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Calibration of the Z-R equation for a polarimetric radar located in Sabancuy, Mexico.

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Rainfall estimation using weather radar has been the keystone in several hydrometeorological applications (Bringi & Chandrasekar, 2001) such as flood forecasting and water balance analysis. Additionally, in large spatiotemporal scales, an integrated network of weather radars provide an invaluable quantity of measured data to be applied to regional studies (Kitchen et al., 1994; Westrick et al., 1999). However, each radar must be individually analysed because the characteristics of calibration and local issues are unique and, therefore require further research (Krajewski and Smith, 1991). For instance, the rainfall rate R and the radar reflectivity Z are represented for the total number of a finite number of drops in a volume of scan and it has been demonstrated that these variables can be expressed into a nonlinear representation Z-R (Marshall & Palmer, 1948) and this relationship is unique and depends on the study region and the type of precipitation. In this study we used data from the Sabancuy-radar located in Campeche, Mexico (Latitude +18.9724, Longitude -91.1726) to estimate rainfall distributions into the convective contour in the Gulf of Mexico. This area counts with a long history of tropical storms and hurricanes which produce extreme rainfall causing flood events and important socioeconomic damages into this region. Therefore, the weather radar calibration and Z-R relationship was achieved applying current methodologies (e.g. Probability Matching Method, PMM) and using raingauges in two different temporal scales (daily and each 10 minutes). Thus, rainfall estimations using weather radar can be used to quantitative evaluate the accuracy of parametrizations of atmospheric models and also the results are particularly useful for error analysis in hydrometeorological modelling (Smith et al., 1975; Sun & Crook., 1997). Finally, a better estimation of rainfall in time and space (and forecasting: in short and long term) is a valuable source of information (Jones et al., 2007) for studies looking at water-related hazards (e.g. floods, drought and climate change in general). This paper presents a new Z-R equation that can be applied to this region in Mexico.