

Interactive comment on “Development of high-resolution multi-scale modelling system for simulation of coastal-fluvial urban flooding” by A. I. Olbert et al.

Anonymous Referee #2

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This paper describes a multi-scale nested modelling system to simulate flooding in coastal towns. The study site is Cork City in southern Ireland. The modelling system involves repeated downscaling of coupled numerical models with increasing spatial and temporal resolution, from a relatively coarse coastal ocean model down to very high resolution urban flood model. An innovative feature of the modelling system is the boundary formulation which allows wetting and drying across model boundaries. The authors also convincingly demonstrate that the use of the nested model system provides satisfactory results and is more computationally efficient than running an equivalent high-resolution model for the whole domain. The paper is well written and is suitable for publication after minor revision.

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Minor Comments

p. 6, lines 156 – 168: U and V are not specified

p. 7. Line 196: “befits” should be “benefits”

Section 2.3: Presumably the child grids have more refined bathymetry than the parent grids. How are mass and volume conservation achieved when moving from the coarse to the fine grid ?

p. 11, line 311. The definition of errors should be moved to the Methods (Section 2). Similarly for Equations 5 and 6.

p. 14, line 390. What is the RMSD and how is it different from the RMSE ? These errors have not been defined.

p. 15. The “infrequent random oscillations” in CG06 suggest that the model is being run at the limits of numerical stability, presumably to minimise computation time. The authors might improve the results of CG06 by reducing the time step. Does the marginal stability of CG06 affect the quality of the boundary forcing supplied to CG02 ?

p. 17, line 468. “. . .details of that analysis are presented elsewhere”. Where ? Please provide a citation.

p. 17, line 476. This may be a matter of semantics, but I find the use of the term “Moving Boundary” misleading. The boundaries in this model system do not “move” (unless I have missed something), but they are adjustable and variable in extent.

p. 20, line 570 – 571. I think the indices c and f denote CG06 and CG02 respectively, not the other way around.

p. 21, line 585. “oppose” should be “opposed”.

p. 23. The Conclusions section is too long and should be shortened. The first para-

graph (lines 667 – 675) is a summary, not a conclusion, and could be deleted. The Conclusion should summarise the main findings, starting at line 676.

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