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Microphysical characteristics considered hydrometeor types observed in Two-Dimension Video Disdrometer data during winter seasons

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The Particle size distribution (PSD) is an important factor of the retrieval for the radar parameter, and the microphysical scheme of numerical models to match between radar observables and cloud properties. Also, the studies on the snowfall analysis are difficult due to various factors (density, shape, fall velocity) of snow particle drop. Nevertheless, the studies on PSD and its characteristics on precipitation in winter season are insufficient.
During December, January, and February from 2014 to 2016, the precipitation systems contain solid hydrometeors were observed on the northern part of South Korea using a Two-Dimension Video Disdrometer (2DVD) to investigate the microphysical characteristics of precipitation by hydrometeor types in winter seasons. The 2DVD measures the diameter, fall velocity and oblateness of the particles such as snowflake and raindrop. In order to adapt the gamma distribution of PSD to snowfall case, the diameter information of snow particles should be calculated to the equivalent melted diameters (Deq (in mm)) assuming when the ice particles melted in water. The Deq were considered as the density relationship versus each diameter for the hydrometeors type to calculate the PSD parameters; 1) the mean volume-weighted diameter (Dm (in mm), 2) the intercept parameter of an exponential distribution (NW (in mm-1m-3), 3) ice water content (IWC (g m-3). Most of previous studies have assumed the snow particle density relationship versus each diameter for snowflakes (Delanoë et al. (2005); Brandes et al. (2006)), however these relationships should be not applied the precipitation of various type. For the analysis of the microphysical characteristics considered hydrometeors on snowfall, it is required to calculate the density versus diameter of each hydrometeors type (graupel, dendrite, plate etc.). The different hydrometeor types were classified using the physical properties (particle and air density, particle mass) with the different fall velocity and oblateness versus diameter relationships of each hydrometeor types.

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