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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 #3

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Comments on: Fluxes from Soil Moisture Measurements (FluSM v1.0). A Data-driven Water Balance Framework for Permeable Pavements Summary: Interesting presentation of a simple model for infiltration and runoff from permeable surfaces. The model requires much less data than less empirical models. An example calibration with data from a set of permeable pavements was presented. The development of improved methods for design and evaluation of permeable surfaces in urban areas is of rapidly increasing interest as new built urban hardscape is adapted to increase climate resilience with respect to flooding from stormwater, and existing hardscape is being converted to handle need for increased capacity. The continued growth of urban areas increases the significance. The scientific quality appears to be good. The paper is

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Discussion paper

well referenced, considering the large body of work in the literature. The main limitation appears to be lack of evaluation of the potential significancne of the simplifying assumption that all soil infiltration is vertical, which are posed in the detailed comments below. The science can be reproduced. Recommendations for what the authors think needs to be done to further improve the model, or how to implement the model should be included. The presentation is fine.

Scientific questions: 1. Horizontal permeability can be greater than vertical, and flows can be considerable, especially for PP, because of natural soil deposition which is sheets often which creates horizontal planes of soil fabric with greater permeability, and the inevitable compaction of the subgrade (bottom of the bucket) from construction which reduces vertical infiltration relative to horizontal. Some more discussion about how this might have affected the calibrations. Also, can you give a better idea of horizontal surface area on the bottom of the bucket vs vertical surface area on the sides of the sections used to calibrate to provide an indication how much leaving out the horizontal flow might have affected the calibration results. 2. What was the definition of free draining versus restricted in “Schaffitel et al. (2019) classified the PPs into free-draining PPs”? Please give a one sentence definition 3. Do the case study pavements have a porous reservoir layer? 4. Were there soil hydraulic conductivity measurements for the case study section done prior to installation of the reservoir layer as a check? 5. Pg 24 line 25, Surface permeability is highly variable across a permeable pavement surface at a scale larger than most surface permeability measuring devices.. Generally, not a problem until whole surface clogs because on the same pavement the areas of high permeability areas can handle the flow from low permeability areas nearby. Example: https://www.sciencedirect.com/science/article/pii/S0301479711003525?via%3Dihub Was that also seen in the cited references? 6. Any recommended next steps for this model? Potential improvements? 7. Any issues with extension to include horizontal flow? This can be an important design issue in heavily built environments because of concerns about lateral flow damaging foundations and other infrastructure near the permeable pavement, particularly if it is a street. 8. Could you comment on how you

recommend to implement the model in practice?

Comments on presentation: 1. Pg 2, Line 23, change to “enable the calculation” 2. Pg 3, line 18, change to “lead to an improved” 3. Pg 14, line 4, change “fist” to “first”

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