

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 Stavropoulos-Laffaille et al.

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Thank you very much for your review. Please find hereafter the comments to your remarks made in the supplement document (the comments are also included in the attached supplement document):

#1 Page 3, line 7: Does this include urban green spaces and green infrastructure. If so, subsoil "under" built-up surfaces seems confusing.

ACs: The soil under urban green spaces is already taken into account in TEB-Veg. In

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TEB-Hydro, soil is added below artificial surfaces like streets and buildings.

#2 Page 4, line 11: Specify how individual E values are calculated.

ACs: A sentence will be added to the description of the evapotranspiration terms: "These terms are detailed in the SURFEX scientific documentation (https://www.umr-cnrm.fr/surfex/IMG/pdf/surfex_scidoc_v2-2.pdf)."

#3 Page 4, line 22: Typical values of Ird?

ACs: We will add a reference tackling typical values for this parameter. Please refer to Ramier et al. (2011): Ramier, D.; Berthier, E. & Andrieu, H., The hydrological behaviour of urban streets: long-term observations and modelling of runoff losses and rainfall-runoff transformation, Hydrological Processes, John Wiley & Sons, Ltd., 2011, 25, 2161-2178.

#4 Page 5, line 17: A useful description would be to add a section or table describing how/if these parameters were considered in previous version of the TEB and specifically to additions with the TEB-veg model.

ACs: You are right; we will refer to Fig.1 in this section.

#5 Page 5, line 19: Phrasing - This might convey meaning better: ...under the category/class of built-up...in the model.

ACs: Thank you for the correction

#6 Page 6, line 2: Reasonable? Scale of grid cells?

ACs: Effectively, this phrase is not well formulated and it will be corrected. We wanted to say that the soil texture is assumed to be homogeneous within a grid cell, no matter what compartment. This is due to the fact that most of the time, we do not have information about the vertical distribution of the soil texture.

ACs: TEB-Hydro can be applied at city scale but also at catchment scale. So the

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resolution of the grid cells depends on the application of the model (the resolution can vary between several hundreds to several deca-meters). We will add this information in the introduction paragraph of section 2.

#7 Page 6, line 28: Please discuss this assumption and limitations further. Consider coastal cities with shallow groundwater.

ACs: In fact, using this option of TEB-Hydro will depend on whether or not infiltration into the sewer pipe has been observed at the study site. This is not always the case.

Interactions between the shallow groundwater, the sea and the sewer systems are complex phenomena depending on the context (geology, state of the sewer pipes, etc.). TEB-Hydro has not yet been applied to such special configurations.

#8 Page 9, line 8: Please expand on how the atmospheric data was adjusted.

ACs: We will add the reference which explains this: Lemonsu, A., Kounkou-Arnaud, R., Desplat, J., Salagnac, J.-L., and Masson, V.: Evolution of the Parisian urban climate under a global changing climate, *Climatic Change*, doi:10.1007/s10584-012-0521-6, online first, 2012.

#9 Page 9, line 24: Essentially a lumped model? How were the local scale variation in urban surface accounted for in the model?

ACs: As the study site is small, we only considered one grid point for the modelling. So you are right, in this configuration the model is close to a lumped one. However, the local scale variation is taken into account by the land use expressed by the fraction of buildings, roads and gardens (see Table 1).

#10 Page 10, line 7: Why only Reze?

ACs: It is of common use to conduct the sensitivity analysis on only one catchment, as the aim is a better understanding of the model processes and the identification of the parameters on which the model needs calibration. These findings do not change from

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one catchment to another. However, when it comes to calibration, the model has to be calibrated on each catchment in order to take into account local properties.

Please also note the supplement to this comment:

<https://www.geosci-model-dev-discuss.net/gmd-2018-39/gmd-2018-39-AC1-supplement.pdf>

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-39>, 2018.

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