Review AMT-2013-258
Validation of spectral sky radiance derived from all-sky images – a case study (amt-2013-258-discussions-typeset_manuscript-version6.pdf)

General comments:

The manuscript presents a method to derive the spectral sky radiance in the wavelength range between 380 and 760 nm from sky images taken with a commercial CCD camera system. The method uses non-linear regression functions for various sky conditions to calculate the spectral sky radiance. The coefficients of the corresponding non linear regression functions and the calculated spectral radiances were determined and validated using a spectroradiometer. Calculated spectral radiances were underestimated by approximately 10 % with respect to the spectroradiometer.

The presented method is in my opinion an interesting and effective alternative to calculate spectral radiances. Therefore the manuscript should be published. In fact, the initial version of the manuscript has been already substantially improved, namely the number of observations has been increased and the presentation of the results using statistical measures is now better. The figures are very nice and clear. However, there are still some issues that must be improved before the manuscript can be published, namely numerous spelling and grammatical errors. Proof-reading by a native English speaking person might be helpful.

Specific comments:

- Line 10-23, p.11: In this paragraph the results from Fig.4 should be described. However, this is not the case. In fact, the given information in the text can also be found in the caption of Fig. 4 (it is more or less the same text). Try to describe the results from the figures in the text (as you did for Figs. 6-9) and reference in the text to the respective figures 4(a)-4(d). The same is also valid for Fig.5. on page 12, line 3-8.
- An additional raw image in Fig. 6 (cloudy conditions) showing the sky conditions might be helpful for the reader.
- Figs. 7-9 nicely illustrate the discrepancies between HSI and spectroradiometer at selected zenith and azimuth angles for the whole visible spectrum. Could you also give a more general statement in this section about the discrepancies between HSI and spectroradiometer for all directions and zenith angles?
- The wavelength shift (of the maximum) between cloud-free and cloudy conditions discussed on p.14 (line 3-7) is clearly visible in Fig.7 (upper left panel, for cloud-free conditions) and in Fig. 8 (overcast) and Fig.9 (lower left panel, for cloudy conditions). However, this is not the case in Fig. 7 (lower left panel, for cloud-free conditions) and Fig.9 (upper left panel, for cloudy conditions). Can you comment on this? What about different zenith angles and directions?
- Add latitude and longitude of the measurement site
- Use “cloud-free” instead of “clear-sky” throughout the manuscript

Technical corrections: some of the spelling and grammatical errors:

- p2, line 7: “was validated using” instead of “was validated by”
- p.5, line 2: “through” instead of “though”?
- p.6, line 10/11: the sentence “a total of 35 images can be in the time of one measurement” may need to be reformulated. For example “ a total of 35 images is within a complete measurement cycle of the CCD spectroradiometer...”.
- p.6, line 12: “a synchronized HSI image” instead of “a synchronized HSI images”
- p.6, line 24: rather “consisting of” than “consisting in”
- p.7, line 20: define ISO

- p.10, line 3: “the correlation coefficients of each channel vary depend...” should be read as “the correlation coefficients of each channel vary depending...”
- p.10, line 7: “at wavelengths less than” instead of “at the wavelength less than”
- p.10, line 8: delete “long” → “...and in the 680-760 nm wavelength range”
- p.10, line 9: “ranging” instead of “ranged”
- p.10, line 22: “the blue channel yields the best correlation coefficients in the 380-450 nm wavelength range..” instead of “ the blue channel provides the best correlation coefficients for the wavelengths from 380 nm to 450 nm...”
- p.10, line 26: use “...obtain the spectral sky radiance in the 451-620 nm wavelength range” instead of “recover the spectral sky radiance at the wavelength region of 451 nm to 620 nm.”
- p.12, line 2: “distinctly” instead of “distinct”
- p.12, line 7: “which can be seen” instead of “which can see”
- p.12, line 11: May replace “occupied” with “covered”
- p.12, line 18: “the HSI system overestimates”
- p.12, line 25: “...than for completely cloud-free and overcast skies”
- p.13, line 11: “... less than 10 % in the 380-700 nm wavelength range as shown in the ratio plots in (of) Fig.7”
- p.13, line 12: “For wavelengths...”
- p.13, line 15: “Figure 8 shows the radiance spectra for the overcast...”
- p.13, line 19: “...less than 10 % in the visible spectrum.”
- p.13, line 22: May replace “occupied” with “covered”
- p.13, line 23: The sentence “,...which leads to selecting the regression model for cloudy conditions.” may need to be reformulated: For example: “The Sky Index was found to be close to 0.22. Therefore the regression model for cloudy conditions was selected.”
- p.13, line 25: “deviation” instead of “derivation”
- p.13, line 27: use “covered” instead of “occupied”
- p.14, line 2: “For wavelengths greater than 700 nm...”
- p.14, line 3: May reformulate this sentence, e.g.:“.., the maximum radiance during (in) cloudy situations is shifted from 400 nm for a cloud-free sky (Fig.7, upper left panel) to 450 nm (Fig.9, lower left panel) as described in Lenoble (1993)”
- p.14, line 6: “...to longer wavelengths...”