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Atmospheric Measurement Techniques Discussions

Interactive comment on "On cloud ice induced absorption and polarisation effects in microwave limb sounding" *by* P. Eriksson and B. Rydberg

Anonymous Referee #1

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This manuscript presents results from a detailed 3D radiative transfer calculation of the effect of ice clouds on microwave sounding at 347.5 GHz. The purpose is to elucidate the role of scattering versus absorption by ice particles and show which measured polarization states minimize the effects of ice clouds on gaseous retrievals. While these topics are perhaps not of major significance, they will be of interest to the microwave limb sounding community. The modeling techniques are solid, though one could perhaps quibble about using oblate spheroids to represent the complex issue of ice particle shape. The manuscript is well organized, and the figures are well chosen to illustrate the concepts being presented. The citations in the introduction are complete and appropriate.

The following minor revisions should be made:

1. The English grammar needs to be improved. It is often distracting and sometimes prevents a clear understanding of what is being presented.

2. The abstract and section 2 should make clear that 3D radiative transfer has been performed. The only indication in section 2 is mentioning that ARTS-MC can do 3D radiative transfer, and it wasn't until later in the results sections that I realized what type of simulation was performed.

3. The figure 4 caption should state the frequency and that the points are from the tropical 3D cloud simulation.

4. "Cloud optical path" would be better than cloud optical depth or thickness, which tend to have a vertical integral connotation.

5. In section 5.1 tauˆZ should be defined with an equation.

6. In figure 8 it looks like more data points are needed in particle diameter. In fact, making size distributions from only 10 discrete particle sizes probably leads to significant errors in the modeling.

7. In section 5 there should be an acknowledgement that there is much more to the complexity of ice particle shape than simply the aspect ratio of an oblate spheroid. Thus particle shape has more than one degree of freedom, which would affect the discussion here.

8. The first sentence of the second paragraph of section 6 is misleading, as scattering is still the dominant radiative process for larger particles at high tangent heights, as indicated by Figure 4. The conclusions also should state that the scattering effect is more important at higher frequencies than the 347 GHz considered here.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 1493, 2011.