

Reply to comments

We would like to thank you for reading our manuscript and commenting on it.
The comments are copied and shown below in italic.

Comment.

Anonymous Referee #1

Received and published: 11 July 2019

*Nocturnal aerosol optical depth measurements with modified skyradiometer POM-02
using the moon as a light source*

by Akihiro Uchiyama et al.

General comments:

*I have doubts on using AOD obtained from LIDAR as the truth. Usually is the opposite,
you use AOD from photometer to constrain the LIDAR results. This is also in some way
recognized by you at L474-477.*

= >

We think that the comparison requires data measured in a way independent of the skyradiometer measurement. The HSRL is one of the instruments that can determine the vertical distribution of the aerosol extinction coefficient. Although data processing of HSRL is done under some assumptions, we used HSRL data.

*I suggest to read and eventually cite also the last paper from Barreto et al. 2019 about
intercomparison between CIMEL and PFR lunar versions.*

<https://doi.org/10.1016/j.atmosenv.2019.01.006>

= >

We cited a paper written by Barreto et al. (2019).

And, we added some sentences (see the text).

We added the following sentences in Introduction.

“In addition, a lunar photometer—the Moon Precision Filter Radiometer, LunarPFR (Kouremeti et al. 2016)—has been developed by the Physical Meteorological Observatory in Davos (PMOD), which serves as the World Radiation Center (WRC), based on the sun-PFR experience. Using these instruments and stellar photometers, a multi-instrument nocturnal intercomparison campaign was conducted to evaluate nighttime aerosol measurements and lunar irradiance models (Barreto et al. 2019).”

I think sections 2.2 and 2.3 could be merged. There are repetitions between them. I don't understand the last part of the last sentence of section 2.2: "depending on the aerosol optical depth....".

= >

We merged section 2.2 and 2.3.

Did you wrote an implementation of the ROLO equation? Did you used filter functions of just central wavelengths?

= >

We used central wavelengths.

We mentioned it in the text.

Eq4 In my opinion is not necessary to define C1 and C2, it's confusing to me.

Eq7 Same as for Eq4. By the way, you are using the same symbols C1 and C2

= >

Coefficients C1 and C2 were introduced to clarify that eq. (4) is a linear function of airmass.

We rewrote equations (4), (7), and (10) and used different symbols.

Finally, I suggest to ask a mother-tongue people to check the manuscript.

= >

Whenever we submit a paper, our manuscript is checked by a person whose native language is English.

Specific comments:

L34 I suggest "reflectance estimated by the Robotic..."

= >

We rewrote.

L34 Maybe a reference to the ROLO paper is required here

= >

Kieffer and Stone (2005) is an important paper. However, we usually do not quote references in the abstract, so we do not quote it here.

L38 "visible and near-infrared"

=>

We rewrote.

L38 "This indicates..." or "could indicate"

=>

We rewrote.

L65 AERONET

=>

We rewrote.

L131 Remove "Prede Co Ltd., Japan". Is a repetition

=>

We removed it.

L157 Could you please explain this sentence? Where you get 2×10^{-5} ?

=>

We rewrote the sentence as follows.

“From Table 1, the calibration constants at 340 and 380 nm are 1.8×10^{-5} and 1.9×10^{-5} (about 2×10^{-5}), respectively. Therefore, the output for the direct lunar irradiance during the half moon is about $2 \times 10^{-5} \times 10^{-6} = 2 \times 10^{-11}$ in the 340 and 380 nm channels.”

L177 "Therefore, it is difficult..."

=>

We rewrote.

L220 The equation is reported without any introduction words.

=>

We inserted the following sentence.

“The empirically derived analytic form based on the primary geometric variables is as follows: “

L305-308 Repetition. Please remove

=>

We removed these sentences.

L373-374 Even if the meaning is clear to me, I suggest to rephrase the sentence in a clearer way.

=>

We rephrased the text.

Please see the text.

L394-395 Remove the repetition of "the detector output" -> "and hence may be..."

=>

We removed "the detector output".

L406-409 Please rephrase the sentence in a clearer way.

=>

We rephrased the text.

Please see the text.

L413 The sentence about the calibration factors at 940 nm is not clear to me.

=>

We rephrase the sentence.

“The absorption band of water vapor is at the 940 nm wavelength. Water vapor in the atmosphere tends to fluctuate. Therefore, it is difficult to make accurate Langley plots, and the accuracy of both V_{s0} and V_{m0} is poor.”

L418 Please check the "C(="

=>

”C(=" is correct.

L448-451 This sentence is a repetition.

=>

We removed the second sentence.

L491 UTC, not UCT

=>

We replace UCT with UTC.

L494-496 You repeated many times in the text this explanation about the statistics shown in the tables. I think one time is enough.

=>

We changed the expression after the second.

L602-603 The sentence about the ROLO model is not clear to me.

=>

We rephrase the text.

Please rephrase Table1 Which are the units? Amperes?

=>

We inserted the unit.

Fig2, Fig3 Maybe you could improve/simplify the labels of the y axes

=>

In the caption of Figs. 2 and 3 (new Figs. 3 and 4), we added the explanation that " The y-axis is the equation in parentheses on the left-hand side of eq. (11)".