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Hydrology and Earth System Sciences Discussions

Interactive comment on "Estimate soil moisture using trapezoidal relationship between remotely sensed land surface temperature and vegetation index" *by* W. Wang et al.

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Many thanks to the reviewer's very suggestive comments. Here are some answers to the reviewer's comments:

(1) Some explanation about vegetation index (EVI) is given as following:

Vegetation indices (VIs) are spectral transformations of two or more bands designed to enhance the contribution of vegetation properties. The enhanced vegetation index (EVI) is designed to enhance the vegetation signal with improved sensitivity in high biomass regions and improved vegetation monitoring through a de-coupling of

the canopy background signal and a reduction in atmosphere influences. EVI is computed with this equation: EVI=2.5(NIR-red)/(NIR+6.0red-7.5blue+1), where NIR, red, and blue are atmospherically-corrected or partially atmosphere corrected (Rayleigh and ozone absorption) surface reflectances.

(2) Some discussion about the uncertainties and possible errors induced by the use of the surface temperature instead of the aerodynamic temperature as following:

Radiometric surface temperature (Ts) is commonly used as a surrogate for aerodynamic temperature (To) in computing the sensible heat flux term (H) in the energy balance. These temperatures may differ by several degrees, leading to possible errors (especially for large H), unfortunately, their relationship is not well known, especially over sparsely vegetated surfaces, although the difference between aerodynamic and radiative surface temperatures has been heavily investigated by many researchers. For instance, Colaizzi et al. (2004) compared aerodynamic and radiometric surface temperature using precision weighing lysimeters, but no apparent relations were found between (To – Ta) and (Ts - Ta). Therefore, we take the normal approach here, i.e., using Ts as a surrogate for To.

(3) It is right that the application of the directional surface reflectance leads to ignoring the anisotropy of natural surfaces. But it seems to be the best available way so far to estimate land surface albedo with the method of Liang et al. (1999), so we use the method in our research here. This is a limitation of the present study. We would like to take a better estimate of albedo if available.

(4) We have numbered all equations, and make captions in figures and tables in more detail.

(5) The reason we downscale the 1km LST to the 500m resolution LST is that the MODIS EVI data are provided in 500m, and we want to keep more details with smaller grid size. The method we resample the LST data is bilinear interpolation.

REFERENCES

Colaizzi, Paul D., Evett, Steven R., Howell, Terry A., Tolk, Judy A. Comparison of aerodynamic and radiometric surface temperature using precision weighing lysimeters. In: Remote Sensing and Modeling of Ecosystems for Sustainability, edited by Wei Gao, David R. Shaw, Proceedings of SPIE Vol. 5544 (SPIE, Bellingham, WA, 2004), 2004, doi: 10.1117/12.559503, pp 215-229

Liang, S., Strahler, A. H., Walthall, C.: Retrieval of Land Surface Albedo from Satellite Observations: A Simulation Study. Journal of Applied Meteorology, 1999, 38(6), 712-725.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8703, 2010.