simulated and estimated discharge during peak discharge time, right?

L26, ‘and uncertainties in flood extent’ could be add as a plus-minus sign to 0.62 and 0.12

Response: Thanks for your valuable comment.

L16, ‘investigate the flooding processes …’ is it from sea side? Yes, it is from the seaside.

L20, There is a ‘jump’ here. I do not believe N-S coefficient is well known parameter

We have added model details here ‘ The boundary conditions were added in the MIKE 21 model and calibration of the model was performed by changing Manning’s n.” The N-S coefficient is used by many authors to compare the statistical results of the models (Kumbier et al., 2018, Shrestha et al., 2020).

L23, ‘with 2.7% with estimated discharge’? It sounds like the error is between peak discharge and estimated discharge. It should be the error between simulated and estimated discharge during peak discharge time, right? We agreed, we have calculated the error between estimated discharge and simulated discharge and presented in Table 4. Further, we compared the peak discharge comparison with the observed data and presented the peak error.

L26, ‘and uncertainties in flood extent’ could be add as a plus-minus sign to 0.62 and 0.12. We have modified it in the abstract “Compound flood event simulation results emphasized that not considering the tidal boundaries caused a 0.62 m and 0.12 m reduction in the flood levels at Jindalee and Brisbane city gauges, and uncertainties in flood extent.” It cant be plus and minus

Introduction

L40, ‘USD’ should be ‘$US’, to be consistent with L38?

L56, I think here could start a separate paragraph for modeling work. The first paragraph is quite long.

L82, ‘The recent flooding’ is the right word to describe such a widespread disaster.
L85-86, I believe only events could not ‘specify the needs’. I would more believe, ‘more frequent or more costly events’ is the wording should be specified here.

L92-93, ‘tidal flooding’ is not defined. Is it should be ‘storm surge’ as defined.

Response: Thanks for your valuable comment. All above suggestions are agreed upon and incorporated and changes are made in the paper as suggested by the reviewer.

Methods

L221-223, this key part of the ‘mesh convergence’ is not introduced clearly. As a concept of ‘convergence’, one needs to present an asymptotic line and define a threshold. Furthermore, convergence is not only related to the error of the water levels, it should be combined with the computation time together (in L218).

Fig. 3, very bad quality figures.

L234-243, should be moved to Introduction?

Fig.5, base scenario and scenario4 have very similar blue color.

L262, if MIKE 21 has not considered wind and pressure, the application of this model in a real storm surge case is very limited. In principle, it can be only used for some numerical experiments as what authors did. So, some discussion on the direction is needed.

Response: Thanks for your valuable comment.

L221-223, this key part of the 'mesh convergence' is not introduced clearly. As a concept of 'convergence', one needs to present an asymptotic line and define a threshold. Furthermore, convergence is not only related to the error of the water levels, it should be combined with the computation time together (in L218).

We have modified it and added the following "Computational mesh grid size was reduced in an iteration to observe the effect on simulated water levels and computational time. The mesh grid size was modified until the increase or decree of size make a considerable effect on water levels and computational time. When there was no considerable change in the simulated water levels and computational time was increased substantially, we then stopped the mesh changing and adopted the mesh resolution with confidence, as it was optimum size with computational time and simulated water levels".

Fig. 3, very bad quality figures.

We have modified the Fig. 3

L234-243, should be moved to Introduction?

We have moved it in the introduction

Fig.5, base scenario and scenario4 have very similar blue color.

The colour is changed as advised

L262, if MIKE 21 has not considered wind and pressure, the application of this model in a real storm surge case is very limited. In principle, it can be only used for some numerical experiments as what authors did. So, some discussion on the direction is needed.

Yes, we agreed that the wind speed and direction is not considered for the MIKE 21 Modelling. The study of (Yu et al., 2016), illustrates that alongshore movement was mainly driven by the tidal current and wind effects were less significant in the Brisbane estuary. That’s why we ignored the wind effect in this study.

Results

L316-318, I can understand this statement. For sure, better resolution gives better results. However, there is no quantification in the increase in computational time. I could not see how authors considered the trade-off between resolution and computational costs. Therefore, a bit more details (maybe on why errors of flood extents in these areas are rather acceptable) would be very helpful for the similar applications.

Fig.12 I have not seen sewage system is mentioned. I have seen some papers discussed the impact on sewage system when considering different flood extents scenarios. Is it relevant to Brisbane?

Response: Thanks for your valuable comment.

L316-318, I can understand this statement. For sure, better resolution gives better results. However, there is no quantification in the increase in computational time. I could not see how authors considered the trade-off between resolution and computational costs. Therefore, a bit more details (maybe on why errors of flood extents in these areas are rather acceptable) would be very helpful for the similar applications.

The trade-off is the point where further increase in mesh refinement doesn’t improve the result and increases the computational time. As mentioned before ““Computational mesh grid size was reduced in an iteration to observe the effect on simulated water levels and computational time. The mesh grid size was modified until the increase or decree of size make a considerable effect on water levels and computational time. When there was no considerable change in the simulated water levels and computational time was increased substantially, we then stopped the mesh changing and adopted the mesh resolution with confidence, as it was optimum size with computational time and simulated water levels”.

Fig.12 I have not seen sewage system is mentioned. I have seen some papers discussed the impact on sewage system when considering different flood extents scenarios. Is it relevant to Brisbane?

The sewage system is not relevant to Brisbane Rive. We are not aware of any study that discusses the sewage system for different flood extents in the Brisbane River.

KUMBIER, K., CABRAL CARVALHO, R., VAFEIDIS, A. T. & WOODROFFE, C. D. 2018. Investigating compound flooding in an estuary using hydrodynamic modelling: a case study from the Shoalhaven River, Australia.

SHRESTHA, A., BHATTACHARJEE, L., BARAL, S., THAKUR, B., JOSHI, N., KALRA, A. & GUPTA, R. Understanding Suitability of MIKE 21 and HEC-RAS for 2D Floodplain Modeling. 2020. American Society of Civil Engineers.

YU, Y., ZHANG, H., SPENCER, D., DUNN, R. J. K. & LEMCKERT, C. 2016. An investigation of dispersion characteristics in shallow coastal waters. *Estuarine, Coastal and Shelf Science,* 180**,** 21-32.