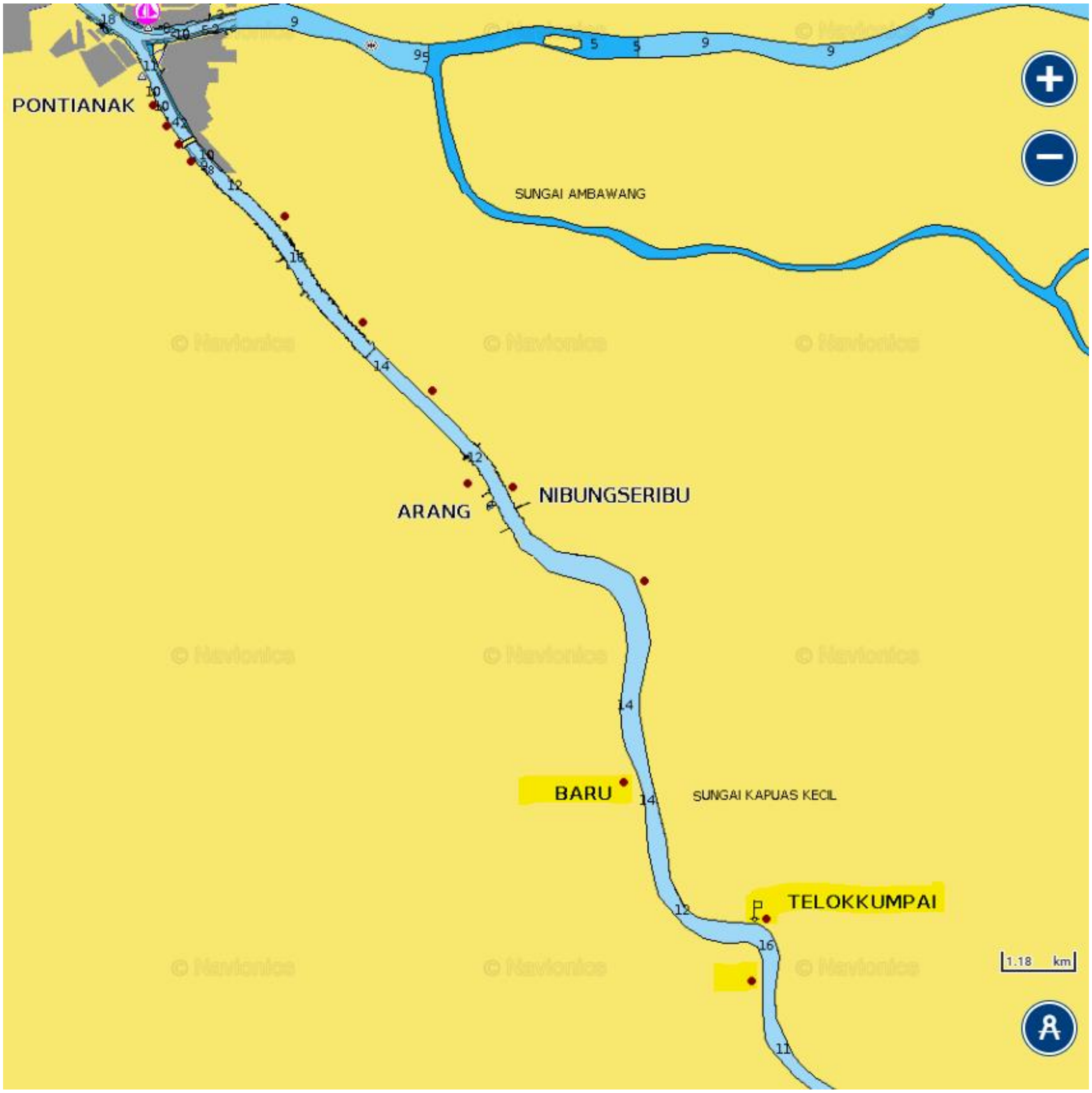
Response to the second comments of the first reviewer (RC1)

We want to thank the reviewer again for having taken the time to review again our paper. His/her comments were really useful to help us further improve the manuscript.

General issues:

Pg 8, 215: ‘Then, from this point to a point located at about 4 km from the river mouth, all MXWL profiles start to drop, indicating that there is a compounding effect of the discharge and the tide.’- I think it is not correct sentence. The drop itself does not mean the compounding effect. We can trace it also in Fig. 7, where the case without tidal forcing is shown. The reason of this drop lies in the topography details and riverbed area change. In some rivers, you can trace several such dropping of the level moving from upstream to the delta without any compounding effect. (Of course, these topography details can be also a reason that the tidal signal reaches the point). Please, put attention to this point and give an explanation of the drop in MXWL.
Response: *We agree with the reviewer. The drop could indeed be due to geometric changes in the river body (strong meandering) and rapid changes in the river depth. We therefore removed this statement.*
We also re-ran the simulation with a further upstream boundary (as suggested by Reviewer 2). As a result, the MXWL profile changed, where the maximum water level at the Kapuas Kecil river mouth is equal to the tidal range, but this drop pattern is consistent. We also more closely analyzed the river bathymetry and topography in that area. In this river part, we found that the bathymetry drops from 11 m to 16 m at TelokKumpai, while at Baru, the river width is narrower (see Figure below). So, this drop pattern could be due to the rapid change in river depth and width.



Source: [*https://webapp.navionics.com/#boating@10&key=%60wT%7Dk%7BzS*](https://webapp.navionics.com/#boating@10&key=%60wT%7Dk%7BzS)

Pg 8, 222-223: ‘This stream part, where both the river discharge and the tide control the MXWL, is called a mixed-energy region’. The definitions of the River-dominated and Mixed regions are not clear and contradictory to what we see in Figure 7. If we consider 2 cases with tidal forcing off and on and discharge equaled to 3000 m^3/s, we clearly see, that the presence of tides influences the MXWL till 70 km from River mouth (Figure 7). So, based on this definition, the mixed region starts nearly from the border, where river source is prescribed. From another point of view, you can say, that the MXWL is defined by the river until MXVL reaches ~2m. Based on this definition you will get an extended River-dominated area compared to present in the manuscript, and this area will be getting larger increasing the discharge. There can be more definitions, please, clarify yours.

Response: *The suggestion has been followed. Firstly, we change the term "mixed-energy region" to the "transition zone". Then, according to the simulation result obtained with an open river boundary located further upstream, we moved the limit between the transition zone and discharge-dominated region to about 150 km from the river mouth. This point is consistent with the previous study* (Kästner et al., 2019), *which found that at this point, the admittance of the tidal propagation upstream has a knickpoint, where dumping strongly increases. Here, we define the transition zone as the part of the river from where the MXWL profile between the "with-tides" and "without tides" scenarios start to differ to the area where discharge is no longer affecting MXWL profiles.*

Technical:

Pg 3, 58-63: Can be shortened to the point: The area of interest represents well-mixed and relatively shallow water body. Therefore, we applied 2D barotropic solution to reduce computational costs.

Response: *Suggestion has been followed*

Pg 7, 172: please, remove ‘with satisfying frequencies’ (you have already identified that in the beginning of the sentence, can be interpreted wrong).

Response: *Suggestion has been followed*

Figure 8: Please, leave only one subpanel, e.g., (a).

Response: *Suggestion has been followed*

Table A3: The details, which are the same for all experiments, can be identified in the Figure caption.

Response: *Suggestion has been followed*

Figure 3: The Figure is nice, but the font is really small compared to other pictures.

Response: *We updated the figure*

Reference:

Kästner, K., Hoitink, A. J. F., Torfs, P. J. J. F., Deleersnijder, E., and Ningsih, N. S.: Propagation of tides along a river with a sloping bed, J. Fluid Mech., 872, 39–73, https://doi.org/10.1017/JFM.2019.331, 2019.

Response to the second comments of the second reviewer (RC2)

We want to thank the reviewer again for taking the time to review our paper. His/her comments were really useful to help us further improve the manuscript.

Minor comments

Nested model: This approach is interesting. Is there a particular reason why the mesh of the large-scale SLIM model has not simply been refined at the drainage channels? Since SLIM allows for local mesh refinement and uses implicit time-stepping, I would not expect a large penalty on the runtime. Even with two models, why was HEC-RAS chosen over SLIM for the nested model?

Response: *Increasing the mesh resolution with the highest resolution of 10 m (much lower than 50 m) to cover the canals within the city, while its lowest resolution is 10 km, can nonetheless substantially increase the number of mesh elements and hence the computational time. HEC-RAS has further been specifically designed to simulate inundations based on a digital elevation map. In that respect, it is more mature than SLIM for such applications. Regarding HEC-RAS implementation, there is no particular reason to choose this model except it is because this model is well-known for tackling flood simulation over floodplain* (Loveland et al., 2021; Santiago-Collazo et al., 2019; Pasquier et al., 2019; Bush et al., 2022)*, and we have already used it previously.*

Upstream boundary: The authors explain that they placed the upstream boundary near Terentang about 100 km upstream from the sea, to avoid missing discharge from tributaries (mostly Tayan and Meliau) downstream of the head of tides at about km 300, near Sanggau. While this approach indeed reproduces the river discharge at the inflow boundary, it cuts the tidal prism, and thereby reflects the tidal wave and reduces the tidal discharge. The figure below shows the tidal discharge estimated with the theory of tides (Hill and Souza, 2006; Kastner et al., 2019). Truncating the domain as in the numerical model reduces the tidal discharge in the Kapuas Besar branch by 50% and increase the tidal discharge in the Kapuas Kecil branch by 30%. To get both the river and tidal discharge right the boundary could be moved to Sanggau while the inflow is set to the discharge measured at Terentang.

Response: *The reviewer made a very good suggestion and we followed it. We moved the upstream boundary to Sanggau. As a result, the MXWL profile changed, where the maximum water level at the Kapuas Kecil river mouth is equal to the tidal range. Then, according to the new result, we moved the limit between the transition zone (a new name for mix-energy region) and river-dominated region to about 150 km from the river mouth. At this point, the MXWL profile between the "with-tides" and "without tides" scenarios start to differ. This point matches with the previous study* (Kästner et al., 2019)*, which found that at this point, the admittance of the tidal propagation along the Kapuas River has a knickpoint, where dumping strongly increases. According to this new result, figure 7 and 9, and the related analyses in the text have been updated.*

Bathymetry: My comment on erroneously shallow cross-sections in the original manuscript was not clear. What I mean is not the mouth bar but that the raw bathymetry data of (Kastner et al., 2017) erroneously contains shallow cross-sections between Pontianak and the upstream

bifurcation. This is due to glitches of the echo sounder used for the measurement. The SLIM model results show jumps in surface elevation at km 30 and 45. This seems physically implausible and is probably due to backwater caused by erroneous constrictions of the cross-section. I suggest verifying this and if applicable, filtering the bathymetry along-channel.
Response: *We preprocessed the bathymetry and then compared it to the Garmin's and Pushidrosal's products. The bathymetry profile along the river is now consistent. Since the raw bathymetry made the simulation unstable, we smoothed the bathymetry map in our pre-processing step. This procedure guarantees that the model will run smoothly. So, we did the filtering process before using it in the simulation.*

Terminology: I agree with the first reviewer who commented that the adopted zone-terminology is somewhat confusing. The terms tidal energy and maximum water level are used interchangeably throughout the manuscript. However, there is no direct correspondence between the maximum water level and the (kinetic) energy. The maximum water level is a combination of the tidal amplitude and tidally averaged water level. The effect of tides on the mean water level is largest upstream of the point where most of the tidal energy has already been dissipated, as it integrates along channel, while the tidal amplitude decreases gradually along channel. The storm surge, furthermore, contributes an important part to the energy budget. Therefore, I recommend referring to water levels throughout the manuscript, and avoiding the term "energy".
Response: *The suggestion has been followed. We now avoid the term "energy" and redefine the mix-energy zone as the transition zone. We define the transition zone as the part of the river from where the MXWL profile between the "with-tides" and "without tides" scenarios start to differ to the area where discharge is no longer affecting MXWL profiles.*

<u>Typography</u>

19 could divide -> divide: *The suggestion has been followed*

105 For the wind shear stress a surface roughness is required, similar to cd for the bed shear stress. What value was chosen?

Response: *For wind speed less than 20 m/s, the wind drag coefficient (Cw) is defined by:*

$$Cw = 0.001*(a + b*U_{10})$$

where, according to Smith and Banke (1975), a = 0.63 and b = 0.066. U_{10} *is the 10 m wind speed. For higher wind speeds, we set 0.003 as the saturated wind drag coefficient* (Moon et al., 2007).

We added this information in the last of this paragraph: Here, the wind stress was computed with the Smith and Banke (1975) formula for the wind speed of less than 20 m/s and was computed with the Moon et al. (2007) formula for wind speed higher than 20 m/s.

188,189 new mesh -> second mesh: *The suggestion has been followed*

194 0.09m -> 0.09 m: *The suggestion has been followed*

197 semidiurnal components explain the rest -> there is no rest (90.69 + 9.31 = 100): *we removed this sentence.*

231 will drop -> drops: *The suggestion has been followed*

234 leads to a reduction in the water levels -> reduced the water level: *The suggestion has been followed*

236 not too significant -> not significant: *The suggestion has been followed*

242 State in here that the reference for the 2.8 m water level is the lowest astronomical tide (LAT) and that the 2.8 m correspond roughly to 1.8 m above mean sea level and 0.7 m above highest astronomical tide (HAT). State also the river discharge for this day.
Response: *The suggestion has been followed. We added these sentences in the paragraph: The 2.8 m water level reference is the lowest astronomical tide (LAT). It corresponds roughly to 1.8 m above mean sea level and 0.7 m above the highest astronomical tide (HAT).*

245 Please state the Kapuas discharge and tidal range (without storm surge) for that day!
Response: The suggestion has been followed. We added this sentence in the paragraph: *During the event, the Kapuas and Landak rivers had discharges of 4400 m3/s and 502 m3/s, respectively. At the river mouth, the tidal range reached 1.8 m.*

251 top -> high water level? **Response:** *yes, it is. We changed word "top" to "peak"*

263 Landak river streams -> Landak River: *The suggestion has been followed*

277 the wind velocity less than 9 m/s or more than 24 m/s, it does not -> wind velocities less than 9 m/s or more than 24 m/s do not: *The suggestion has been followed*

281 zone border -> boundary: *The suggestion has been followed*

281 mix-energy -> mixed-energy: We change the term: "mix-energy" to "transition"

282 border -> boundary: *The suggestion has been followed*

293 from the river mouth to the upstream -> upstream from the river mouth: *The suggestion has been followed*

293 was coincidentally met with a high river discharge -> I would call this more an intermediate discharge, as it seems to be less than 1/2 of annual peak discharge of the river.
Response: *The suggestion has been followed. Since the discharge of the Kapuas River is only 4400 m3/s, we agree that it is only an intermediate discharge. We changed the word: "a high river discharge" to "an intermediate river discharge".*

321 where ebbs no longer impact -> where tides no longer impact: *The suggestion has been followed*

Figure 7 It would be insightful to complement this figure with an along channel plot of tidal range and tidally averaged water level.
Response: *The suggestion has been followed. The figure has been updated.*

Figure 13 Limit the colourmap of water depth between 0 m and 2 m, to better distinguish flooding in the city. **Response**: *The figure has been updated.*

Reference:

Bush, S. T., Dresback, K. M., Szpilka, C. M., and Kolar, R. L.: Use of 1D Unsteady HEC-RAS in a Coupled System for Compound Flood Modeling: North Carolina Case Study, J. Mar. Sci. Eng. 2022, Vol. 10, Page 306, 10, 306, https://doi.org/10.3390/JMSE10030306, 2022.

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