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# Cloud Induced Polarization in 122 GHz Aura MLS Radiances

**C. P. Davis** (1), D. L. Wu (2), C. Emde (3), J. H. Jiang (2), R. S. Harwood(1)

(1) Institute for Atmospheric and Environmental Science, University of Edinburgh, (2) NASA Jet Propulsion Laboratory, Pasadena, (3) Institute of Environmental Physics, University of Bremen. (cdavis@staffmail.ed.ac.uk, Fax:+44 131 6505780)

Previous simulation studies have outlined the possibility of significant polarization signals in microwave limb sounding due to horizontally aligned ice crystals in cirrus clouds. Others have studied the use of these polarization signals in future slant-viewing space-borne ice sensing microwave instruments. However, given that cirrus clouds consist of a variety of crystal shapes with unknown orientation behaviour, it is not clear to what extent preferred orientation affects the bulk polarized optical properties of cirrus at mm/sub-mm wavelengths. Polarized limb sounding observations would help quantify this effect. This is now possible with the recently launched Aura MLS instrument. We present the first polarized observations of cirrus clouds in the mm/sub-mm region. We also present polarized radiative transfer simulations that indicate the limits to which aligned non-spherical particles are influencing bulk optical properties of cirrus clouds at mm wavelengths. Although 122GHz is not ideal for cloud measurements due to strong $O_2$ absorption, data and simulations indicate that preferential crystal orientation is causing small, but noticeable, partial vertical polarization, which can be replicated in in simulations by considering all particles as horizontally aligned prolate spheroids with aspect ratios of around 0.75.