

We are grateful to the reviewer for their detailed and insightful comments, including the helpful pointers to more recent lunar spectral irradiance models and the comprehensive review of lunar calibration activities, which will strengthen the revised manuscript.

Leading digits in comments are line number in the preprint

This is a significant paper and the large effort described will aid in approaching absolute lunar calibration.

———— Major —————

As you state, it is widely thought that ROLO model has biases. Better models have been available for several years.

You may find the following comprehensive review helpful.

“Activities to Promote the Moon as an Absolute Calibration Reference”

Z. Jing et al, Remote Sens. 2023, 15, 2431. <https://doi.org/10.3390/rs15092431>

58: Use of the LIME model for this work would be problematic, as they are based upon the same thru-the-atmosphere methodology and share data observations. This work and LIME would best be derived in parallel! although there are no authors in common.

54+. There is a newer lunar spectral irradiance model that would be useful.

H. H. Kieffer, ‘Multiple-instrument-based spectral irradiance of the Moon’ ,

J. Applied Remote Sensing, Vol. 16(3), 038502 (2022)

<https://doi.org/10.1117/1.JRS.16.038502> (open access)

This article is now referenced.

As listed in Table 7 of that SLIM (now SLIMM) paper, ROLO is 3 to 8% below SLIMM.

Over 400 to 1040 nm, the SLIMM model is within 1% of the carefully calibrated air-LUSI results (discussed within GSICS, but not yet published)

Fig 1. These values look close to what the SLIMM model would forecast.

~75 The variation of lunar irradiance with sub-viewer lunar coordinates (“libration”) is about 1% for modest phase and more at large phase. Libration should be considered in a correction LUT. 600 observations should be enough to assess the magnitude of libration from your data alone. Or you could use the model based on lunar maps (e.g., SLIMM Table 3). Hopefully, this will reduce the scatter in Figure 2.

An explicit correction for libration is being evaluated for potential application to future Lunar AOD algorithm versions.

Section 3.1 Good discussion of lunar irradiance properties.

Fig 5 and 6. Good figures!

Section 5: The near-in-time solar and lunar observations by the same instruments, especially at the two high-elevation sites, are key to this paper.

All things that might affect these need thorough and prominent quantitative discussion. E.g. ,instrument non-linearity, exposure timing resolution and accuracy, sensitivity to sky radiance level, ADC resolution at low light levels, The sensitivity to AOD is already well discussed.

The 24-bit ADC resolution of the amplified detector signal (current/voltage) is sufficient at all levels, however for lunar observations the very lowest signal levels can experience greater triplet variability as instrumental noise becomes an appreciable fraction of the measured signal which likely results in higher rejection of AOD observations due to triplet variability thresholds. The observed mean differences in 3-hour transition AOD differences are also bigger (0.0072) at the largest LPA bin (80°-90°) (smallest signal) though this is a small fraction (2.8%) of the lunar dataset.

The following sentence has been added to Section 5.3

“While the 24-bit ADC resolution of the amplified detector signal (current/voltage) is sufficient at all levels, lunar observations at the very lowest signal levels can experience greater triplet variability as instrumental noise becomes an

appreciable fraction of the measured signal which likely results in higher rejection of AOD observations due to triplet variability thresholds.”

Section 5.2 Overall bias message is clear, but the concept behind 440nm exclusion and Fig. 15 are hard to follow.

The following sentence has been added to clarify this.

AOD at 440nm will be significantly higher than 870nm when Angstrom exponent is large so the removal due to the minimum signal threshold is disproportionately impactful resulting at a much higher rate of shorter AOD observations than that experienced at longer wavelengths. This is also clarified in the captions.

1. Say where is Palangkaraya and its elevation

Now stated.

1. Fig 15a. Move both interior labels down so that ‘Solar’ does not look like a subtitle to the upper part

Type of measurement titling was re-positioned for clarity.

252:253 Meaning unclear. Is ‘range’ a verb or noun here?

It is a noun but now changed to ‘interval’ to remove ambiguity.