Comparison of Indian Doppler Weather Radar Reflectivity Observations with TRMM-PR

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A network of 14 S and C band Doppler Weather Radars (DWR) is established by the India Meteorological Department. Radar observations of reflectivity and wind have the potential for improving the forecasts of high resolution numerical weather prediction(NWP) models because of their high spatial and temporal resolution, enabling better initialization of the model fields. Identifying the quality of radar observations is important before using these data in the NWP models. So it is essential to compare these observations with other available observations and identify the error in the data, if any. The aim of the present study is to develop a quality control algorithm for reflectivity data so that the errors can be removed and the data can be used in the data assimilation system which prepares the initial condition for the NWP models. Reflectivity observations from April, 2012 to August, 2013 of eight DWR are used in this study.

DWR reflectivity observations are compared with similar observations from other sources such as the Tropical Rainfall Measurement Mission Precipitation Radar (TRMM-PR) observations. We have also compared the DWR reflectivity observations from different radar over common observation areas. Our studies indicate that non-precipitating echoes are present in the DWR reflectivity data. The echoes from non-precipitating objects are false echoes, which have to be removed from the observations. It is found that the filtering technique adapted by us significantly improves the quality of reflectivity data by removing the false echoes from the observations. We have quantified the improvements in radar observations after applying filtering technique in terms of increase in the correlation, reduction in bias and Root Mean Square Error (RMSE). The correlation of filtered reflectivity observation of DWR against TRMM-PR is around 0.95 and the RMSE is smaller then 2 dBz. Comparison with collocated DWR observation shows the correlation of filtered observation is over 0.95.