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Snow Size Distribution Measurements in Southern Ontario, Canada

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As part of the Global Precipitation Measurement (GPM) ground validation efforts, several optical disdrometers including two Parsivel and one two-dimensional video disdrometer (2DVD) were operated during Canadian CALIPSO/Cloudsat Validation program (C3vp) field campaign during 2006-2007 winter in Southern Ontario, Canada. The observation site permanently hosts numerous in-situ precipitation measurement devices including double wooden fenced Geonor vibrating wire weighting bucket gauge. Throughout the experiment, one of the Parsivel disdrometers recorded 34 snow and 20 rain events. In this study, we examined variability of snowfall fall velocity among different events as well as between the three disdrometers listed above for the same event. The snowfall size distribution (SSD) is then examined between the events and between the different disdrometers for the same event. To demonstrate the role of fall velocity in SSD, the different fall velocity relations were applied to the same snowfall spectra. We have also derived normalized gamma fitted parameters for the modeling and precipitation retrieval algorithms which are an important asset for the GPM mission. The bulk density and density diameter relations were sought through comparison of disdrometer precipitation and Geonor melted precipitation rates for each event. Here, the accuracy of the Geonor measurements is crucial since it is considered to be reference. We examined the role of the two different meth-

ods of snow density in disdrometer derived reflectivity in Rayleigh regime. We then derived snowfall versus reflectivity as well as snow water equivalent versus reflectivity relations through linear least squares. We also examined any temperature and humidity dependence of the snow density.