Geophysical Research Abstracts, Vol. 9, 07104, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07104

Inhomogeneity effects in spaceborne mm/sub-mm cirrus observations

C. P. Davis

Institute for Atmospheric and Environmental Science, University of Edinburgh

There is considerable interest in using space-borne mm/sub-mm radiometry to measure the amount and characteristic particle size of cloud ice in the atmosphere. In particular SIRICE and CIWSIR are similar proposed missions that employ conical scanning at several mm/sub-mm wavelengths on a polar orbiting platform. Recent work has indicated that such observations will be affected by the beamfilling effect, where cloud inhomogeneity within the field of view (FOV) causes a systematic bias in cloud induced radiance. This is in addition to the possibility of 3D radiative transfer effects, due to photon transport transverse to the field of view. Also, the preferential alignment of ice crystals will cause polarisation which itself will be influenced by cloud inhomogeneity. The accommodation of these affects in the "forward" part of retrieval algorithms has been considered too computationally demanding. In this work, we use a state of the art radiative transfer (RT) model ARTS-MC, which fully considers polarised RT in a 3D spherical atmospheric geometry. The model is used to simulate CIWSIR and SIRICE observations for many 3D cloud scenes obtained by a combination of radar data and a stochastic Fourier technique. A statistical picture is obtained for the beamfilling effect, and also the less significant 3D RT effects, for the different frequencies and FOVs for these sensors.