Hydrology and Earth System Sciences

Discussions

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Interactive
comment

Interactive comment on "Wetropolis extreme rainfall and flood demonstrator: from mathematical design to outreach and research" *by* Onno Bokhove et al.

Anonymous Referee #1

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General comments:

The paper presents an innovative approach to demonstrating rainfall and flood probability and therefore discusses a topic relevant for the scope of HESS. The paper goes into detail regarding the numerical model used for the design , but lacks a presentation on the outcome of that modelling, i.e. what numerical tests were conducted and how that informed the selection of dimension, range of flows, rainfall intensities, moor and reservoir parameters that were used in the physical Wetropolis model.

Specific comments:

As noted above much of the paper focuses on presentation of the mathematical model

developed for the design of the physical model. The authors claim in the abstract that this mathematical model "is of scientific interest from a hydrodynamic modelling perspective". There have been a considerable number of mathematical models for simulation of water flow developed over the past decades and it is not immediately clear why the authors have developed their own model rather than using an existing one. It would be of interest if the authors provided a justification or an explanation. If the authors believe that they have made a contribution to mathematical modelling, they should, as a minimum, a) provide a review of relevant literature in the introduction; b) clearly specify what is novel or added value in their modelling approach; c) provide a validation of their mathematical model against observations on the physical Wetropolis model, such as by comparing the predicted and observed outflows of the system, water levels in the city, reservoir and moor, etc. Otherwise, the sections of the paper that present model components that are not related to new contribution should be shortened. The authors should present the results of the numerical tests and explain how this informed the construction of the physical model. This presentation should provide enough information for the reader to understand what were the goals of this exercise (e.g. determining which input parameters or dimensions), what are the relations between contributing flows (upstream inflow vs flows from rainfall) and conveyance (river, floodplain and canal) and in which rainfall events flooding of the city occurs. Regarding the latter, the authors should also confirm whether the predictions of the numerical model correspond to the observations on the physical model. In chapter 2.2.1, it is not clear how the floodplain accumulation and flow were modelled At the first glance and without making any calculations, it seems that canals are relatively small compared to the river and floodplain. The authors should comment on what is the role of canals in the demonstrator; does their inclusion (or omission) have other effects apart from achieving visual familiarity with the Leeds case.

Technical corrections:

on p8, line 11, symbol b usually refers to (bed) width. It seems that the authors use it for

(bed) level, in which case this word (level) should be added to avoid misunderstanding. Also for level, the symbol z could be more appropriate than b.

Interactive comment

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Discussion paper