Atmos. Chem. Phys. Discuss., 6, S3396–S3397, 2006
www.atmos-chem-phys-discuss.net/6/S3396/2006/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "First Odin sub-mm retrievals in the tropical upper troposphere: ice cloud properties" *by* P. Eriksson et al.

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Received and published: 28 September 2006

The authors state that "the dominating error source of the IWP retrieval is the assumed PSD". I disagree with this statement. For a single observation I believe that cloud inhomogeneity will provide at least as much error as the PSD assumption. Although the cloud scenario may not be particularly representative, Fig. 3 in Davis et al 2005 demonstrates that the position of a cloud system along the line of sight can have a dramatic effect on the observed brightness temperature depression. As suggested in Wu et al 2006 this error may be mitigated to some extent by only using data averaged over many observations. Although the extent to which this is true has not been studied for tropical ice clouds. Given the large ΔT_b values presented in Fig. 7. it is clear that a considerable number of cases are in the regime where ΔT_b varies non-linearly with

cloud amount. This increases the above effect of along path inhomogeneity, and also introduces the possibility of a systematic beamfilling effect through integration over the field of view.

It is remiss not to acknowledge these error sources and the limitations of using 1D clouds to establish the ΔT_b to IWP map, particularly since they could outweigh the PSD error. With this in mind I also question the wisdom of quoting 50presented it seems somewhat "invented", and given the possibly large influence of cloud inhomogeneity, probably an underestimate.

A related, but less significant point is that there may be uncertainty in relating the optical properties of ice crystals to their mass. Did you assume solid ice crystals?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 8681, 2006.