

Response to the Editor's comments for manuscript egosphere-2025-3263

The authors would like to thank the two referees as well as the editor for the time spent reviewing our work and for their valuable suggestions. We have attentively addressed all the raised issues and have produced a revised version of the manuscript. Please find below our answers (shown in blue color) to each of the comments. The line numbers indicated in our response refer to the "track changes" version of the new version of our manuscript.

Associate Editor Comment — Both reviewers appreciate the new simulations and physical explanations added in the revised version. They recommend acceptance with minor, however, important revisions. Please see their detailed reports. The recommendations of the reviewers should be performed, most importantly:

Reviewer 1

Reviewer Comment 1.1 — The abstract has to be revised to explicitly acknowledge that significant sphericity-induced biases occur in the high-angle regime.

Reply: The abstract has been modified in order to clarify that significant dependencies on surface and aerosol properties were also identified, but only under extreme solar and viewing conditions (see lines 15-16-17).

Reviewer Comment 1.2 — The conclusions have to be clearly conditioned (e.g., "for moderate viewing angles..."), to avoid over-generalization.

Reply: The conclusions have been modified accordingly. We have specified that biases on FCI channel and sun-sensor geometry were present at all times, whereas the dependencies on other parameters (such as aerosol properties) only occurred under extreme geometries (see lines 543-545).

Reviewer Comment 1.3 — The framing of the findings should avoid the suggestion that the effect is of limited practical relevance simply because it is strongest at large angles.

Reply: We hope that the modifications that we made regarding comments Comment 1.1 and Comment 1.2 are sufficient to re-frame our findings.

Reviewer Comment 1.4 — Please remove the last sentence of the abstract "...this study make recommendations... so that one can keep using plane-parallel radiative transfer codes for near-real-time operational applications..." and instead state the main recommendation and limitations here explicitly.

Reply: Thank you for your comment, which we took seriously into account. However, we have decided to keep the last sentence of the abstract because, in our opinion, it emphasizes a key point of the paper: the recommendations and precautions one must follow when using plan-parallel codes in relation to

sphericity effects. Furthermore, we are concerned that summarizing our recommendations in one or two additional sentences in the abstract would misrepresent the messages given in the manuscript, particularly in the discussion. Instead, we modified the "Discussion" section to clarify our recommendations, particularly regarding which parameters to consider depending on the intended compensation method (see lines 507–509). For this reason, we decided against removing the last sentence of the abstract, which now directs readers to the "Discussion" section for clearer, more nuanced recommendations.

Reviewer 2

Reviewer Comment 2.1 — Why have all numbers changed in tables 3 -10 + B1 ? Most are small changes, and it does not affect the data interpretation, but still I don't see an explanation of why all numbers need updating. Please explain.

Reply: Indeed, we should have given an explanation about this change when uploading the revised version of the manuscript. The justification is simple: the figures presented in the pre-print version of the manuscript were not of sufficient quality for AMT requirements, so we redid the simulations corresponding to these figures to obtain an improved version of figures 2, 4, 5, 7, 9, 10 and 11 that were included in the revised version of the manuscript. Although the conditions of these new simulation were exactly the same as before, minor differences can be observed in comparison to the previous results due to the statistical variability of Monte Carlo methods such as SMART-G. These difference can be observed in the tables mentioned by the reviewer, as they were modified to correspond to the new simulations and figures.

Associate Editor Comment — Additional recommendation by the Editor: please mention in the conclusions the limitation of the study, namely that the remaining sphericity error of pseudo-spherical corrections has not been addressed. So the paper is not useful for applications of geostationary satellites that already use a pseudo-spherical correction of sphericity effects, like for example, the CM SAF cloud products.

Reply: Thank you for this comment, which highlights one of the addressed limitations of our study. However, the conclusions already state that this study "can be useful to develop future operational-friendly **plane-parallel** atmospheric correction methods incorporating a fast compensation for sphericity effects" (see lines 551-552), making it clear that the conclusions of our paper can be of interest to the "plane-parallel approximation user community" but not necessarily to users of pseudo-spherical radiative transfer models.