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A remote sensing method is presented to retrieve rain microphysical parameters from vertically pointing Ka and W-band radar measurements from the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Program radars. It is shown that the Doppler velocity difference (DVD) measurements, which are immune to vertical air motions, Doppler spectra widening and errors in the absolute radar calibration, can be effectively used to retrieve characteristic drop size such as mean mass-weighted drop size (D_m) or median drop size. The rain drop size distributions (DSDs) are analyzed from the variety of observational sites and a mean Ka-W- band DVD - D_m relation is suggested. The retrievals using this relation is verified using the ground based disdrometer measurements. The suggested method is then applied for retrievals of vertical profiles of D_m in a number of observational events. An approach then is suggested to vertical profiles of retrieve rain water content (RWC) using information on characteristic drop size and the measurements of non-attenuated reflectivity from cm-wavelength radars or wind profilers. Combined retrieval profiles of D_m and RWC provide the data to study such processes as the evaporation and collision coalescence. Attenuated-based approaches applied to vertically pointing Ka and W-band radar measurements are also used to retrieve rain rates. Examples of retrievals and error estimates are presented.