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Geoscientific Model Development Discussions

Interactive comment on "Improvements of the hydrological processes of the Town Energy Balance Model (TEB-Veg, SURFEX v7.3) for urban modelling and impact assessment" *by* Xenia Stavropulos-Laffaille et al.

Xenia Stavropulos-Laffaille et al.

xenia.laffaille@ifsttar.fr

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Responses to anonymous Referee #2, 10 July 2018:

Thank you very much for your review. Please find hereafter the comments to your general remarks, the specific comments are taken into account in the supplement document:

General comments: #1 The link to urban planning / climate adaption is not well made and the flow and writing structure of the abstract and introduction is quite poor.

ACs: We have taken into account the general and specific remarks you have made concerning the abstract and the introduction. We have been more specific in the abstract, on answering your question "what do nature based adaptation strategies have to do with climate change and demographic pressures?"

#2 The terminology of "sewer and "stormwater" etc is a little confusing at first. . .. . .

ACs: We have clarified and explained these terms in the manuscript.

#3 Does the TEB-Hydro improve and/or significantly change urban ET? You made the point that these coupled approaches are needed for accurate urban-microclimate assessment but you didn't actually show how TEB-Hydro influence urban climate. Is this planned for future work?

ACs: Yes, exactly, we state this at the end of our conclusion: "Given that water and energy budgets are coupled, it is likely that the energy budget of this model is being influenced at the same time. An upcoming research project now underway entails investigating energy patterns, like latent and sensible heat fluxes, alongside the hydrological processes." We did not treat this point in the current article, as it would need even more data (latent heat fluxes) and other approaches (i.e. footprint) to evaluate the model on the energy balance. It would have led to a very long paper. Thus, we decided to present this part of the work in another paper.

Specific comments:

All specific comments are treated directly in the supplement document, some of them are answered below:

P2L15: Unclear what is meant by... . .

ACs: What we tried to say is that hydrological models have usually a simple representation of energy processes. It is obvious that hydrological models do not have a representation of the energy balance as detailed as the one of energy balance models. However, the models available today to evaluate the hydrological and microclimate im-

pacts of NBSs could be questionable regarding the evapotranspiration process. Moreover, we here try to promote a more integrated evaluation by considering both detailed water and energy balances. The sentence has been changed and the end of the paragraph and the following paragraph try to argue this point of view.

P2L20: The authors use very long and confusing sentences with multiple commas. . ...

ACs: We tried to split long sentences found in the paper.

P2L23: . . .

ACs: “Such a model” referred to “urban micro-climate models” with “a water balance” that “is often simplified”. The sentence has been changed to clarify the intention.

P4L4: what does the (-) mean? Typo?. . .

ACs: The mistake has been corrected and we added the SI-units to the list of symbols.

P4L25: . . .

ACs: The model is able to distinguish combined, stormwater and wastewater sewers. In our case (for both catchments), the sewer is not a combined sewer. The wastewater sewer is taken into account only for the process of soil water infiltration into the pipes. When taking into account the total sewer discharge, we refer to the stormwater sewer discharge, as the experimental sites do not have any observed data on the wastewater sewer discharge. The text has been clarified when it was necessary.

P6L20: You will need to provide more information about the Ip calibration parameter here?

ACs: Ip is a parameter that needs to be calibrated as it has no physical significance. Such a parameter is used in Rodriguez et al. (2008), from whom the equation was adapted. This parameter is needed to calibrate the soil water drainage by the sewer network, as this process depends a lot on the water tightness of the pipes. But this is not easily measurable and thus unknown.

P10L14: I suggest adding the sources of chosen values to Table 2.

ACs: The sources have been added to table 2.

P10L15-17: sentence beginning: "The MIN and MAX. . ." please rephrase sentence and clarify.

ACs: The sentence has been clarified and the whole paper was proofread by a professional translator.

P10L22-23: Confusing phrasing here. Also, table 3 is unnecessary - simply state that the +1 and -1 respectively denote the MAX and MIN values in Table 2?

ACs: The sentence has been clarified and table 3 has been removed.

Table 4: it would be easier for the reader to interpret table 4 if you added the parameter that is perturbed to the table - I found myself flicking back-and-forward between table 2 and 4 a lot.

ACs:The parameters have been added to the table.

P12L29-30: “In fact soil water . . .” can you please clarify your meaning and logic here.

ACs: This sentence has been removed

P13L19: First sentence is poorly written.

ACs: This sentence has been changed to “According to the results of the sensitivity analysis, TEB-Hydro needs to be calibrated on four parameters.”

P14L20: “. . ..most likely caused by the various hydrological properties of both simulation periods.” - this is vague - please be more specific or remove.

AC: Some sentences have been added to be more specific. Please refer to the paragraph “This trend had indeed already been noticed when coupling ISBA with TOPMODEL (Furusho et al., 2013). The soil scheme of ISBA shows slow dynamics in the soil water evolution, thus underestimating the water content under wet weather condi-

tions and overestimating it under dry conditions. The model has been calibrated over the first simulation period under wet weather conditions and evaluated over a drier period. The soil water and hence total stormwater discharge are raised with parameters D_* and I_p, leading to an overestimation."

ACs: A list of symbols has been added as appendix.

ACs: The figures have been changed. Please refer to the supplement document.

ACs: The paper was proofread by a professional translator. The certificate is attached at the end of the supplement document.

Please also note the supplement to this comment:
https://www.geosci-model-dev-discuss.net/gmd-2018-39/gmd-2018-39-AC2-supplement.pdf

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