Atmos. Chem. Phys. Discuss., 8, S6121–S6122, 2008
www.atmos-chem-phys-discuss.net/8/S6121/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "FRESCO+: an improved O_2 A-band cloud retrieval algorithm for tropospheric trace gas retrievals" *by* P. Wang et al.

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Received and published: 19 August 2008

The authors appreciate the referee's comments and suggestions. We have included the comparison of FRESCO and ARM cloud height in the revised paper. Comparing FRESCO+, FRESCO and ARM data, FRESCO+ cloud heights are lower than FRESCO, which is as expected. The FRESCO+ cloud heights have significant improvement for single layer low clouds. FRESCO cloud heights are often higher than the cloud top heights for single layer low clouds, which is due to lack of scattering in the FRESCO algorithm. The comparison of FRESCO and ARM cloud height is shown in Fig. 7(c and d). We have also changed Fig. 7(a) to effective cloud fraction (c_eff) greater than 0.2. The original Fig. 7(a) was for c_eff $>$ 0.1 and Fig. 7(b) was for c_eff $>$ 0.2, which was not consistent. We used c_eff $>$ 0.1 because of more data points, unfortunately we forgot to point it out in the caption.

Over snow/ice pixels FRESCO+ and FRESCO retrieve cloud height and cloud albedo, assuming the cloud fraction of 1.0. Therefore, the cloud height is a equivalent height of surface and cloud height. FRESCO+ has much better fit than FRESCO over snow/ice pixels because Rayleigh scattering is more important over snow/ice pixels than over a dark surface. Actually this is another improvement in FRESCO+. However, it is difficult to understand and validate the retrieved cloud height over snow/ice pixels, we focus on the pixels without snow/ice in this paper. We would like to improve the FRESCO+ algorithm over snow/ice pixels in the future.

We have checked p. 9708 line 16 carefully. However we could not change it as the referee's suggestion.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9697, 2008.