Dear Editor,

Thank you very much for your great help. We greatly appreciate the reviewers for taking their valuable time to review the manuscript. We also thank the two reviewers for their suggestions and comments, which have been of great help in improving the quality of our manuscript. After carefully reading the good suggestions from the editor and reviewers, we have made point-by-point response to the reviewers' comments. Please refer to the revised manuscript for details. Below are our responses to each comment and suggestion.

Yunfei Fu

RC2:

This work provides a dataset that includes features derived from two types of fittings applied to rain cells observed by TRMM PR, along with collocated VIRS and TMI brightness temperatures. This dataset has potential value for users who wish to extract horizontal and vertical geometric information of precipitation clusters from the extensive TRMM dataset. However, the publicly available data, as indicated by the URL provided by the authors, is currently limited in temporal coverage. As a result, users are unable to conduct long-term analyses of cloud clusters, which is likely one of their primary interests. Additionally, some expressions in the manuscript are potentially misleading to readers, and the description of the data processing methods is inadequate. For these reasons, there are critical issues that must be addressed before this manuscript can be considered for publication.

Response: Thank you very much for your nice suggestion! Regarding the limited data availability on the website, we have updated the dataset. The data volume is relatively large because it is under the detection resolution of the PR orbit. In the updated dataset, we have provided a comprehensive dataset of rain cells for the summers of 1999 and 2003 (from June to August). This dataset generally meets the needs of users and can be

used to analyze the characteristics of summer rain cells in the middle and low latitudes before and after the TRMM ascending orbit. The data are freely available at https://doi.org/10.5281/zenodo.15387988. Furthermore, we have refined the description of the data processing methods in the article to enable readers to better understand the methods.

Major Comments:

1.

The data description paper should be published only after a sufficient amount of data is made available for users. Although the Abstract and Section 6 ("Data availability") refer to the data sources, only two days' worth of data are currently available. Since the extraction of rain cell features is primarily intended for statistical analyses, long-term data is essential. The currently provided data is insufficient for effectively utilizing the dataset. While it is understandable that the original TRMM precipitation and brightness temperature datasets are large in volume. However, at minimum, the data under the "Rain" node in the dataset should be made available for a longer period.

Response: Thank you for what you said. Based on your suggestion, we have uploaded the rain cell datasets for the summers (June–August) of 1999 and 2003 to the updated dataset website. We hope this meets your requirements. The new dataset enables long-term statistical analysis of summer precipitation in mid-low latitudes regions. Researchers can use this dataset to conduct in-depth studies on the structural characteristics of rain cells and precipitation mechanisms. The data are freely available at https://doi.org/10.5281/zenodo.15387988.

2.

The manuscript contains several instances where the description could mislead readers regarding the processing performed on the dataset. These should be corrected. For example, in the Abstract, the following sentences appear (Lines 14–19):

"In this study, based on the merged data of precipitation profile data, reflectivity and

infrared data, and microwave brightness temperature data, …, rain cells were identified in the PR swath by two methods, the minimum bounding rectangle (MBR) method and the best fit ellipse (BFE) method. The geometric and physical parameters of rain cell were also defined."

This wording suggests that rain cell identification was performed based on merged data from three sensors. However, as described in Section 3, rain cell identification is determined solely based on the PR data, by checking whether four or more pixels are connected. The infrared and microwave brightness temperature data are used only for deriving the physical parameters after the identification. Moreover, the MBR and BFE methods do not perform identification; they are fitting methods applied to already-identified rain cells.

Other instances with potentially misleading wording include:

- Lines 70–73 ("For the above...")
- Lines 134–135 ("To automatically...")
- Lines 301–304 ("By matching...")

Furthermore, many other parts of the manuscript incorrectly refer to MBR and BFE as identification methods. To avoid confusion, I recommend consistently referring to them as fitting methods.

Response: Thank you for your valuable suggestions! What you said is very correct. Just as you said, a rain cell is composed of connected rain pixels identified by PR, and then the MBR and BFE methods are used to fit these connected rain pixels to obtain the parameters of the rain cell. We simply abbreviate this process as the MBR and BFE methods for rain cell identification.

According to your suggestions, we have modified “identification method” in the full text to “fitting method” to avoid confusion in the expression. For example, the modified Lines 14-19 are as follows:

“In this study, based on the merged precipitation profile data, reflectivity and infrared data, and microwave brightness temperature data, …, rain cells were identified in the PR swath. For the identified valid rain cells, two fitting methods (the minimum bounding rectangle (MBR) and the best fit ellipse (BFE)) were applied to fit the external frame. Then, the geometric and physical parameters of rain cells were also calculated.”

3.

In Section 5.2, while the two case studies help contextualize the dataset, the findings primarily reflect well-established knowledge and do not seem to introduce new insights. Please clarify what new synergies are expected by incorporating VIRS and TMI data into the dataset alongside the fitting of rain cells using the MBR and BFE methods. Additionally, since Section 5.2 feels somewhat redundant, I suggest minimizing the description of well-known results and moving them to the Introduction.

Response: Thank you very much for your reminder! The integration of rain cell geometric parameters with VIRS/TMI data yields the following synergistic effects:

1. The geometric parameters of rain cells can be obtained through the fitting methods, which can clearly characterize the morphological features of rain cells. Meanwhile, the visible and infrared channel signals of VIRS can provide cloud-top microphysical parameters, while the microwave brightness temperature of TMI can reflect intra-cloud hydrometeor information. The combination of such multi-source data enables us to deeply explore the interrelationships among geometric morphology parameters, precipitation intensity, and cloud microphysical parameters, thereby enhancing our understanding of precipitation systems.
2. The integration of multi-source data breaks the limitations of single observation methods in the past. By combining the observation data of active and passive instruments, we can build a richer database for precipitation detection. In particular, the relationship between the precipitation detected by PR and the brightness temperature of VIRS can be extended to the infrared channels of geostationary satellites. The corresponding research can not only optimize the precipitation

estimation of geostationary satellites, but also enrich precipitation inversion methods, thereby improving the ability to monitor precipitation.

3. The active observation of PR and the passive microwave observation of TMI can complement each other's advantages in precipitation detection. On the one hand, PR’s high-precision precipitation results can serve as a reference for correcting the wide-swath TMI precipitation measurements on the same platform, optimizing the passive microwave inversion of precipitation results. On the other hand, the improved algorithm can be applied to microwave instruments of the same frequency band across different devices, achieving algorithm scalability and further enhancing the accuracy of precipitation inversion.

Additionally, we have revised the content in Section 5.2 by restructuring the wording for better clarity.

Minor comments:

Sections 3 and 4

They currently describe the algorithm separately; however, it would be more organized to combine them into a single section, such as a unified "Methods" section.

Response: Thank you very much for your suggestion. We have combined these two parts in the article.

3.1 The algorithm of rain cell identification

3.2 The definitions of rain cell parameters

Table 2

It should be clearly indicated which sensor each variable is derived from.

Response: Thank you! We have modified Table 2. The new table clearly indicates the sensor for each parameter.

Table 3

Many values listed in Table 3 are not referenced in the main text. It would be better to

remove unnecessary items. Regarding γ_{max} and γ_{avg}, should these not differ between the MBR and BFE methods? Also, for parameters where the values are identical between MBR and BFE, combining them into a single column would improve readability.

Response: Thanks. The design of Table 3 has been restructured to align with the main text content and consolidate parameters with identical values into a single column. For the parameters γ_{max} and γ_{avg}, as you pointed out, we recalculated and corrected the previous values. Since the results retain two significant figures, the displayed differences are not significant.

Lines 193–203

The content described in this paragraph might be easier to understand if explained directly with reference to Figure 1. If the authors wish to present specific numbers, it would be sufficient to mention them within the text. Therefore, I would suggest that Table 4 may not be necessary.

Response: Thank you for your nice suggestion. Table 4 presents the calculation results of physical parameters for two rain cell cases. Presenting them in the table can make the differences between the cases more intuitive. Based on your above suggestions, we have also redesigned Table 4 and added sensor labels for parameter detection, which corresponds to Table 2, thereby facilitating reader comprehension.

All the above have been modified in the revised manuscript. Thank you again.