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Hydrology and Earth System Sciences Discussions

Interactive comment on "Accurate LAI retrieval method based on PROBA/CHRIS data" *by* W. Fan et al.

W. Fan et al.

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the reply is organized according to the order of the comments

1. The structure of the paper is poor. I suggest to reorganize this paper according to the style of a normal research paper.

We will reorganize the paper according to the suggestion.

2. In section 6 "Field measurements and validation", you mention that "It can be found from the two figures the inversion LAI using DSD method is more reasonable", why? In the abstract, you mentioned that the retrieve LAI was validated by the ground truth of 11 sites. I can't find the validation results throughout the paper. Why don't you give

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Discussion Paper

us the validation results, such as correlation coefficient, rms error, for the methods by NDVI and DSD model? Please give more quantitative values.

I mention that "It can be found from the two figures the inversion LAI using DSD method is more reasonable" because the LAI distribution pattern agrees well with the ground classification. There are mainly winter wheat and maize at the place at that time. According to the ground measurements conducted at the study area, the average LAI of the winter wheat crop approaches 4, while the one of the maize is around 1. The result obtained utilizing DSD method shows a similar dynamic range with ground measurement. However, the LAI map calculated using NDVI method has a much smaller dynamic range than the facts. We have also compared the retrieved LAI by using DSD method and NDVI method with the ground measured LAI. Errors are analyzed for both the two methods. We will also add another figure showing the comparison of the retrieved results and measured dataset. From the error analysis data and figure, it can be seen the DSD method is more accurate.

The validation results using the 11 site ground truth is listed in Table 1. In Table 1, the average, max, min, standard deviation of the errors are given for both the DSD method and the NDVI method.

3. The write-up is causing major problems, I strongly suggest that you let your manuscript be proof-read by an English native-speaking scientist.

As to the writing-up of the manuscript, we will ask a native speaker who is also doing research in the field for help.

4. Figure 3 illustrated the impacts of multi-scattering on reflectance spectra. I can't believe a reflectance spectra with a value of 0.9 in the NIR bands. Please check it.

I have checked the originally measured spectra of the canopy, leaf and soil and found out that the calibration was wrong with this dataset. The measuring equipment was recalibrated later in the ground experiment, so I replaced the wrong results with the

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new one calculated using the correct dataset.

5. Figure 6 illustrated the comparison of canopy spectra on CHRIS image before and after filtered using the two-step denoising method. However, only one spectral curve was illustrated. Please check it.

I add in another figure which is a part of the original one in the spectral range from 650nm to 750nm, the interest area of the study, to show the detail of the spectra before and after filtered. From the newly added figure, it can be seen that the difference between the two is obvious. The filtered spectrum is more smooth than the original one. Since the CHRIS image has only 18 bands, the effect of the innovative filtering method is not obvious. The comparision between orignal and filtered CHRIS spetrum is shown in figure 6.Therefore, in order to demonstrate the ability of the innovative filtering method to remove noises, we applied the method to a Hyperion image, which has 242 bands in total. The results of the Hyperion image will be added in the paper as figure 7. The orgianl figure 7 of the manuscript will be replaced.

6. In figure 8, please separate the CHRIS images at different view angles.

The images at different view angles will be separated in the manuscript according to the suggestion.

7. There are only 18 bands for the CHRIS images, how do you calculate the directional second derivative.

I calculated the DSD at the wavelength of 706nm using the adjacent bands of 697nm and 712nm as (reflectance at 697nm + reflectance at 712nm - reflectance at 706nm) / ((712nm-706nm)(706nm-697nm)). Though there are only 18 bands for the CHRIS images, they are not distributed uniformly at the spectral range from 442nm to 1018nm.

8. In the abstract and discussion parts, you mention that “It shows that by applying innovative filtering method, the new LAI inversion method is accurate and effective”. Why don’t you give the result without filtering.

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Since the CHIRS images have been influenced a lot by the noise, DSD turned out to be negative at the wavelength of 706nm if the images were not filtered. So LAI can not be retrieved from the unfiltered images. Or we can say LAI retrieved from the unfiltered images are wrong. This can prove the fact that the new LAI inversion method is accurate and effective by applying innovative filtering method.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 7001, 2009.

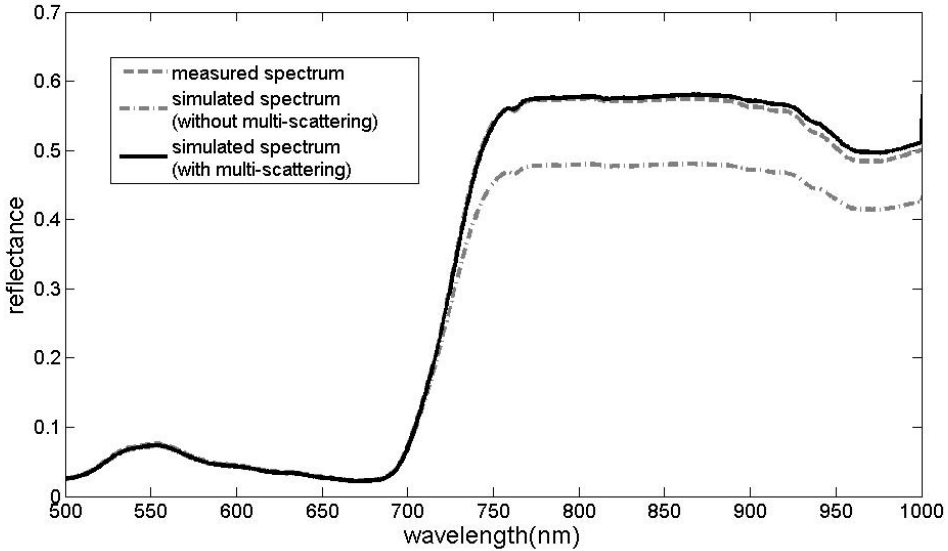

Fig. 1. Figure 3. Impacts of multi-scattering on reflectance spectra

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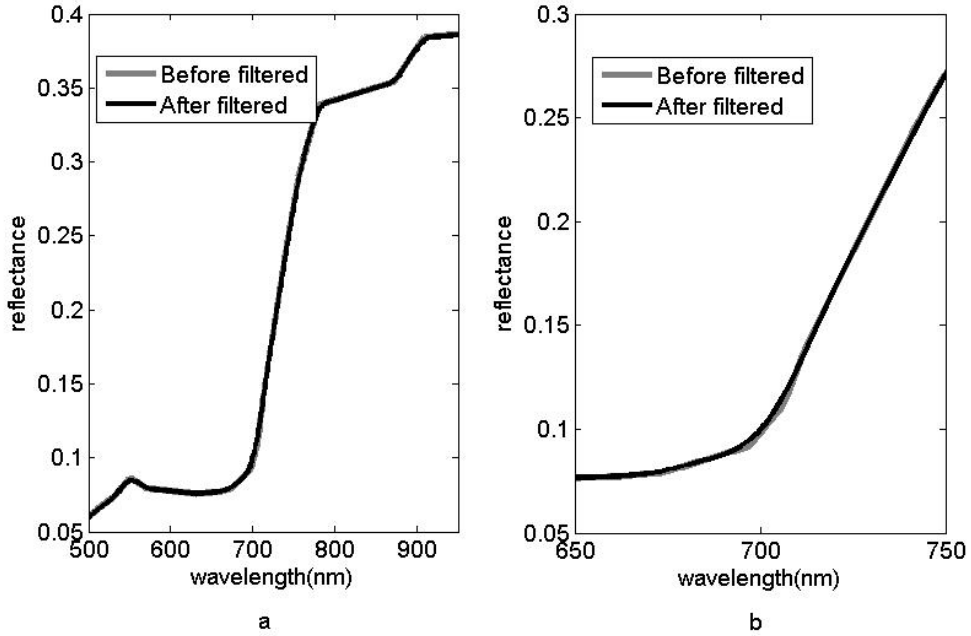

Fig. 2. Figure 6. Comparison of canopy spectra on CHRIS image before and after filtered using the two-step de-noising method (b is part of a to show the detail)

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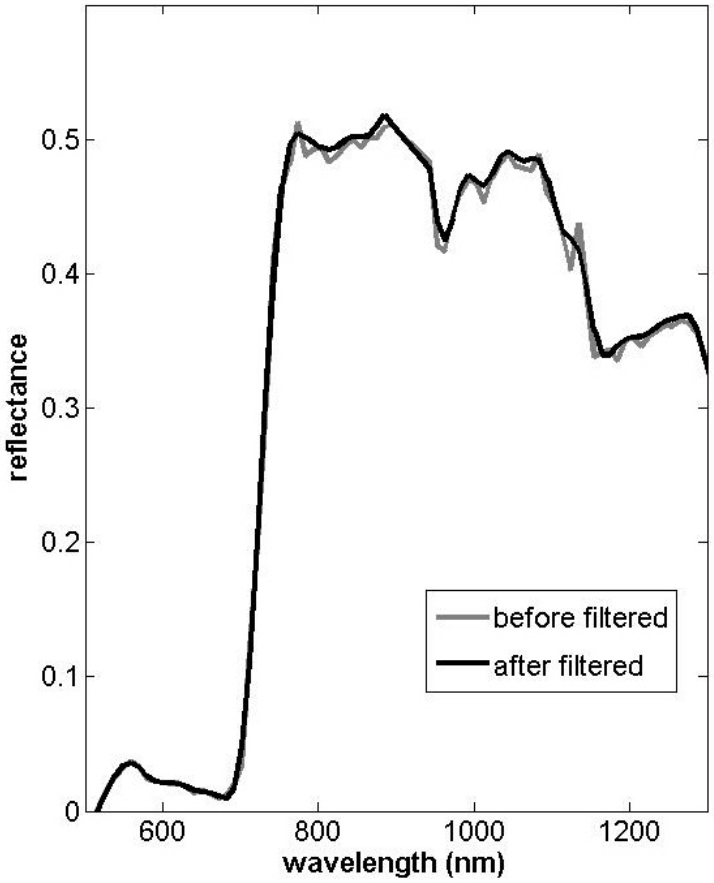

Fig. 3. Fig. 7 Hyperion spectrum before and after filtered by using the innovative filtering method

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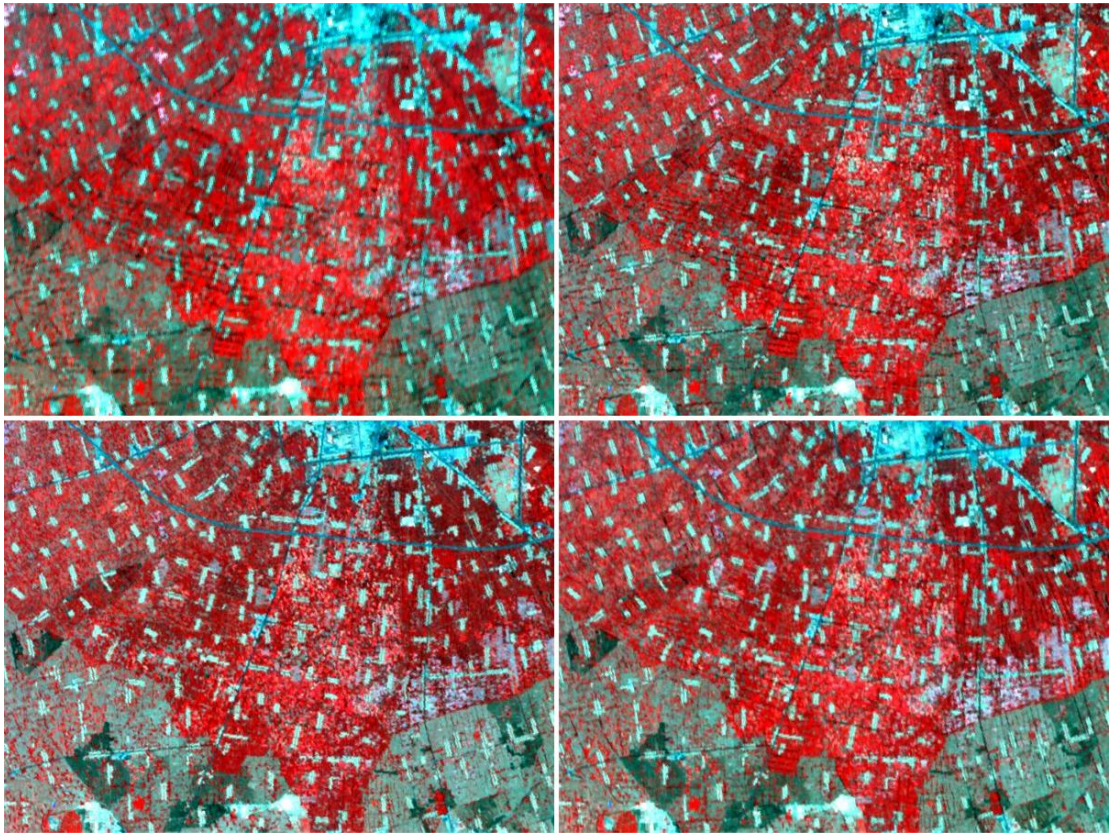

Fig. 4. Figure 8. CHRIS images covering the study area of four view angles after geometric correction (the view angle from top left to lower right is 55°, 36°, 0°, −36°, respectively)

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