ESTIMATING COEFFICIENTS OF Z-R RELATIONSHIP FOR BAHIR DAR CITY BY USING BLUE NILE WEATHER RADAR DATA

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Rain gauge measurement represents only point rainfall and considered as the "ground truth" for rainfall rate, but it is associated with different errors and exposed to outliers. On the other hand radar does not directly measure rainfall rates, but it estimates rainfall rate, R (mm/h) by an empirical relationship with the radar reflectivity factor, Z (mm^6/m^3). Reflectivity is converted into a rainfall rate by the Z-R relationship using the formula: $Z = aR^b$ and we determine both of the coefficients (with 95% confidence bounds) station- I, Bahir Dar station-II and the overall station the result was different from the early studies, suggested by Marshall and Palmer (1948), for the parameters of a = 250 and b = 1.2 for under tropical rainfall events of a power-law Z–R relationship. Many subsequent studies like (Rosenfeld et al. 1993) also found that different values for the parameters a = 200 and b = 1.6 for tropical region. The coefficient of determination r square (R^2 =0.921 & 0.94) shows that the model is a good fit and acceptable to predict the rainfall rate from the radar reflectivity data with the relationship between Z and R. The estimated values of the rainfall rate by using the values of the parameters shows a great accuracy to predict the rainfall rate from radar reflectivity in the area. However the parameters for the power model Z-R relationship has different values from the previous studies for tropical regions. This may be because of either a lack of reliable and consistent radar data for the region or the type and the size of rain drop diameter differences.

On the other hand radar reflectivity and rainfall rates are correlated highly and positively (+0.96 & +0.97). The results shown in this paper highlight the importance of the use of weather radar information in order to estimate correctly the spatial rainfall rate for Bahir dar city.

Key words: Reflectivity, Z-R relationship, Doppler radars