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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The importance of city trees for reducing net rainfall: comparing measurements and simulations" *by* Vincent Smets et al.

Anonymous Referee #1

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Review comments The importance of city trees for reducing net rainfall: comparing measurement and simulations By V. Smets, C. Wirion, W. Bauwes, M. Hermy, B. Somers, B. Verbeiren

The hydrological role of urban vegetation is an issue of growing importance, in relation with urban sustainable development, and more recently in relation with urban climatology. This manuscript which deals with urban trees addresses both societal concerns, which are also scientific concerns, urban vegetation being a widely open research subject. The authors study interception by urban trees. The manuscript combines field experiment and modelling complemented by a case study. The field experiment

seems to me original, the model comparison concerns existing models, applied to an urban context, and I consider that this manuscript is of interest to HESS. Nevertheless, I would suggest a significant revision before its publication :

- The manuscript is, in my opinion, too long and contains details which are not very useful and which don't help the reading. I would recommend a shorter manuscript, written in a more synthetic and efficient way and focusing on the key points of the contribution, and may more rigorous (notation and denomination of variables, model presentation) - The manuscript organisation could be simplified. Each section is divided into many paragraphs (up to 9 or 10) which don't help the understanding. - The field experiment concerns individual trees. What about the tested models? Do they apply to individual trees or tree covers? Consequences concerning the model evaluation?

The following comments should help the authors to revise the manuscript.

p 1 – line 33-36: if the problem of heavy events should not be forgotten, the growing interest for vegetation in urban areas seems more related to the promotion of sustainable urban development, and more recently to urban climatology. p 2 – paragraph 1: I have some agreement to that. The authors may indicate that the role of vegetation in urban areas remains a very open question, largely unstudied so far. p 3 – paragraph 1.3: in urban areas, many trees are tree lines, along streets. In that case, the soil around these trees is sealed (impervious). Is the situation studied by the authors really representative of urban trees? p 5-11: The experiment device is interesting and original. Nevertheless, it raises issues. How representative is this experimental setting of urban trees that are subject to very different contexts ?. I would suggest that the authors write in a more synthetic way. p 10 – paragraph 2.6: what difference between data processing and modelling (next section ? It is not clear to me. p 12 – paragraph 2: If modelling and model comparison is a central part of the manuscript, I would suggest to present the models as part of the manuscript and not in Appendix. p 12 – paragraph 2.8: Do these models apply to individual trees, as the field experiment, or a tree plant cover? I suppose that there is a very important difference between the two. It is a

significant point concerning the model relevance. p 13: the scenario analysis appears as important as the modelling and model comparison. Is it really the case, or is it just an illustration example, in which case, I would suggest to reduce its length. p 15 – lines 5 to 14: I would suggest to move this lines to Section 2. p 17 – figure 8: I am not convinced that this figure is very useful here, it could eventually be moved in Appendix. p 19 – paragraph 3.3: is a full page needed to see the weak sensitivity? A few lines would be enough. p 20: line 1-4: small events of 1 mm are not very important from a hydrological point of view p 20: figure 10: the presence of the inflexion point on the regression lines is not obvious. Is it justified by physical reasons? p 22: Equation 6. The authors introduce I as interception (in mm). The legend of Table 5 mentions the Interception storage capacity (S in mm), as Equation 5 (p 11) and in Appendix A (Eq. 1) I is the interception storage, and S the crown surface storage capacity, and IS appears in following equations. In equation 6, D is duration and in A-1, it is drip-off . . .... A very careful checking of notations is required. What is the difference between interception, interception storage and storage capacity. p 22: Equation 6 – I am sceptical concerning the regression model (eq. 6) which provides better results, but which introduces 9 numbers, that is 9 parameters, which means that this model is strictly limited to the analysed data set, without any generalization. Such a model is of a very limited interest. p 23: Figure 12 – Interception storage – A new denomination? p 25: I would suggest that Figure 13 and Table 6 to be the central points of the model comparison. p 26-27 paragraph 3.7: I wonder about the usefulness of this paragraph “land cover change scenario” in this manuscript. In the light of previous results, it is not surprising that an increase of sealed surfaces generates a runoff increase, and that tree planting generates an increase of water storage. p 27: It seems to me that interesting discussion subject could have been the following: i) validity of this model assessment given the possible differences between individual trees and tree plant cover; ii) application of the models to a more usual urban context: available data, types of trees . . .... p 32: Table to remove, it is unreadable (the data set can be provided on request).

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