

Measurements of the linear depolarization ratio of various ice crystal habits generated in a laboratory cloud chamber

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Ice clouds are generated in the Manchester Ice Cloud Chamber (MICC), and the backscattering linear depolarization ratio (LDR) is measured for a variety of habits. In order to create particular morphologies, the humidity in the chamber was varied throughout each experiment, resulting in a range of habits from the pristine to the complex. This was repeated at three temperatures: -7°C , -15°C and -30°C in order to produce both solid and hollow columns, plates, sectorized plates and dendrites. A linearly polarized 532nm continuous wave diode laser was directed through a section of the cloud using a non-polarizing 50:50 beam splitter. Measurements of the scattered light were taken at 178° , 179° and 180° using a Glan-Taylor prism to separate the co- and cross-polarized components. The intensities of these components were measured using a CCD array spectrometer in order to find the linear depolarization ratio. The dependence of LDR on habit is discussed, and measured results are compared with modelled results from ray tracing.