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Interactive comment

Interactive comment on "Estimating Interception from Near-Surface Soil Moisture Response" *by* Subodh Acharya et al.

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The discussion paper by Acharya et al. estimates total forest rainfall interception (canopy, understory, litter and topsoil) from shallow soil moisture sensor data using a modified Gash model (that replaces the 'precip required for throughfall drip' with the 'precip required for soil moisture response'). HYDRUS model-based estimates of the topsoil component were removed from the total forest rainfall interception (hereafter "total interception"). This was done for a large number of pine plots (n=36 in line 91, but n=34 in line 302?), then total interception estimates were compared with literature values and other site data (density, LAI, groundcover, age, etc.). The methods are clearly described (the manuscript is very well written), it provides an interesting alternative to deploying throughfall and stemflow gauges, and it would no doubt interest HESS read-

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ers. There are, however, some shortcomings that I believe should be addressed before publication.

1) There are very few soil moisture sensors per plot (n=3?). To estimate rainfall interception, throughfall sampling (using gauges roughly the same-to-larger size as the soil moisture sensor areas) would require 30-50 roving gauges, and 100s of stationary gauges (see publications by Zimmermann, 10.1029/2009WR007776 and Voss, 10.1016/j.jhydrol.2016.06.042). Stemflow monitoring would also be required, although stemflow from the pine species studied is generally negligible. The dense throughfall (and stemflow) sampling is to account for wet and dry points due to canopy rainwater redistribution; yet, for soil moisture sensors, lateral flow is another issue. Preferential flow of net rainfall fluxes laterally is possible and has been reported by the few studies searching for it (e.g., Spencer and van Meervel, 10.1002/hyp.10936). I would like to see these issues discussed; i.e., the total interception estimates are highly localized (sub-plot) estimates that do not account for lateral soil moisture flow.

2) There are no data from the study sites for evaluation (only comparison with other studies' data). Perhaps a full-fledged throughfall monitoring campaign is not necessary in this case (throughfall and interception field studies are available for similar pine stands already). Instead, the authors could estimate canopy, groundcover, and litter water storage components and, subsequently, evaporation. This could be done by sampling leaves, bark, litter and performing water storage tests in the lab.

3) The proposed method is not quite a “simple" method, especially when applied at the stand scale as this would require a greater number of soil moisture sensors. Additionally, it involves HYDRUS modelling and the issue of lateral soil water transport is, at present, unaddressed.

Minor comments:

a) I don't think the term “loss” in “interception loss” is necessary. As “rainfall interception” is a process that returns rainwater to the atmosphere, it is a “gain” to the atmo-

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sphere. Would the authors consider simply using the term “interception” or “rainfall interception” throughout?

b) The discussion paragraph beginning on lines 298 focuses on the spatiotemporal variability of interception. All the literature discussed is concerned with canopy interception; however, field studies exist which show that variability in seasonal canopy materials can influence litter interception, particularly seed pods: eg:

Levia et al., 2004, doi: 10.1623/hysj.49.5.843.55133

Van Stan et al., 2017, doi: 10.1002/hyp.11292 <-Please note that I am the corresponding author on this publication and only share it as it is directly related to the topic being discussed – a topic little researched.

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