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Interactive comment on "The potential of polarization measurements from space at mm and sub-mm wavelengths for determining cirrus cloud parameters" *by* J. Miao et al.

J. Miao et al.

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Thank you very much for your helpful comments.

The random orientation case we considered in this paper is a true 3D randomness. This means, the principal axes of the particle have equal probability for all directions in a 3D space. The averaging for ice particle single scattering property calculations is done analytically by the T-Matrix code developed by Mishchenko. For calculations using the single scattering code of DDA, the averaging was done for 15 azimuth angles and 15 elevation angles.

Even for randomly oriented or perfect spherical particles, the polarization difference Q is non-zero for non-nadir observation geometries. This is because of the non-symmetrical distribution of the intensity of atmospheric radiation around the satellite

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observation direction.

The radiative transfer within clouds was done for ice particles with a modified Gamma size distribution as given in Eq. (11) in the paper. This size distribution is treated in a discrete manner in evaluating the ensemble-averaged single scattering properties of ice particles. One hundred sizes were used for particles with maximum dimension from 20 micron to 2000 micron in a fixed interval of 20 micron. Angle integration for Eq. (10) was also done in a discrete manner with 2 degree intervals in both azimuth and elevation directions.

The infinity case in Figs. 5 and 6 corresponds exactly the random orientation situation of ice particles, as can be inferred from Eqs. (12) and (13).

It is true that the so-called resonance effect is largely a result of the convolution of the particle single scattering property and the particle size distribution.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1403, 2002.