Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-157-SC1, 2019

Hydrology and Earth System Sciences
Discussions

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

D. A. Kaplan

dkaplan@ufl.edu

Received and published: 10 May 2019

We (the authors) are writing to clarify that this manuscript was previously submitted to Water Resources Research (WRR) as a technical note, where it was rejected with an invitation to resubmit. We initially sought to follow that guidance and made numerous expansive changes in response to the previous reviewer. However, in so doing, we expanded the publication's scope and length substantially, beyond the constraints of a WRR technical note. Given the revised scope and content, we chose to submit it as a full manuscript to HESS.

The revised paper in review at HESS has several key modifications and improvements to the previous paper. Both submissions used near-surface soil moisture observations

to estimate "combined" forest interception. However, in the WRR version, "combined" referred to the total storage capacity of the canopy, groundcover vegetation, and the amount held in the top soil layer above the sensor depth (15 cm below ground surface). Because this approach included water stored in the top of the soil profile, the interception estimates in that submission were substantially larger than values reported in the literature for canopy or canopy plus groundcover. While we discussed the conceptual reason for our higher estimates, we had not yet developed a method to account for and subtract the effect of moisture changes in the top of the soil profile. This was seen as a major shortcoming that challenged interpretation of our results.

In the current HESS version, we developed an analytical approach to estimate infiltrated rainfall stored in the soil column before a change in soil moisture at the sensor depth is observed. Analytically accounting for this infiltration term facilitated calculation of forest plus groundcover interception capacity (referred to as "total interception" in the current submission), which is a more appropriate and interpretable hydrological component relative to the previously proposed "combined" interception that included soil water storage. We developed this approach by combining the physical principles presented by Gash (1979) with simulations from a detailed soil water flow model (HYDRUS-1D). As a consequence, the annual interception estimates presented in the current submission are better aligned with values reported in the literature.

The current version of the manuscript also includes more rigorous statistical modeling to explain interception losses as a function of forest canopy attributes (leaf area index) and groundcover (percent cover), and the discussion has been expanded to better contextualize our results and suggest areas for future study.

Attached to this comment is a document detailing all changes from the previous WRR manuscript to the current version submitted here.

References: Gash, J.H.C.: An analytical model of rainfall interception by forests. Quarterly Journal of the Royal Meteorological Society 105 (443): 43–55 DOI:

10.1002/qj.49710544304, 1979.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-157/hess-2019-157-SC1-supplement.pdf

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-157, 2019.