

***Interactive comment on* “Development of a high spectral resolution surface albedo product for the ARM Southern Great Plains central facility” by S. A. McFarlane et al.**

Anonymous Referee #2

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The paper entitled “Development of a high spectral resolution surface albedo product for the ARM Southern Great Plains central facility” by McFarlane et al. demonstrates a method to use upward looking multichannel MFRSRs and downward pointing MFRs to best estimate broadband and spectral channel albedos and then, by identifying the dominant observed surface type and using libraries of high spectral resolution albedo for various surface types, extrapolate these estimates to a high spectral resolution surface albedo product. The authors stress the importance of spectrally varying albedos that span the usual broadband range for various closure studies and provide a case study to illustrate why this technique to extrapolate and expand the use of MFRs and

MFRSRs represents a valuable contribution. The ARM site is unique in that multiple towers are available over a range of surface covers and this is particularly important when field data are being used to validate coarser spatial resolution multispectral satellite derived albedos. The authors rightly point out that the method is most applicable for the predominate surface types immediately underlying the tower and sensors and should only be extended to larger areas when the land cover is fairly homogeneous. They suggest satellite data or land cover maps will be needed to extend the method over greater areal extents.

All in all, this is a very well written description of the method and a careful presentation of the results. The authors should probably point out that one limitation in the use of spectral libraries is that they tend to represent quite homogeneous surfaces. These do not necessarily capture those cases where the structural aspects of the surface generate extensive gaps and shadows (such as forests, shrub-lands, and naturally mixed landscapes) and can greatly affect the reflectance anisotropy and therefore albedo of a location. Therefore, as always, care will be needed when attempts are made use these tower measurements to characterize larger landscapes, and the use of airborne albedo measurements or characterizations of the bidirectional reflectance distribution function (BRDF), such as recently described for the ARM site by Román et al. (2011), should be considered. Beyond this suggestion for some added discussion, I recommend that this paper be accepted in its present form.

Román, M. O., C. K. Gatebe, C. B. Schaaf, R. Poudyal, Z. Wang, M. D. King, Variability in surface BRDF at different spatial scales (30 m - 500 m) over a mixed agricultural landscape as retrieved from airborne and satellite spectral measurements, *Remote Sensing of Environment*, 115, 2184-2203, 2011.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 4, 3097, 2011.

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