



## **Verifying FY-3B Level 2 Rain Rate Retrievals Using Gauge Measurements of Minute-Rainfall over Eastern China**

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Despite their critical importance to the technology development and products applications, evaluating the performance for and quantifying the error in the satellite-based passive microwave (PMW) level 2 rain rate retrievals have been a challenging task, largely due to the lack of reliable ground truth matching the time / space scales of the target satellite retrievals. In this paper, we report a new approach to verify the level 2 rain rate retrievals from the Microwave Imager aboard the Chinese FengYun (FY) 3B satellite using gauge measurements of minute-rainfall over a dense network over the eastern China.

As a first step, analyses of minute-rainfall are constructed on a 0.05olat/lon grid over eastern China for the warm seasons (May – September) of 2012 and 2013 through interpolation of quality controlled gauge reports from over 30,000 stations. At the meantime, parallax correction is performed to correct the displacement of the satellite field of view (FOV) position caused by the assumption of zero cloud height. Ground truth for the FY-3B level 2 retrievals of instantaneous rain rate is then defined as the 5-minute mean rate centering at the corresponding FOV observation time and over the 0.05olat/lon grid boxes falling into the target FY-3B FOV of ~25km diameter. Quantitative examinations of the FY-3B level 2 retrievals are finally conducted through comparisons against the gauge-based analyses of 5-minute rainfall for the 2012-2013 warm seasons. Only gauge analyses with three or more reporting gauges inside an FOV are used as the ground truth to ensure reasonable quality.

Our preliminary results showed the following:

- 1) Parallax correction is crucial to ensure accurate evaluation of the level 2 satellite retrievals. The spatial displacement caused by parallax is about the same as the cloud top height, or half of the FY-3B FOV size, greatly compromising the accuracy of the performance evaluation;
- 2) The current version of the FY-3B level 2 retrievals tend to under- / over-estimate heavy / light precipitation. In particular, the maximum rain rate is saturated at a relatively low level of 35mm/hr, yielding significant under-estimation for many heavy rainfall events; and
- 3) The FY-3B level 2 retrievals tend to miss precipitation from warm and low cloud systems;

Further work is underway to quantify the error in the FY-3B retrievals as a function of location, season and cloud types. Detailed results will be reported at the meeting.