Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2020-293-RC1, 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 #1

Received and published: 1 September 2020

In this paper, a method for estimating RIMO correction factor (RCF) was developed for correcting the low bias in lunar irradiance as computed from the RIMO model. The RCF was developed by comparing reference aerosol optical depth (AOD) values estimated using daytime observations over pristine conditions with AODs estimated from Gain calibration. The retrieved nighttime AODs from moon photometer, with the use of RIMO RCF, are inter-compered with AODs from star photometer measurements. This paper presents a study that shall be interesting to users who use RIMO for nighttime aerosol and cloud property retrievals. Still, there are some minor issues that I would like the authors to make changes.

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Line 39-41, “Finally, the direct effect of aerosols on solar radiation at night-time is avoided, but the aerosols presented at night-time can profoundly modify the longwave balance by means of the change in cloud properties and the impact on the longwave radiation absorbed by clouds, which is back-emitted to the Earth’s surface”. Add references to justify the comment.

Line 121, “Sky at solar aureole and Moon measurements are recorded by the same detectors than Sun but with an amplification” This sentence is confusing and may need to be rewritten. What is “same detectors than Sun”?

Line 123, “are recorded with the same gain than Moon observations”. I believe “than” should be “as”?

Lines 135-136, “AOD in these spectral bands will be assumed equal to the AOD at 440, 500, 675 and 870 nm in order to compare with the CE318-T photometer” Why not interpolate star photometer data to the precise wavelengths as used by the moon photometer. If the authors do not want to match wavelengths from the two instruments, they need to document uncertainties introduced by the differences in wavelengths between the two instruments.

Lines 164-165, “This fact makes that the knowledge of the absolute extraterrestrial irradiance is not needed in the AOD calculation” This sentence is confusing. Please rewrite

Line 213, please explain the “Langley-plot method” using a few sentences. Not all readers know about the concept.

Lines 248-249, “Moreover, some cloud contaminated nights have been discarded manually by visual inspection in order to warranty the AOD quality.” What are the criteria for the mentioned visual inspection? Home many data points are excluded by this step?

Lines 257-259, “These differences point out negative values in the calculated AOD with Gain method and RIMO model, and the existence of a fictitious nocturnal cycle,

symmetrical with the optical airmass, which could be associated in Sun photometry to a deficient calibration" This sentence doesn't make sense. "point out" should be "suggests that"??

Lines 262-263, "Assuming the Gain calibration and AODref are right," What do authors mean by "right"? I assume that the authors want to say that "Assuming the Gain calibration and AODref are accurate"??,

Line 298, "MPA absolute values lower or equal to 55° since" Any reason for picking 55 degree as the threshold?

Line 345, What is the study period for Figure 3?

Line 345, for a comparison purpose, can the authors also add a plot that is similar to Figure 3 but without using the RIMO RCF (e.g. using the original RIMO model)?

Lines 359-360, what are the causes of the negative values? Can figure 3 be modified to include negative AOD values?

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