

Response to the reviewers

We are grateful to the Editor and the two Reviewers for their precious times in reviewing our manuscript.

The issues raised by the reviewers have been addressed (in blue color) in the revised manuscript. Kindly find a point-by-point reply to the issues as follows (presented in blue color).

Referee #1

I think that the manuscript now qualifies for publication in ACP. The data and method are described pretty well. The R_e profiles from 00:30 UTC to 01:30, 02:30, 03:30, 04:30, and 05:30 are now discussed in more detail. The manuscript is in good quality overall. I would suggest it be accepted for publication in ACP. Here are some minor suggestions:

Line 140: “mixed-cloud” should be “mixed-phase cloud”?

Response: Thanks! Changed. [Line 140]

Line 288: “the regional difference” is not very good. It could be changed to “the multiple zones”?

Response: Thanks! Changed. [Line 291]

Line 292: Why do the 25 and 75 percentiles show different turning points of R_e and growth rates from the median? Are there any explanations?

Response: Turning points and growth rates are affected not only by temperature, but also by R_e . The 25th and 75th percentiles have different sizes of R_e , so turning points and growth rates will also be different. [Line 296-297]

Referee #2

1) Can the authors check if their retrieval is influenced by the absorption lines of CO₂ within the 1.61 micron channel of FY-4A? Looking at the atmospheric transmittance between the surface and high ice clouds (18 km) in Figure 1, there might be some cloud height dependence on the retrieval to which the MODIS channel at 1.65 micron is not sensitive to? A simple radiative transfer calculation should be sufficient and a short sentence in the manuscript if this needs to be considered.

Response: Many thanks for your important suggestion! The retrieval is indeed affected by factors such as water vapour and CO₂. We conducted the tests under the most extreme conditions, that is, setting the ice cloud top to 0 km and 18 km respectively. The results show that the 1.61 μm reflectance in the two extreme cases differ by ~8%, which is acceptable. In other words, the impact of cloud height difference in reflectance will not exceed 8%. [Line 141-144]

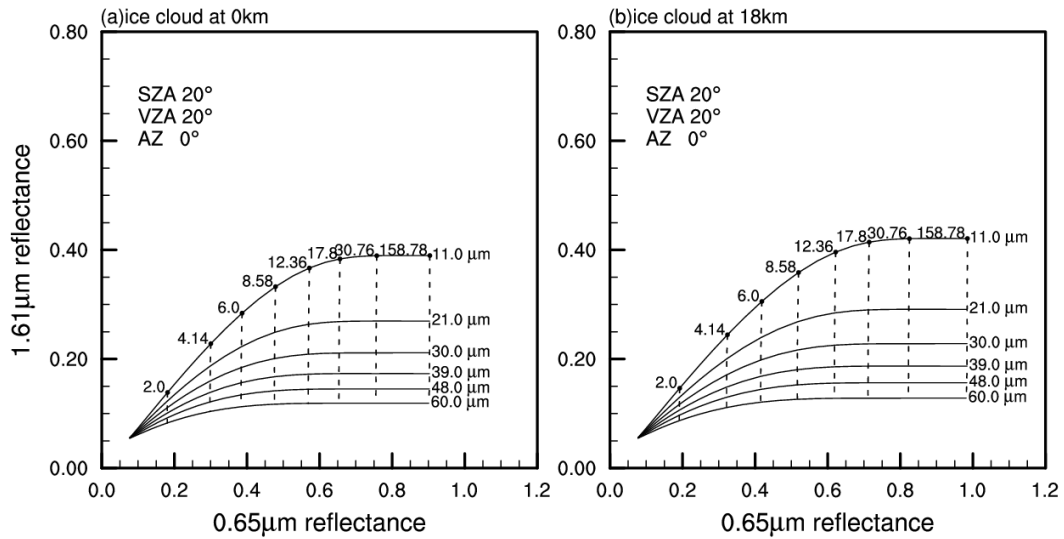


Figure S1. Bi-spectral solar reflectance lookup table for FY-4. (a) Ice cloud at 0 km; (b) Ice cloud at 18 km.

2) L160-L161:

"... standard deviation of 10 and truncated at 4 times the standard deviation ..."

A unit is still needed here: 10 pixel or 10 km?

Response: It is 10 pixels. [Line 164]

3) L168

"... we first calculate the local temperature minimum of the complete scene ..." -> "... we first calculate local temperature minima for the complete scene ..."

Response: Thanks. Changed. [Line 171]

4) Figure (3) 1.65 -> 1.61

Response: Thanks. Changed. [Figure 3]