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Interactive comment on "Throughfall and temporal trends of rainfall redistribution in an open tropical rainforest, south-western Amazonia (Rondônia, Brazil)" *by* S. Germer et al.

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The authors studied spatial and temporal variations of canopy interception in an open tropical rainforest. The study site was characterized by a relatively high density of Babassu palms. A total of 97 measurements of throughfall were taken during two sampling campaigns, one during the dry season, the second during the rainy season. Canopy interception was estimated from the combination of throughfall experimental data, and the revised interception model of Gash et al. (1995). The authors observed that interception varied greatly from one collector to another, and from one rainfall event to another. They concluded that the particular morphology of Babassu palms has a strong impact on canopy interception. In particular, a generic estimation of interception

by standard methods would probably not give accurate results.

Before starting this review, I should tell that I am far from being a specialist of canopy interception models. Therefore, I am not qualified to judge the pertinence of the references used by the authors, nor the novelty of the authors' approach. I will thus focus the comments mostly on the organization of the paper, and only partly on the methodology. I would also like to congratulate the authors for the impressive experimental work they present.

The abstract is clear and appropriate. The introduction might be slightly improved. In particular, the authors should stress why their research is original, compared to the state-of-the-art references they present. A short description of the standard methods used to estimate canopy interception could also be useful. Finally, the objectives are clearly stated, but not really introduced. An additional sentence would ensure a smoother transition.

The structure of the body should be improved. It is more or less customary to present the theoretical aspects first, and then the material and methods. I understand that the authors present a mostly experimental work, which might explain why they presented the experimental design first. However, I found it difficult to keep track of which parameters were measured, which were directly estimated from experimental data by statistical analysis, and which were only used in the revised Gash model. For example, two sets of indices could be used to represent throughfall, one representing collectors (e.g., i), the second representing events (e.g., j). Thus, $TF_{i,j}$ would be the throughfall measured at collector i for event j, TF_i the throughfalls measured for different events at collector i (as used for the estimation of canopy interception, eq.(4)), and TF_j the median throughfall for event j, as used in Table 2. Moreover, parameters and notations are not always properly introduced. For example, the fraction of gross rainfall becoming stemflow, p_t, is mentioned in section 2.2.3, but the notation only appears in section 2.3.2. Similarly, the amount of rainfall needed to saturate the canopy, P'_G, is introduced section 2.3.1, and reintroduced with a completely different definition section

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2.3.2. Overall, this lack of consistency in the introduction of the variables adds to the confusion of the neophyte reader.

Section 2.3.1 should be rewritten, and possibly presented earlier in the paper (for example as as a 'theoretical background' section). The authors start by presenting the basic assumptions the Gash model relies on. Then, they present a simpler model for the estimation of canopy interception, before going back to the Gash model. Ideally, the authors should start with the simple regression equation, explain its limits, then present the basic assumptions of the Gash model and the different steps followed in the calculation of interception, before finishing with details of implementation.

The first half of the throughfall analysis is relatively clear. The authors should make more explicit that the throughfall volumes presented table 2 are median throughfalls (T_j, in the proposed notation). It is therefore understandable why the ratio median throughfall / gross precipitation is sometimes greater than one. To compare values of normalized throughfall at different collectors over the whole study, a box-plot might be more illustrative than the dots used by the authors in Figure 2. Thus, the height of each box would be an indicator of the temporal dispersion of throughfall measurements for each collector. Moreover, one could wonder why the authors chose to combine resistant and non-resistant statistics (median and standard deviation, respectively) in their normalization strategy. Why not using the interquartile range as a measure of spread ?

The link between Figure 2 and 3 is clear, but I have difficulty understanding Figure 3. Figure 3 presents the throughfall percentage of incident rainfall along time, at two collectors. How was the throughfall proportion calculated ? If it was computed from the median throughfall for each event, the two plots should be identical. If the actual throughfall measured at each collector for each event was used instead, I'm quite surprised the authors could measure up to three times more throughfall than gross precipitation for some events (Figure 3b, November). It is also difficult to see the pattern in the second sampling season the authors are referring to. Some rewriting would

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doubtlessly clarify what the authors mean.

The first two paragraphs of section 3.3. could have been presented earlier. The second half is relatively clear. The authors analyze the time evolution of cumulative interception for different groups of collectors, and its comparison with the values calculated with the Gash model. As the expected (modeled) interception losses look quite the same from one graph to another, one could assume the cumulative interception is in fact the cumulative average interception for all collectors, computed from the average canopy capacity for all collectors. This point should be clarified in the text. This point also raise a problem of methodology. The authors indicated earlier that throughfall was highly variable in time, and from one collector to another, mostly because of the particular morphology of the canopy. In that case, why use average values for the canopy ? Would it have been better to apply the Gash model on a collector basis (*ie.*, estimating canopy capacity and additional parameters for each collector) ?

Technical corrections

P2708-L20: Suppress 'either'.

P2711-L07: Precise that the rainy season lasts from October to June.

P2713-L08: The proportion of rain diverted to stemflow, p_t, should be introduced here.

P2713-L09: Precise whether the average stemflow fraction is independent of collectors and events, or not.

P2714-L05: Refer to Gash et al., 1995 when introducing eq. (3).

P2714-L18: There are only five equations in table 1., as in Gash et al. (1995), and not six.

P2715-L23: The authors estimate the canopy capacity per unit cover area, S_c by regressing measured throughfalls per collector versus stemflow-corrected gross rainfall. However, in the initial Gash and Morton (1979) model, the intercept of the regression

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line with the P_G axis yields the canopy capacity S, not S_c. Is this a mistake from the authors, or did they forget to precise it ? In any case, the estimation of canopy cover should be presented first.

P2714-L23: This sentence is a bit awkward, please rephrase.

P2716-L10: Change 'far too wet' to 'far wetter than average'.

P2716-L12: Repeat the dates of the two sampling periods (Aug.-Dec. and Jan.-Apr.).

P2717-L03: Replace 'high intensive event' by 'high intensity' event. More generally, what distinction the authors make between the size of an event and its intensity ? Do they refer to the volume of precipitation and the precipitation rate ? Wouldn't it be better to use 'intensity' and 'duration'?

P2717-L18: The sentence starting with 'Although several collectors...' is too long and awkward. Please simplify.

P2717-L29: Replace 'of throughfall proportions' with 'of throughfall proportions, for two collectors, 2 and 19'.

P2717-L29: Replace 'In both cases' with 'For both collectors'.

P2718-L01: Repeat what the second study period is (Jan.-Apr.).

P2718-L02: Please clarify the meaning of 'opposite trend'. What trend ? In opposition to what ? The previous study period ? Or should the reader understand that for the second study period, the two collectors exhibit opposite trend.

P2718-L06: Please specify which collectors showed temporal trends, which collectors didn't have any palms above them, and which 'palm-less' collector exhibited some kind of trend.

P2721-L18: Please add a minus sign in the exponent of h.

Table 2. Use 'estimated stemflow' instead of 'computed stemflow'. The events for which

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$TF > P_G$ could be marked with an asterisk, and the events for which $TF + SF > P_G$ could be marked with another symbol.

Figure 2. In the text, the normalization is done with the median, not the mean. Is the legend correct ?

Figure 3. The variable $I_{10}\mathrm{max}$ should first be introduced in the text (and in section 3.2, not in section 3.3). Its pertinence should be addressed.

Figure 4. The authors may want to use a straight line instead of solid dots, to increase readability.

Figure 5. The variable $I_{10}\mathrm{max}$ should be introduced in the text.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 2707, 2005.