# 13.15 RADAR-DERIVED QUANTITATIVE PRECIPITATION ESTIMATION BASED ON VERTICAL-RAINCLOUD TRAJECTORY PROFILES

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Utilization of radar polarimetric variables such as reflectivity (Zh), differential reflectivity (Zdr), and specific differential phase (Kdp), has revealed to produce robust Quantitative Precipitation Estimation (QPE). However, relationships of such factors known as growth or evaporate of drops, signal enhancement in a bright-band, and strong updrafts or downdrafts in convective rain are rarely considered for generating the QPE model. These are then assuming as causes bias between radar and raingauge measurements. Furthermore, the wind-induced factor, updraft as well as downdraft during cloud developing and dissipating process, evidently trigger some distortions in point rainfall measurement. This study is intended to assess the factor of inter-space bias between radar bins and raingauges to generate better QPE algorithm using vertical profile of raincloud. A four dimensional window including spatial (x and y axes) distribution, vertical profile, and time of occurrence, is statistically assigned.

Through the vertical profile, a trajectory pattern of raincloud's movement containing updraft and/or downdraft at the upper raingauge position could be depicted in a form of rainfall amount. The spatial correlations in vertical dimension among the trajectory fields are used to estimate the descending speed and the horizontal movement of raincloud, correspondingly. Through this process, non-parametric density estimators could be generated from the selected raingauges representing various distances from the radar site. Non-parametric estimators have no fixed structure and depend upon all the data points to get an estimate. After all variable values obtained, the empirical weighted ratio is distributed over the entire of radar grids for updating the QPE. For checking a consistency of the spatial variance over the radar coverage area, all available raingauges are utilized to validate the result. This model performs more compatible QPE model to be used for various types of rainfall, as convective and stratiform, since it is tracking a real-time profile of raincloud trajectory while such factors causing distortion toward point rainfall measurement are taken into account. Moreover, it gives better understanding particularly dealing with physical parameter during raincloud formation stages.