This study proposes and validates a global ice water path dataset (FYAI) based on passive microwave observations from the Fengyun-3 (FY-3) series satellites, spanning 15 years (2010–2024) and comprising two product levels: total ice water path and suspended ice water path. The study employs a machine learning framework and utilizes high-precision CloudSat/CALIPSO data as the training benchmark, demonstrating clear scientific significance and practical value. However, there are still some issues that need to be addressed.

1. It is recommended to supplement the introduction with research on microwave-based ice cloud remote sensing, both the advantages and disadvantages of microwave cloud remote sensing should also be explained.
2. It is recommended to add the novelty of the deep learning approach in the introduction.
3. Reference data and test data are different types of data. How can consistency be ensured between the two?
4. About the reference data,
    1) How does 2C-ICE obtain ice cloud parameters, what is the accuracy in distinguishing ice clouds from water clouds, and how is its penetration? Why can it be used as a reference for microwave ice cloud detection?
    2) 2C-ICE uses detection channels at 532 nm and 94 GHz, and there are differences in cloud detection sensitivity compared with the channels of Fengyun MWHS, such as sensitivity to ice cloud particles of different sizes and penetration through cloud layers. How can these differences explain the inconsistencies they cause?
    3) After 2011, CloudSat has no daytime data. How is the data trained then?

5. As validation data, CCIC and MODIS/VIIRS use visible-infrared optical data. How to explain the differences in sensitivity to ice cloud particles between these and microwave detection, since the cloud targets or cloud depths they observe are different? Although this was briefly mentioned in the comparison results below, how to address this difference requires countermeasures or explanations.
6. The part of ‘quality control’, it is recommended to express this paragraph concisely.
7. L192, what is the basis for choosing this threshold?
8. In the part of ‘Data Record’, the data format specifications and charts can be compressed or simplified, focusing more on their scientific value.
9. The payloads of Fengyun-3 from different batches, or in other words, the payloads of different satellites, do not necessarily have consistent radiometric baselines. It should first be explained how to ensure the consistency of Level 1 data across different satellite payloads. Although this is addressed in the uncertainty analysis later in the text, the issue of radiometric consistency of Level 1 data should be resolved before performing inversion. It would be helpful to look into the historical reprocessing data of Fengyun satellites, as this reprocessed data ensures the radiometric consistency of Level 1 data across historical datasets.
10. Figure 11, FYAI is consistent in magnitude with 2C-ICE and DARDAR over different times, but this does not prove that the two are consistent, because there may be temporal variations. Why not compare FYAI with the data from 2C-ICE that covers the same time period?

11. Some typos need to be noted. For example, L75, l145, Figure ‘theblock’, etc..