Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2020-188-RC1, 2020

Geoscientific Model Development Discussions
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Interactive comment on "Fluxes from Soil Moisture Measurements (FluSM v1.0). A Data-driven Water Balance Framework for Permeable Pavements" *by* Axel Schaffitel et al.

Anonymous Referee #1

Received and published: 20 July 2020

OVERVIEW

The study describes the development of a data-driven approach for estimating water fluxes from soil moisture observations. The method is tested over 15 different permeable pavements in the city of Freiburg.

GENERAL COMMENTS

The paper is mostly well written and clear. The topic of the paper is interesting for the readership of GMD as a simplified approach for estimating water fluxes from soil moisture observations is a novel approach and potentially important approach as being cost effective. Moreover, the spread of soil moisture sensors worldwide potentially

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guarantees its applications over large areas.

I have also checked the code and the data distributed with the paper. The code works perfectly and the data are very good. I really appreciate the effort from the authors to share the code and the data, well done!

However, some points need to be clarified to make the methodology description clearer and to fully understand its applicability in different areas.

On this basis, I believe the paper needs major to moderate changes before the publication; I have listed below my comments with the indication of their relevance.

1) MAJOR: It is not clear if the proposed model is applicable only to permeable pavements or its structure can be generalized and used in different areas. It is an important clarification. Indeed, based on that, several parts of the text should be changed to clarify in which conditions the model can be applied. From the title it seems only for PP, from the text I am confused. Please clarify.

2) MODERATE: A surface layer is introduced into the model structure. It seems very related to its application to permeable pavements, right? If yes, it must be clarified. The acronym FluSM seems to be applicable everywhere, but I am not it is the case. I would appreciate if the authors will discuss the reasons of their choices on the model structure and its parameterization.

3) MAJOR: The parameterization of the developed model is not completely clear to me. The single parameter I_{cap} is estimated trough site specific infiltrometer measurements. I believe this parameter is not easily estimated over large areas and/or over many sites. How to estimate such parameter over several sites? How much is the model sensitive to the value of this parameter? Moreover, in Table 1 I read values of I_{end} higher than 50 mm/h. It means that all rainfall infiltrates into the soil, and hence infiltration plays a very minor role. More details on the estimation of I_{cap} and the model sensitivity to this parameter should be added (in my opinion). On this basis, I would disagree that

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input and parameters uncertainties have a small effect on the results, as it reads in the abstract. The model sensitivity to I_{cap} should be included.

4) MINOR: The paper introduces a method for estimate runoff, drainage and evapotranspiration water fluxes from soil moisture measurements. Other studies have used soil moisture measurement for estimating water fluxes even though mostly specific to a single water flux (e.g., rainfall or evapotranspiration). These studies are not mentioned and should be discussed in the introduction.

SPECIFIC COMMENT (P: page, L: line or lines)

P1, L15: "no influx into the soil layer" Which soil layer? Please clarify.

P23, L7-10: For very high infiltration rate, infiltration is not playing a role. In these conditions, all rainfall infiltrates into the soil and fluxes estimation is easier. Please consider this aspect in the discussion.

P24, L9-27: This part is not relevant for the purpose of this paper, particularly L9-15. I would remove this subsection 4.2.

Table 4: The bucket depth shows large variability, e.g., for sites CP2 and GP1 from 96 to 185 mm. How is that possible? Please clarify.

RECOMMENDATION

Based on the above comments, I suggest a moderate/major revision before the possible publication on Geoscientific Model Development.

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