

Interactive comment on “The significance of soil properties to the estimation of soil moisture from C-band synthetic aperture radar” by John Beale et al.

Anonymous Referee #2

Received and published: 9 October 2019

General comments:

This is an interesting work investigating potential perturbing factors and “forgotten processes” of soil moisture retrieval from SAR data at C-band. This is useful because some of these limitations are not often presented in the existing literature, and because many applications derived from Copernicus Sentinel-1 data are emerging. From this point of view, the focus on the impact of soil temperature on permittivity is particularly interesting. The overview of recent results regarding soil roughness is also interesting for HESS readers. Comments on the limitation of the change detection approach are relevant. However, this work cannot be considered as a research paper. No new orig-

C1

inal result is presented. Category could be changed to "review paper". To reach this status, a more complete overview of the literature is needed (e.g. recent research on the use of interferometry to retrieve surface properties).

Recommendation: major revisions.

Particular comments:

- P. 3, L. 18 (“Sigma0”): Yes, Sigma0 is useful. What about other quantities such as phase, coherence? The possible use of interferometric information to constrain soil moisture was investigated by a number of authors. E.g. Scott et al. (<https://doi.org/10.1038/s41598-017-05123-4>) and other works cited by Scott et al.. This cannot be ignored.
- P. 4, L. 16 (LAI): Is LAI the main factor or should vegetation water content or plant biomass be considered?
- P. 6, L. 9 (dew): What about intercepted rainwater?
- P. 9, L. 17 (“increase of NDVI”): This could be a matter of soil water holding capacity. E.g. Dewaele et al. (<https://doi.org/10.5194/hess-21-4861-2017>) found a relationship between maximum annual LAI values and SWHC for straw cereals.
- P. 10, L. 11 (“for the others...”): Why? mv values for soils 1-4 (less than 50%) sound more realistic to me than for soils 5-7 (above 50%). mv larger than 50% are usually observed for organic soils presenting a very large fraction of organic matter. Are soils 5-7 organic?
- P. 13, L. 1 (Fig. 3): Are they organic soils? mv values larger than 50% are quite uncommon for mineral soils. Why 10°C? Is a similar result obtained at 25°C for example?

Editorial comments:

- P. 4, L. 7: “ $2 < 0.22$ ” ?

C2

