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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of micro rain radar-based precipitation classification algorithms to discriminate between stratiform and convective precipitation" *by* Andreas Foth et al.

Anonymous Referee #1

Received and published: 20 September 2020

This study proposes two algorithms (PDF and ANN) for convective and stratiform precipitation separation based on the MRR measurements. The manuscript has a clear structure and smooth expression, but have some issues (e.g., weak literature survey, validation of results, the application value etc) and requires a major revision before its acceptance.

Detailed comments are provided below.

P1: In Introduction section, the authors should provide background on convective and stratiform rain in meteorological applications (e.g. Houze 2014). What are the existing methods for convective and stratiform rain separation? How the proposed algorithms

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on convective and stratiform rain separation has the advantage over the existing different methods? Literature survey for the artificial neural network (ANN) for rain type classification is required. The novelty of the work is not enough highlighted.

Houze, R. A., Jr. (2014) Cloud Dynamics. Academic Press.

P3: Description of MRR is insufficient,. Please elaborate especially the signal processing part. The Ku-band signal attenuate/extinct in convective rain. How the authors make sure about this phenomena. What signal-to-noise ratio has been considered for processing the MRR dataset

P4: Ln 4: In stratiform case, the Zmax will be at the melting layer (bright band). Do the authors consider this factor in their analysis? Upto what height, the analysis is performed?

P4: Ln 8: On what basis 15 min time interval is taken?

P4: Ln11: On what basis the scores/weight are defined in Figure 1? Is threshold values of weight are region-specific? Which dataset is used to calculate the soaring index (S), convection index (Ko), total totals (TT)? What is the temporal and spatial resolution of those data?

P4: Ln 21: On what basis the convection score partition (stratiform less than 3, inconclusive 3-6 and convective >6) is taken? Does the author consider the rain rate criteria also?

P5: Figure 2: The inconclusive data points are more than the convective and stratiform samples. Please comment on it? Whether the inconclusive samples are the transition from convective to stratiform event.

P5: Ln 3: ....visual classification of each single profile. How the authors have visually classify the profile into convective and stratiform? What parameter and criteria are used for the visual classification? Please provide a skill score table for better representation of your results.

P10: Figure 6: Out of two proposed algorithms (PDF and ANN), which method is superior? Authors also need to discuss the source of errors for each method.

In the manuscript, the evaluation of the precipitation classification algorithms is not shown.

Please provide some discussion on the proposed algorithm and related future research to put the results into a broader context.

Minor:

P2: Ln25: .... following section. Change to sub-section.

P5: Ln 10: Zmax upto 50 dBZ. Don't you think there will be attenuation at such high reflectivity value?

P6: It will be good to show the rainfall distribution like figure 3d.

P7: What bin size the authors have considered for Eq. (4) and (5).

P11: Figure 7: PDF is overestimating the convective and stratiform precipitation than ANN. Which result is more accurate. For the inconclusive sample, both the methods have the same occurrence frequency. Why the number of data sample (NPDF and NANN) for analysis are different

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