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Interactive comment on "Examining the relationship between intermediate scale soil moisture and terrestrial evaporation within a semi-arid grassland" *by* R. B. Jana et al.

Anonymous Referee #2

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The authors present an interesting case study comparing three different commonly used evaporation schemes versus a COSMOS soil moisture probe. The results illustrate reasonable statistical comparisons between the methods between the 25th and 75th quantile, but breakdown outside these ranges. I agree with the authors assessment of the challenges comparing the state variable of soil moisture with evaporation flux, particularly given the spatial scale differences of the observations. The work here is a valuable contribution to continue advancing the utility of the COSMOS soil moisture probes with applications in surface energy balance or land atmospheric coupling. The paper is well written and suitable for HESS. Below are some recommendations to improve the manuscript.

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Comments:

Pg 2. L2. Is it land surface evaporation or evapotranspiration? The symbol ET is a bit confusing if it only refers to evaporation only.

Pp 6. L11-19. Is the COSMOS data the same as presented by Hawdon 2014? That is, it is corrected for water vapor, geomagnetic latitude, pressure in the same way? Please specify.

P 8 L24. The selection of sampling periods seems a bit arbitrary. Why not use seasons or PET to separate periods?

L 10 L31. I am not what is might by this sentence, the soil moisture profile becomes heterogeneous during periods when it is disconnected to the atmosphere? Can you please explain more or show an example?

Pg 11 L13 and Figure 2a. The comparison between soil moisture and ET should be further partitioned by PET amount or season. Following the simple broken stick type model in Rodriguez-Iturbe 2001 and Laio 2001, I would expect there to be a family of curves with the plateau being near ETmax for each set of curves. I suggest the authors organize the data by season or PET groups and replot (with either colors or different symbols). For such a simple dryland grassland site I would expect the broken stick kind of model to represent this data well. The direct correspondence between soil moisture and ET may become more clear instead of just the distributions. If so things like the soil moisture threshold at which ET is reduced may become clear from the datasets.

Rodriguez-Iturbe, I., A. Porporato, F. Laio, and L. Ridolfi (2001), Plants in water-controlled ecosystems: active role in hydrologic processes and response to water stress - I. Scope and general outline, Adv. Water Resour., 24(7), 695-705.

Laio, F., A. Porporato, L. Ridolfi, and I. Rodriguez-Iturbe (2001), Plants in water-controlled ecosystems: active role in hydrologic processes and response to water stress - II. Probabilistic soil moisture dynamics, Adv. Water Resour., 24(7), 707-723.

Comments on conclusions: The challenge of relating energy balance models like SEBS to soil moisture has some interesting applications. For example, in agriculture many research and private industry groups are using such routines from satellites and drones to schedule irrigation. However, the soil moisture may be more unconstrained in this case than can be suitable for reasonable management of irrigation amounts and timing. The authors could potentially comment on this application given the findings of the paper.

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