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Hydrology and Earth System Sciences Discussions

Interactive comment on "Field data collection and analysis of canopy and litter interception in commercial forest plantations in the KwaZulu-Natal Midlands, South Africa" *by* H. H. Bulcock and G. P. W. Jewitt

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General comments

The paper by Bulcock and Jewitt describes the field observations from canopy and litter interception measurements in South Africa. Since there do not exist many interception studies in Africa (especially litter interception) the results of the paper are very relevant for water resources practice and research studies. The paper shows the results of canopy interception observations for three species by measuring gross

precipitation and throughfall. To measure litter interception they developed a device to quantify the storage and evaporation from the litter layer. Bulcock and Jewitt analysed their data on event basis to derive the storage capacity (or water holding capacity).

The paper is well written and clearly structured and only needs minor corrections (see Specific comments) in my opinion. However, my main concern on the paper is about the applied method to estimate de storage capacity. Although the applied method is used more often by other authors, I recommend to change the method to derive the storage capacity, since it is the main scope of the paper.

As mentioned by the authors the applied method is a simplification (P8268 L9-12). This is mainly due to the fact that the method does not distinguish the difference between interception storage and interception evaporation. Especially, since the authors observe significant evaporation during the events, this is very important and should be incorporated correctly. The authors also use all available events to derive the storage capacity, instead of only using those events where the storage capacity is (very likely) empty (P8268 L24-26). The applied method is not suitable to distinguish any difference between partly wetted storage and evaporation during the event. Therefore, I recommend to use only those events where the storage capacity is empty and apply the method of Klaassen et al (1998) to estimate the storage capacity if this data is available. With the method of Klaassen the storage capacity is compensated for evaporation during the event and the evaporation rate can be determined by the deviation of the slope from the 1:1 line.

Specific comments

P8258 L12: The litter interception percentages are also as a percentage of gross precipitation?

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P8258 L19: You may add Gerrits et al, 2010 as a reference for the importance of litter interception.

P8258 L23: Remove 'therefore'.

P8259 L1: Change sentence to "The amount of canopy interception depends on climatic factors like..".

P8259 L15: Remove 'therefore'.

P8259 L23: You may add Gerrits et al, 2010 as a reference for the importance of litter interception.

P8260 L9: You may add Tsiko et al (2011 in press) and De Groen, 2002 (or De Groen et al, 2006) for other interception studies in (southern) Africa.

P8260 L9-16: Add location of the mentioned studies.

P8260 L17: Change order text. The authors seem to be interested in Acacia mearnsii, but it is not clear from the text why they are interested in this specie. This is explained later in the text.

P8262 L23: Explain what is meant by an 'energy balance weather station'.

P8263 L2: Change unit for rainfall from 0.1mm into mm. Or add accuracy of other

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equipment as well.

P8263 L3: It is not clear what measuring interval is used. Please clarify.

P8263 L6: Change unit for rainfall from 0.1mm into mm. Or add accuracy of other equipment as well.

P8265 L17-20: It is not clear how the litter device is exactly working. The water from the lower basin is measured by a Davis tipping bucket and the water that would have drained into the soil by a Hobo. But is this not the same? Maybe clarify this by adding in Fig 4 the position of the tipping buckets.

P8266 L25: Is Figure 6 the correct reference?

Section 2.6.1: Were there no problems with clogging of the tipping buckets?

P8267 L11: What were the lengths of the events?

P8272 L16: How can the threshold process being seen from the presented results?

P8273 L4: Correct reference to Fig14-16

P8273 L21: Correct reference to Fig13.

Table7: Would be good to also add the values for canopy and litter interception.

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Interactive Comment

Fig1: Add scale.

Fig 4c: Add position of tipping buckets.

Fig 5 6: Change order of Fig 5 and 6, since one needs fig 6 to understand 5. Or explain in the manuscript that Sc can also be derived from the point where the observations start deviating from the 1:1 line from the origin.

Fig 9: Very important figure, but too small for clear reading. Please enlarge.

Used references

Gerrits, A.M.J., Pfister, L., Savenije, H.H.G. (2010): Spatial and temporal variability of canopy and forest floor interception in a beech forest, Hydrological Processes, Vol 24, 3011–3025.

Tsiko, C.T., Makurira, H., Gerrits, A.M.J., and Savenije, H.H.G. (2011 in press): Measuring forest floor and canopy interception in a savannah ecosystem, Physics and Chemistry of the Earth.

Klaassen, W., Bosveld, F., de Water, E., 1998. Water storage and evaporation as constituents of rainfall interception. Journal of Hydrology 212-213, 36–50.

De Groen, M. M., 2002. Modelling interception and transpiration at monthly time steps: introducing daily variability through Markov chains. Swets Zeitlinger BV, Lisse, the Netherlands.

De Groen, M. M., Savenije, H. H. G., 2006. A monthly interception equation based on the statistical characteristics of daily rainfall. Water Resources Research 42.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 8257, 2012.