

The manuscript by Xiaoli Wei et al., attempts to develop a new aerosol type classification model using an innovative hybrid algorithm. An optical database was developed using Mie scattering and a complex refractive index, different aerosol types were identified by applying a random forest algorithm trained on aerosol optical parameters obtained from the AERONET sites. The method effectively integrates machine learning and density clustering algorithms and is not limited by the amount of data, improving the accuracy of aerosol type classification. The study shows good consistency between the new method and traditional Gaussian density cluster method. In conclusion, this manuscript is logically organized and well written, and provides some insights and new methods to identify aerosol types based on aerosol optical parameters. However, a number of issues need to be addressed before it can be accepted by STOTEN.

#### Major comments

1. Line 134-136, Table 1 and Figure 1: Site names need to be aligned, e.g., “AltaFloresta” and “Alta\_Floresta”, “Abracos Hill” and “Abracos\_Hill”, etc.
2. Line 160-161: It is mentioned here that for the first time the median value of the complex refractive index is used as a criterion for identifying the type of aerosol. What are the advantages of applying the median value of the complex refractive index? It is suggested that a specific explanation be given in the manuscript.
3. Line 183: Punctuation is in red.
4. Line 193: Punctuation is in blue.
5. Line 220-227: The manuscript mentioned the use of aerosol size distribution parameters, CRI and Mie scattering model to build a database of aerosol optical parameters instead of using AERONET data directly. Perhaps the manuscript could give more explanation and how the accuracy of the established database can be verified.
6. It would be helpful to explain more clearly why the Random Forest model was chosen over other AI models, and the specific steps in the implementation of the Random Forest model.

7. It is recommended to add a comparison with traditional aerosol type identification algorithms to highlight the advantages of your own hybrid algorithm.
8. Figure 7: Perhaps adjusting the horizontal and vertical coordinates of each sub-figure to place the image horizontally would make it easier for the reader to see.
9. Figure 12-16: Pie charts labelled with illegible fonts.