

Overall, the manuscript has clear research objectives, solid data, and standardized methods. It systematically compares the effects of three aerosol types on Landsat 8 atmospheric correction, demonstrating clear research value. However, improvements are still needed in the following aspects.

The introduction points out issues with LaSRC's Urban Clean assumption, but it does not clearly explain why it is necessary to compare the three aerosol types (MOD04/MOD09/Urban Clean), nor what dimensions of comparison are lacking in existing studies (global site coverage, full reflectance range, different land cover). The novelty and necessity of the study need to be further strengthened. The logical progression from fixed aerosol models to dynamic aerosol models is not sufficiently clear. It is recommended to restructure it as "commonly used models → limitations → three dynamic models selected in this study", highlighting the representativeness and rationality of the comparison. There is too lengthy information in the first paragraph of the introduction, the research significance and research status of AC algorithm are all presented, and the logic is unclear. Reorganize this section and present it in several shorter paragraphs. In addition, the hybrid strategy proposed in the conclusion has no foreshadowing in the introduction, resulting in poor coherence between the two sections.

The manuscript adopts a large number of acronyms, which reduces its readability for readers not familiar with atmospheric radiation community. It is recommended to eliminate unnecessary acronyms and retain only the commonly used ones. Moreover, since the author has already used acronyms, the full forms still used later in the text (e.g., atmospheric correction, lookup table), Please unify them. What is "BRDF" in Line 766.

The citation of references in the main text should use a standard format. For example, Line 74-75 should be " *Ichoku et al. (2013) proposed highly absorbing aerosol...*". Other nonstandard references in Line 98, Line 293-294, Line 218....

Figure 1 shows the distribution of AERONET sites and global climate zones. Is the atmospheric correction, the topic of this work, highly sensitive to climate regionalization? It is recommended to further present the dominant type or sub-types of aerosol at each AERONET site. In addition, in the subsequent validations of dynamic aerosol types, consider incorporating the spatial performances of AOD and SR, and revealing the possible impacts of different aerosol sub-types.

Line 265, a unit error, the general O₃ concentration is 300 DU or 0.3 atm-cm.

In Equations (25)–(27), what do ε_i , ρ^e , ρ^t , and n denote respectively? Using the assessment metric "acuuracy" may cause confusion with the word "accuracy" in the main text (e.g., Line 397, 420, 466, 483, 586...). The use of statistical terminology in the manuscript is confusing. The metric "precision" indicates "result consistency", how should we understand "result consistency"

There are typos. Line 400: " MOD0-based"; Line 482: "domin • ant"

The texts and axis labels in many figures are too small to be legible; it is recommended to increase the font size. For the heatmap in Figure 6, only the numerical values can be placed within the plot, and the magnitude scale can be placed outside the plot (e.g., " $\times 10^{-2}$ " in plot title part or any blank space of the heatmap).

Line 485-490: Provide some possible explanations for why these assessment metrics increase with the increase of SR. Are there any analogous studying results to confirm whether the current levels of accuracy, precision, and uncertainty are within acceptable ranges?

Line 581: What is the data source for land-cover?

Regarding the captions of Figures 8 and 9, the results are not derived solely from building (Figure 8) and snow cover (Figure 9).

Line 611-618: MOD04-based has the largest RMSE and bias over soil, this is opposite with those over other land covers. Can the author explain some of the reasons?

It is recommended to strengthen the explanation of the physical mechanisms, as most of the analysis in the manuscript remains descriptive. The *Discussions* (Section 5) appears to repeat descriptions from the *Results* (Section 4). It is advised to remove these redundant descriptions and instead add more mechanistic descriptions and physical interpretations.

Add some discussion of research limitations, such as cloud contamination, snow/ice and urban heterogeneous underlying surfaces, and the limitations of AOD and reflectance range, and present them in the future directions.