

## ***Interactive comment on “Relating surface backscatter response from TRMM Precipitation Radar to soil moisture: results over a semi-arid region” by H. Stephen et al.***

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Received and published: 14 January 2010

We have removed the sentence **The devised approach presents an alternative to the usual unavailability of in-situ soil moisture measurements.** since the proposed method requires soil moisture data for model calibration.

We have added a paragraph about the limitations of this model.

**The method has limited utility in areas that lack soil moisture data for calibration. Moreover, the calibration of the model is grid-point specific and thus for spatial mapping requires spatial maps of soil moisture from hydrological model-**

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**ing. Nevertheless, the model has established the ability of TRMM Ku-band data over arid-regions for soil moisture retrieval.**

Nevertheless, we would like to emphasize that this paper is intended to establish the usefulness of TRMM Ku-band backscatter for soil moisture retrieval. Previously, very little attention has been given to Ku-band backscatter soil moisture retrieval due to limited penetration depth and effects of vegetation canopy. We show that in the arid regions, Ku-band backscatter has a strong dependence on soil moisture that can be explored to use the ongoing Ku-band missions for soil moisture mapping. In our future research, we will continue to find a more practical method for soil moisture retrieval.

1. The penetration depth for Ku-band is relatively small and only top few millimeters of soil affect the backscatter. Nevertheless, the near surface soil moisture is related to the top soil skin moisture as seen from the results of this research. We have added the following text to clear this point. **We note that the penetration depth of Ku-band microwaves is shallow and thus only top few millimeters (depends on the moisture) of soil layer soil moisture affects the backscatter measurements. Nevertheless, the surface moisture is linked to the soil moisture at near surface layers (5–10 cm). This is evident from the high correlation of derived soil moisture to VIC and gage soil moisture data.**

2. Although we do not have remotely sensed soil moisture data from other sources at this point, we have shown that the soil moisture measurements from hydrological models and ground measurements (at Walnut Gulch Experimental Watershed) match reasonably well to backscatter measurements and the derived soil moisture. This paper's key focus is the potential of TRMM Ku-band backscatter for soil moisture retrieval. In our future research, we intend to retrieve soil moisture with minimal dependence on previously measured data and to compare with other sources of remotely sensed and ground measured soil moisture.

3. We have carefully revised the manuscript to correct the reviewer identified and any

other typos.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 6425, 2009.

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