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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 comments:

1. Limitations of the method would be put at the end of the paper, including:

The method's dependence on ground-based data is one significant limitation of the method, restricting its use in areas where ground-based meteorological data (i.e., air temperature, wind speed, relative humidity) are available. This method could not be used with any level of confidence in areas with poor to no data coverage, particularly in

remote and mountainous regions. For such kind of areas, we have to either use limited observations to do interpolation, or take the use of regional climate model such as the Weather Research and Forecasting (WRF) Model.

2. The inconsistency in model formulation for calculate u* is an error in the manuscript. Many thanks for pointing out this. We will write u* consistently as a function of atmospheric stability.

3. Surely, using three stations to derive air temperature cannot ensure accuracy. To minimize the error, we have tried to propose a method in the present study to interpolate the temperature data considering the effects of topography and wind speed. Although there still must be some errors, there is no better way with limited availability of ground meteorological observations.

4. It's right that β=0.0065 k m-1 represents a long term average. In fact, we have investigated the air temperature of three stations. The vertical temperature gradient is 0.0089 between two stations with an elevation difference of about 500 m over a year. But we think it would be safer to have the value of 0.0065 which is commonly accepted. Maybe it would be better to have a more dynamic and specific value of β for different area and different period.

5. We did not do a thorough sensitivity analysis to determine the impact variations in parameters. But we find that two most sensitive parameters are Skb and G/Rn, which are set by trial and error process. Skb is the parameter to determine KB-1. Lots of studies have been conducted on the estimation of KB-1. By many comparisons, we choose the equation of Kustas et al., (1989) which makes kB-1 as a linear function of the product of u, Ts – Ta and an coefficient Skb.

6. All editorial errors pointed out by the reviewer and some others are corrected.

7. Indeed, the data from a small semi-arid area are not good for validating the method. We are trying to conduct additional validation for areas with greater spatial variability,

but it is not easy to find good validation data immediately. Surely, we will continue to work on this in near future.

REFERENCE

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