

Earth Syst. Sci. Data Discuss., author comment AC2
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Reply on RC2

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Author comment on "A new merged dataset for analyzing clouds, precipitation and atmospheric parameters based on ERA5 reanalysis data and the measurements of the Tropical Rainfall Measuring Mission (TRMM) precipitation radar and visible and infrared scanner" by Lilu Sun and Yunfei Fu, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-26-AC2>, 2021

Responses to RC2

We are grateful to the Editor and the Reviewers for reviewing our manuscript. The comments and suggestions are very helpful and valuable. Kindly find a point-by-point reply to the issues as follows.

RC2:

- Introduction, I suggested the authors to pay more attentions to the development of merging method for the multiple data sources, the available merging data sets, and the corresponding results in accuracy evaluation.

Response: Thank you for your advice.

In the introduction part, we gave three main aspects. First, the importance of the 3D structure of the precipitation and clouds are showed which can explain why we established this new dataset. Then, introducing the datasets which can be used to study the characteristic of the precipitation and clouds system. So that we can understand which datasets can be chosen to realize the aim. Finally, combining dataset of different types becomes a developed tendency in the study. So we combine those datasets from the TRMM PR, VIRS and ERA5 reanalysis.

Those three aspects are equally important. To enrich the content in the introduction part. We have added some related references in the revised manuscript. [89-93] "Fu et al. (2013) used moving surface fitting method to combine TRMM TMI and PR pixel data. The differences in the mean, standard deviation and frequency distribution between the original and merged data are analyzed to validate the accuracy. Wang et al. (2017) merged the TRMM PR 2A25 products with the IGRA dataset to investigate the profiles of temperature and humidity for the convective and stratiform precipitation."

Generally, as you mentioned that there are many data merging methods, but this paper focuses on merging satellite data with reanalysis data to obtain the corresponding atmospheric parameters of the precipitation structure detected by satellite-borne precipitation radar, so as to provide merging data for the subsequent research on the

atmospheric environment of the precipitation structure. Thanks!

- Data, to make it easier to follow the involved data set, it is preferred to list the critical informations (e.g. spatial resolution, span period, recorded frequency) using a table.

Response: Thank you for your nice suggestion. We have added the corresponding table in the revised manuscript.

Table 1. Critical information of the M-1B01-2A25-GD

M-1B01-2A25-GD

Spatial resolution

Temporal resolution

Parameters

Swath width

Vertical resolution

- Method, the current description is insufficient. How to merge the datasets? How to deal with the so-called “match”, how to evaluate the reality of merged product.

Response: Thank you for your nice questions.

- There are three main steps in the data merging process. First, we merged the 1B01 and 2A25 pixel data due to the little time lag between the TRMM VIRS and PR. We reduced the spatial resolution of the 1B01 pixels to merge with the 2A25 pixels at the same orbit. Second, to match with the ERA5 reanalysis data, the merged pixel data should be gridded, the resolution of the gridded data is 0.25 degree. Third, ERA5 data has the hourly output, so for the same grid location and time, we merged the 1B01-2A25-GD with the ERA5 reanalysis data.
 - “Match” here in this paper refers to the process of the data merging in a spatial and temporal way.
 - As can be seen in section 3.1, after merging process between the 1B01 and 2A25 pixel data. Fig 1 reveals that the PDFs of RF1, RF2 and TB_0 are almost the same before and after data merging. The differences on the PDFs of $TB_{3.7}$ and $TB_{10.8}$ can be explained from the results shown in Fig 2. Also, Fig 3 shows that no unacceptable distort exists on the 1B01-2A25 merged data after gridding process. Three different types of the precipitation and clouds cases were presented in section 3.4. Three-dimension of the precipitation, clouds and atmospheric parameters were plotted to fully understand the characteristics of the cases.
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- What’s the value for the developed dataset, what gaps can be filled comparing to the available dataset.

Response: Thank you for your nice questions.

First of all, the developed dataset contains comprehensive parameters, such as profiles of rain rate, precipitation reflectivity factor, spectral signals and atmospheric parameters. Also, the grid dataset has fine spatial resolution about 0.25 degree and hourly temporal resolution, which filled a gap in this field.

Compare to the available datasets, the dataset introduced in this paper can be very useful for analyzing the characteristics of the precipitation structure and its atmospheric environment in precipitation system. The dataset provides us the comprehensive parameters simultaneously among the same orbit field with less digital storage space.

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