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Interactive comment on "Measurement of the water balance components of a large green roof in Greater Paris Area" *by* Pierre-Antoine Versini et al.

Anonymous Referee #1

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General comments:

Whilst a large number of test bed scale monitoring studies of green roof hydrological performance exist in the literature already, there are relatively few examples of full scale monitoring. This data set is therefore a welcome addition.

If the intention is for other researchers or practitioners to make use of the data, e.g. for model validation, it is critically important that all details of the roof's configuration and monitoring are fully and clearly explained. As it stands, my confidence in the data quality is moderate – this can potentially be improved by some error estimation, and some analysis of individual storm-based data via rainfall-runoff hydrograph comparisons and mass balance volumetric comparisons. It is not clear whether the authors believe the moisture content data to be useable or not.

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I also have some reservations about the completeness of the data. In particular, models of green roof retention require information about evapotranspiration. However it does not appear that climatic data required to estimate ET has been collected. This seriously compromises the data set's value for model validation.

Specific Comments:

1. Figure 1 is very difficult to understand, with photographs overlaid on top of a blurred engineering drawing. There are no dimensions. A clearer diagram is required.

2. Insufficient detail of the green roof profile is provided (line 136-7). Please provide a clear vertical section through the system, and confirm that it is consistent over the whole area. What is the actual shape/configuration of the drainage layer?

3. The information provided here on the physical properties of the substrate (lines 137-9) is insufficient for the validation of physically-based models. Please provide more detail on the particle size distribution, moisture retention characteristics and hydraulic conductivity.

4. The monitored area appears to be only a portion (1143 + 2368 m2) of the total roof area (1 ha, line 119). Please indicate the monitored portions clearly on a revised version of Figure 1. Some indication of the longest flow path lengths from catchment boundary to outlet would be useful for interpreting/modelling runoff detention.

5. Line 135 mentions two types of vegetation. Please show where each type of vegetation occurs on a revised version of Figure 1.

6. In line 209 it is suggested that the moisture content probes were specifically located to study the influence of slope. Therefore, please provide some information about the slope at their location.

7. Moisture content probes. Section 2.2.2 contains a lot of information about the general principles of soil moisture measurement, suggesting (Equation 3) that a standard calibration equation for natural soils was applied. There is no indication that these were

calibrated for the specific substrate used here. Other green roof studies have repeatedly emphasised the need to undertake substrate-specific calibrations. The statement later on (lines 385 to 387) is unclear, but suggests that perhaps you don't trust this data. Do the authors recommend use of this data set or not?

8. What are the estimated uncertainties associated with discharge measurements (page 6)?

9. How did you define a storm event? Line 365. Is this based on a standard inter-event dry period of e.g. 6 hours, or something else?

10. Text on line 52 suggests that evapotranspiration can be neglected during storm events. This is a reasonable assumption for short events in cool or temperate climates. However, it may not be correct for longer events and/or hotter climates. In all cases though, ET is a critical component of the overall water balance, as it is ET that generates the roof's retention potential (initial losses) during dry periods. Do you have climate data that would enable ET0 to be estimated (e.g. from Penman-Monteith FAO56 equation)?

11. Given the emphasis on acquiring the complete water balance, it would have been nice to see some evidence that the collected data is capable of demonstrating mass balance by comparing the total volumes of rainfall x catchment area, volumetric change in soil moisture and runoff for several specific storm events. It would also be good to see one or two illustrative hydrograph comparisons over shorter time-scales (< 24 hours). Do you see initial losses after long dry periods? Do you see lag and attenuation of the peak runoff or not?

12. I have attempted to retrieve and process some of the data. Data retrieval was straightforward. As I am not a python user, I chose to work with the raw rainfall and pipe discharge data files. The .dat files were read into Excel as csv files, and the data format appears to correspond to the description in the paper. The rainfall data is consistent with Figure 4. However, I have some concerns about the pipe discharge data. Missing

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data is not clearly indicated in the file. Without smoothing, the data appears noisy, and it doesn't appear to return to zero between events. Pipe slope is not provided in the paper, so Q cannot be independently verified. The Manning-Strickler formula applies to steady uniform flow; its application here for the measurement of time-varying discharge needs more justification.

Technical corrections:

English is generally acceptable, though there are many minor errors and it would benefit from further editing.

There is a problem with the typesetting of superscripts in lines 40-41.

Line 365 – Reference to Figure 3 should be Figure 4.

Line 373 – Reference to Figure 4 should be Figure 5.

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