

Dual Frequency Radar DSD Retrievals from CAMEX-4

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Preliminary retrievals of the rain-rate and a drop size distribution shape parameter in the form of the uncorrelated mass weighted mean drop diameter (D''), have been made with data from the JPL PR-2 dual frequency precipitation radar, which operated for the first time in the CAMEX-4 field project. Unfortunately, due to problems with the Ka-band TWT amplifier only two cases are available for investigation. The first a generally stratiform sample from tropical storm Gabrielle, is made up of light rain such that both the Ku and Ka channels are able to see all the way to the surface. The second case from Hurricane Humberto features heavier precipitation and in a number of scans the Ka band is unable to penetrate to the surface before attenuation reduces the signal to the systems noise levels of approximately 5dBZ.

Due to the various sources of uncertainty present in the retrieval problem, instead of making conditional estimates of the rain-rate and D'' , estimates of the maximum and minimum of these quantities due to the uncertainty are calculated. As no in-situ measurements are available for these cases for comparison to the estimates, forward reflectivities are calculated from the retrievals and compared to the measured reflectivities. This approach while not a validation does highlight areas in which the DSD model used for the retrievals is both able and unable to explain the observed reflectivities and point the direction where further understanding of the precipitation processes is required.