

Review of the revised manuscript (ID: egosphere-2025-6150) titled “The JUICE 2024 close flyby of the Moon: Thermal assessment from MAJIS” by Tosi et al. submitted to the journal *Annales Geophysicae (ANGEO)* for publication.

The authors have thoroughly revised the manuscript and addressed my suggestions and concerns from the review. The manuscript has improved significantly, and I am satisfied with most responses. I have a few minor suggestions that should be addressed before acceptance.

Minor comments

- 1) The manuscript does not address the covariance between emissivity and temperature in the retrieval framework. It appears these cross-covariances have been omitted or considered negligible. Please clarify this in the manuscript.
- 2) The following statement in the response to my comments

“The coupling between temperature and emissivity is naturally represented through the Jacobian and the posterior covariance, which captures their correlation in the retrieved state.”

This statement is not technically accurate. The Jacobian matrix shows how measurements respond to changes in state variables, but it does not directly represent the relationship between temperature and emissivity. The posterior covariance matrix is not part of the retrieval process itself; it quantifies the uncertainties and correlations among the retrieved parameters.

A clearer explanation is that when the Jacobian sensitivities for temperature and emissivity are similar, the inversion process becomes more ambiguous. The posterior covariance matrix reflects the resulting uncertainties and correlations.

Including a plot of the diagonal elements of the averaging kernel matrix would be helpful. These values indicate the contributions of observations and prior to the retrieved state, making it easier to assess retrieval sensitivity and information content.

- 3) In Fig. A1(a) and A1(c), the observed radiance and NESR appear to have nearly the same magnitude. Please recheck these plots and clarify the corresponding SNR values. If the observed radiance is comparable to the NESR, the resulting SNR would be close to unity, indicating very poor measurement quality.

In their response, the authors state:

“However, for the selected best-case pixel, its amplitude is much smaller than the measured/modeled radiance in the 4.5-5.5 μm interval, and therefore it appears nearly overlapped by the other curves at this plotting scale.”

This explanation is difficult to reconcile with the figures. If the NESR amplitude is much smaller than the observed radiance, the two curves should not overlap closely unless the plotting scale compresses the differences. Please clarify the plotting scale and provide quantitative SNR estimates for the displayed spectra.