



EGUsphere, author comment AC1
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Reply on RC1

Agnethe Nedergaard Pedersen et al.

Author comment on "All models are wrong, but are they useful? Assessing reliability across multiple sites to build trust in urban drainage modelling" by Agneth Nedergaard Pedersen et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-615-AC1>, 2022

The original reviewer comments are included in italics and sequentially provided with numbers for easy cross-referencing.

Authors' responses are written in normal style, and the line numbers and Figure numbers refer to the original manuscript

Reviewer RC1:

A.1. In their paper, Pedersen et al. present an approach for assessing the performance of urban drainage models at the local level (i.e. at different sites) based on a variety of criteria. The manuscript is well-written and structured, and it is easy to follow. There are many other papers that deal with model validation at local scales in rural and urban areas, so I found the novelty of the paper to be a bit weak. My rating for the paper's suitability for HESS is "medium", as I am not sure its content will be of interest to most of the journal's readers. Apart from that, I have no major concerns with the paper's content, as both the methods and the analysis are sound. Below you will find some specific comments.

Thank you very much for your review of the manuscript and your comments, which have given us ideas for improving the clarity of the manuscript.

We are aware that many papers in the urban drainage modelling field have dealt with model validation (e.g. Annus et al., 2021; Tscheikner-Gratl et al., 2016; Vonach et al., 2019). These however focus on calibration of models, i.e. reducing the uncertainty contribution related to (lumped) model parameters based on relatively few measurement sites and events, and use classical statistical indicators. The approach we here develop has focus on reducing uncertainty contributions related to (spatially distributed and detailed) system attributes, using hydrological and hydraulic signatures for the statistical evaluations while in this process accounting for the input uncertainty stemming from spatially distributed rainfall (through weighting of individual events in the statistical evaluation). We furthermore suggest that there is a novelty in the way we focus on several model objectives, use measurement data from multiple sites and multiple events, and display the results graphically in map-format, in a way that can be systematically up-scaled (and automated) for use with hundreds of measurement sites and very large models in an operational digital twin environment. We will make this more clear in the Introduction as well as the Conclusion, to better highlight the novelty of the paper.

We will do our best to accommodate your suggestions for changes to the manuscript, see our replies to your comments below.

A.2. Figure 2. This is a cross-section, I assume. Include labels to indicate ground level, pipe borders, circle dashed lines, etc.

Thank you for your comments, we will update this figure in the revised manuscript to the version presented below (and update the figure caption accordingly):

A.3. Table 1. Units should be added to the variables

We will include units in a new column in the table.

A.4. Figure 4. Figure 4 is not very informative. Could you please elaborate on the different symbols in the figure caption? This figure should also be moved to the supplementary material - it does not add any value to the article.

We realize that Figure 4 is wrongly placed and too briefly introduced in section 2.3.2 (about event weighting methods), making its value to the manuscript unclear. However, this figure is designed to illustrate the structured uncertainty framework we rely on in an easy-to-refer-to manner, so that discussions related to model uncertainty can become clearer and more structured. We thus prefer keeping it in the manuscript.

Reviewer RC2 furthermore asks for further elaboration of the uncertainty framework used (RC2, introductory remarks and comment B.6). We suggest moving this figure forward to section 2.1 (where the framework for model adequacy assessment is introduced) and explaining it thoroughly there. Please see also our response to Reviewer RC2.

A.5. Figure 5. The 1:1 line should be in a different color or presented as a solid line.

We will change the 1:1 line to a solid grey line for Figure 5, 6 and 9.

A.6. Figure 6. Can also be transferred to the supplementary material.

We believe this is one of the essential figures in the paper, explaining the three methods we use to evaluate model performance, and we already refer to it several times in the text of the Methods chapter (lines 233-235, 258, 275). We thus suggest keeping it in the manuscript while at the same time inserting references back to it when later explaining details in the Results chapter as well.

A.7. Sites names. I suggest simplifying the names of the sites in the text (e.g. in line 336) and in the figures (e.g. Figure 7). For example, it would be easier to read "Site A" instead of "F64F46Y".

We agree that the many different site names can appear confusing. However, the naming structure is made by the utility with a direct link to the asset database. This same naming is also used in the open dataset (Pedersen et al., 2021) that we previously published, containing part of the data and models used here. To ensure transparency and maintain the possibility that others can replicate our results and contribute to further developments in the field, we therefore suggest keeping the names as they are.

The naming structure is systematic and includes a reference to where the manhole is located (character 1-3), to which system type it is (character 4, F=combined system, R=rainwater system), a forthcoming number (character 5-6), and (character 7) and an indication of whether it is a basin (B), if something is being regulated (R) or if it is an overflow structure (Y). In this paper further suffix is given to indicate where this manhole is in a structure when needed. We will include these descriptions in the revised manuscript.

A.8. Lines 467-472 and Figure 12. From these statistics, what can we learn? Does it tell us

anything about the model's capabilities? I suggest removing this part from the manuscript if not.

Figure 12 and 13 (see A.9. below) represent our first efforts to investigate possible patterns in the scorings presented in tabular form in Figures 10 and 11 as well as tables in the Supplementary Material. We wanted to present the results in the paper to stimulate others to potentially contribute to work in this field and improve the analysis based on our open data set. We agree however that this preliminary analysis does not produce clear results and thus suggest moving the figures to the Supplementary Material and only mentioning it briefly in the manuscript.

A.9. Section 4.4 and Figure 13. I don't understand this section. The figure shows what exactly? I cannot follow the rationale for plotting based on physical properties, signatures, and slopes here.

Again (like for A.8 above), we agree that this section is confusing, and we thus suggest moving it to the Supplementary Material and only mentioning it briefly in the manuscript.

A.10. Conclusion section. Currently, it's a summary, mirroring the abstract a bit. I suggest shortening it to one paragraph, summarizing the main findings.

We will shorten the conclusion in the revised manuscript.

References

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