# Storm Tracking and Forecasting using High Resolution echoes of Short Range X-Band Radar

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Storm Tracking has vital role in the accuracy of any weather predicting tool. In the centroids based tracking algorithms, up to our knowledge only two characteristics of storms i.e. centroids and area have been exploited until now. The contribution of each attribute i.e. centroid and area to the correct tracking, is not yet assessed. Furthermore, very little attention has been paid to tracking evaluation. Finally, a good forecast is the core purpose of any forecasting tool. A novel procedure called SALdEdA (Structure, Amplitude, Location, Eccentricity difference and Areal difference) for storm tracking is proposed. Each component of SALdEdA is computed as the normalized difference between volumes, mean of reflectivity/precipitation, locations, the eccentricities and areas of storms. Basic idea behind mapping objects of two consecutive time instances is to find how much similar they are in structure, amplitude, circularity and area and how much closely they are located. A global cost function is formulated as the weighted sum of all SALdEdA descriptors. Combinatorial optimization problem is then solved by using Hungarian algorithm. The contribution of each component of SALdEdA has been assessed and recommendations have been given to assign suitable weights to each component while computing cost function. The ratio between correct tracks and total tracks is adopted to objectively evaluate the tracking algorithm.

Our variables of interest for forecasting are area, major/minor Axis length, angle of orientation and speed and direction of the storms. Second Order Exponential smoothing strategy is adopted for modeling the above variables. The growth and decay of these variables is assumed to be linear. The obtained results are quite promising for tracking where amplitude and eccentricity contribute less to tracking than other three components. Satisfactory results are also obtained for forecasting.