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Atmospheric Measurement Techniques Discussions

Interactive comment on "Effect of spectrally varying albedo of vegetation surfaces on shortwave radiation fluxes and direct aerosol forcing" *by* L. Zhu et al.

L. Zhu et al.

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Response to referee #2: Thank you for your comments. Below is our reply based on your comments. Reply to general comments:

1. The SBDART model does not require high spectral resolution data. The input surface albedo and aerosol information can have high spectral resolution or low spectral resolution, depending on the need of the research. The comparison between MEVA and the simulated canopy spectral from canopy spectral model will be interesting as part of our future research on this topic but is outside the scope of the current paper.

2. One limitation of this research is that the validation of MEVA used leaf reflectance as canopy albedo in radiative transfer simulations. As suggested by the reviewer, additional discussion about this limitation was added in the 4th paragraph in section 3. Some discussion about it was also added as the last two sentences in conclusion.

3. The determination of 40% of the reflectance at 1.24 μm for 1.44 μm and 20% of the reflectance at 1.63 μm for 1.92 μm is simply based on particular spectra presenting the general spectral behavior of healthy green vegetation. They are designed to capture these spectral features. It is true that the percentage might be different when the water content of leaves changes. However, our flux and forcing calculations (presented in the paper) showed that the error associated with the corrections for these two channels are relatively small because of weaker solar radiation and strong atmospheric water vapor absorption in those spectral ranges. It means that if we used 50% (instead of 40%) or 30% (instead of 20%), the results will not make much difference. This was added in the last paragraph in section 3.1.

4. The limitation of the application of MEVA was added as the last two sentences in the conclusion section: "In this study, the MEVA algorithm validation used laboratory measurements of leaf reflectance as land surface albedo in radiative transfer simulations. This work can be further improved with the analysis of real remote sensing data where individual pixel might be composed of mixed different land and vegetation types including yellow leaves."

Reply to specific comments:

1. P4042, line 8, "correction" were changed to "gap filled" in the manuscript, which is more accurate.

2. P4047, line 14, discussion about the BRDF assumption was added in the 3rd paragraph in section 3.

3. P4047, line 23, this study only applied MEVA to the leaf spectral data over

the MODIS bands. No MODIS data was directly used for the development of the methodology. Real MODIS data was only shown in Figure 1 as an example to show the vegetation's spectral variation. MEVA will be applied to MODIS surface reflectance data as part of our future work in this subject but it is out of the scope of the current paper where we are basically developing the methodology and showing its effects on radiative flux and aerosol forcing.

Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/5/C2312/2012/amtd-5-C2312-2012-supplement.pdf

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Interactive comment on Atmos. Meas. Tech. Discuss., 5, 4041, 2012.