RADAR-BASED QUANTITATIVE PRECIPITATION ESTIMATION IN VIET NAM

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*Meteorological radar is a remote sensing system that provides rainfall estimations at high spatial and temporal resolutions. In recent years, the attention of the Prime Minister of Weather Radar Network in Vietnam has been invested in upgrading and new construction to improve the quality of forecasting of dangerous weather phenomena as well as rainfall estimation forecast. At present, the weather radar network of Vietnam has 10 radar stations, covering the entire territory of Vietnam. The radar system in Vietnam includes 04 main radar types, namely JMA-272 radar from Japan (in Phu Lien and Vinh); WRC200 radar from Finland (in Pha Din, Dong Ha, Tam Ky, Pleiku, Quy Nhon and Nha Be); TRS2730 radar from France (in Viet Tri) and DWRS2500C from American (in Nha Trang). In particular, the weather radar atPhu Lien, Vinh, Dong Ha, Tam Ky, Nha Trang stations is single polarization weather Doppler; the weather radar at Pha Din, Pleiku and Quy Nhon stations is dual-polarization Doppler weather radar. There is only one conventional radar in Viet Tri. With this new investment network and more than 1000 automatic rain gauges, quantitative rainfall forecasting has been significantly improved. The estimation of rainfall intensity based on weather data in Vietnam is mainly manual, based entirely on humans and Quantitative precipitation estimation (QPE) results are mainly based on PPI or CMAX products. Therefore, the accuracy of QPE is not high for high terrain areas, if only using rainfall quantitative data from PPI products at low elevation angle, it is not possible to show all the results of rainfall quantification in the regions that is obscured by topography, sea clutter, ground clutter, ... Thisstudy focuses on simulation method to create a composite of the lowest elevation angle and use PCAPPI 2 km product to produce rainfall quantitative results.

The procedure consists of three main steps. The first step is to create PCAPPI data at the height of 2 km.To do this, we need to make a composite of the lowest elevations angles.The reflectivity data were converted into rain rate using the Z–R relationship for the second step.The radar-based rainfall intensities are calculated from the observed radar reflectivity. We only used Marshall-Palmer relationship to convert from radar reflectivity data to rainfall intensity. In the laststep, the differences between radar data and rain gauge data were calibrated usingmethod of E. Goudenhoofdt and L. Delobbe, 2009 [1]. The PCAPPI 2 km data used in this studyis interpolated from 3 to 4 lowest elevation angles for each radar system of Vietnam, which takes into account the reflectivity response compensation where is obscured by topography and filtering sea clutter, ground clutter. QPE data isaccumulated rainfall for 1 hour.
The results of the study confirm that QPE from radar depends on the quality control of weather radar data and automatic rain gauge data. Using the composite table of the lowest elevations to create PCAPPI products for rainfall quantification plays an important role for making precipitation results more accurate than using only PPI product. By applying the adjustment method by [1], the more accurate the results of QPE is increased.