Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2020-293-RC2, 2020

Atmospheric Measurement Techniques Discussions

Interactive comment on "Correction of a lunar irradiance model for aerosol optical depth retrieval and comparison with star photometer" *by* Roberto Román et al.

Anonymous Referee #2

Received and published: 19 September 2020

The paper points out the importance of the accurate knowledge of the Moon extraterrestrial spectrum over a full moon cycle for nighttime AOD retrievals in lunar photometry. A large dataset of Langley extrapolated values at Cimel's photometer wavelengths, covering the spectral region 380 nm -1640 nm, has been retrieved under stable and low AOD conditions, leading to an empirical spectral correction factor (RCF) of the RIMO model with respect to MPA. The number of data points and the ideal conditions is expected to lead to a low uncertainty correction factor. The validation of the RCF, by AOD comparison of Cimel photometer against a star photometer gives convincing results always within the uncertainties of the two independent retrievals. I find this work very interesting as it leads to a very useful and practical correction that allows nighttime

AOD retrievals based on the lunar photometry, in anticipation of a traceable update of ROLO and RIMO models.

Comments

1. The correction methodology described in the paper in based on the assumption of linear behavior of the instrument with respect to the measured irradiance. The authors need to address this in the paper, to avoid any confusion between instrumental and RIMO correction.

2. What is the spectral uncertainty of the correction? Figure 1 should include a panel demonstrating the uncertainty with respect to MPA as well as the relative RCF to a selected MPA.

3. Has the RCF been applied to other photometers/spectroradiometers?

4. How the degradation of the reference Cimel is accounted for? Are the daytime calibrations used between the night observation?

5. The stability of the atmospheric aerosol load has been well described, however what is maximum difference between the afternoon and next morning AOD to retrieve the correction factor? Is there any dependency of the RCF to the slope of the linear fit?

6. Apart from the comparison of the corrected AOD to the star photometer it would be very interesting to add in figures 2,3,4 the uncorrected AOD retrievals, so the reader can visualize the improvement.

7. A spectral RCF version of the Figure 1c for selected MPA would be helpful.

8. Why the could-flagging is wavelength dependent? Given the noise of 380 nm why the cloud flag from next measured wavelength is not used?

Technical comments/suggestions

Line 2: that is very relevant in polar areas Important, interesting, high value

Line 14: that provides the expected AOD values provides AOD closer to the expected values

Line 87: located below the Izaña's level. located below Izaña's level /altitude.

Line 121: same detectors as the Sun Line 125: the photometers used in this paper belong to AERONET, being the #933 a reference photometer used at Izaña data Used for Izaña data / operated at Izaña What is the measurement period?

Line 165: makes that the knowledge of the absolute extraterrestrial irradiance is not needed in the AOD calculation, because an equivalent Noncompulsory

Line 167: calibration transfer Line 170: this fact points out the need of knowledge of the extraterrestrial lunar irradiance for Moon photometry purposes this fact points out the need of knowledge of the extraterrestrial lunar irradiance, and especially the variation with respect to the MPA, for Langley based Moon photometry purposes

Line 360: appreciated in Figure 3 since they are out of axis limits, and they are not cloud-screened since the used criteria does not reject Seen

---

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-293, 2020.