Interactive comment on “Characterizing coarse-resolution watershed soil moisture heterogeneity using fine-scale simulations” by W. J. Riley and C. Shen

Anonymous Referee #2

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General comments: It is interesting to characterize the soil moisture heterogeneity. This paper discussed the soil moisture heterogeneity in coarse-resolution based on the hydrological model simulation in fine-scale. The method is clear and the results are significative.

Special comments: 1. Some sentences are too long, such as “We applied a watershed-scale hydrological model (PAWS+CLM) that has been previously tested in several watersheds and developed simple, relatively accurate (R2 ~0.7–0.8) reduced order models for the relationship between mean and higher-order moments of near-surface soil moisture during the nonfrozen periods over five years.” It is not easy to understand.
2. P1968, L2, “than” is redundant.
3. P1968, L3, two “and” is used, which makes confusion.
4. P1984, L5, “were stressed” may be “were unstressed”.
5. The figures can be reorganized and make the topic focus on the relations between $\mu_\theta$ and $\sigma_\theta$, $s_\theta$, $k_\theta$. Therefore, Fig.2, Fig.3, Fig.8, Fig.A2 are redundant and the related discussion can be rewrote. Fig. A1 and Fig.A3 should be kept.
6. Is “C1+C2gET” used to surrogate the relation between $\mu_\theta$ and $\sigma_\theta$? How about the relations between $\mu_\theta$ and $s_\theta$, $k_\theta$? And are C1 and C2 consistent or different for different gridcells?

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