

Interactive comment on “Separation of Convective and Stratiform Precipitation Using Polarimetric Radar Data with A Support Vector Machine Method” by Yadong Wang et al.

Yadong Wang et al.

yadwang@siue.edu

Received and published: 9 January 2020

We do appreciate the reviewer provide so much important comments help us improving our manuscript. We'd like to address these comments as following.

Line 2: “that require a whole volume radar data” should read as. . . “that require a whole volume of radar data”

Response: the manuscript was modified following the reviewer's comment.

Line 7: “with multiple precipitation events including two widespread mixture of stratiform and convective events” May read better as. . . with multiple precipitation events

Printer-friendly version

Discussion paper



including two widespread mixed stratiform and convective events”

Response: the manuscript was modified following the reviewer’s comment.

line 10: “can accurately identify the convective cells from stratiform storms with the radar data only from the lowest scan in tilt. It can produce better results than using the separation index only.” Would read better as.“can accurately identify the convective cells from stratiform rain using radar data from the lowest scan in tilt only, and produced better results than using the separation index only.”

Response: the manuscript was modified following the reviewer’s comment.

Line 15: “convective precipitation’s are associated with” reads better as. . .convective precipitation is associated with”

Response: the manuscript was modified following the reviewer’s comment.

line 16: “while stratiform precipitations are associated” reads better as. . . .while stratiform precipitation is associated”

Response: the manuscript was modified following the reviewer’s comment.

line 17: what is meant by saying a convective system consists of large and dense raindrops?

Response: It was found the values of raindrop’s mass weighted mean diameter(D_m) in stratiform and convective precipitation generally are within 1-1.9 mm and above 1.9 mm, respectively (Chang et al., 2009). Following the review’s comment, we added more discussions in the manuscript L:73~76

Line 53: “of the DSD-based approaches depends on the environmental regime”. . . .Could you expand upon this a little bit please?

Response: The separation index derived from Equations 2~5 in the manuscript depends on several factors: the radar wavelength, temperature, drops size distribu-

[Printer-friendly version](#)[Discussion paper](#)

tion(DSD), and drop shape relations(DSR). The last three factors depend on environmental regime. In our work, we demonstrated that temperature, DSD and DSR features from Taiwan very similar to Darwin, Australia. Therefore, all the coefficients derived by BAL can be directly used in the current work. Following the review's comment, we added more discussions in the manuscript L:105~112.

Line 58 and 59: "classification results even it is operated".....Reads better as. ...classification results even if it is operated"

Response: the manuscript was modified following the reviewer's comment.

line 68: "together with other three single polarization"....Reads better as...together with the other three single polarization"

Response: the manuscript was modified following the reviewer's comment.

line 73: "for convective and stratiform precipitations, total 4306 minutes of DSD data"....Reads better as.....for convective and stratiform precipitation, a total of 4306 minutes of DSD data"

Response: the manuscript was modified following the reviewer's comment.

line 81: "stratiform precipitations generally consist of condense of small to median raindrops".....This sentence needs to be corrected and explained better.

Response: this sentence is modified as in L:73~76.

Line 98: "using the separation index i to identify convective precipitation from stratiform" ... This may read better as...using the separation index i to identify convective from stratiform precipitation"

Response: the manuscript was modified following the reviewer's comment.

Line 100: I assume that N_w refers to liquid water concentration. ...Is this true?

Response: N_w is the normalized number concentration in the gamma drop size distri-

[Printer-friendly version](#)[Discussion paper](#)

bution.

Equation 5: it may help to list as equations 5a) and 5b)

Response: the manuscript was modified following the reviewer's comment.

Lines 157 – 160: I understand the authors using the MRMS precipitation classification algorithm as ground truth. ...However, he should be noted that there are many imperfections in the system, especially since it only uses single pole information to determine echo classes

Response: We appreciate the reviewer point this out. In the revision, we made the following statements in the revision L:151~160: "The performance of MRMS has been thoroughly evaluated for years for the quantitative precipitation estimation, flash flood monitoring, severe weather and aviation weather surveillance (e.g., Gourley et al., 2016; Smith et al., 2016), and also used as the benchmark and/or ground truth in many studies (e.g., Grecu et al., 2016; Skofronick-Jackson and Coauthors, 2017). It should be noted that, although the performance of MRMS is well accepted in weather research community, there may be some imperfections in this system, especially it only uses single-polarization variables to determine the precipitation type. Other observations, such as the accumulated rainfall amount measured by gauges may be another reference. However, biases in the gauge measurements and improper R(Z) relations may causes other uncertainties. Therefore, at the current stage, MRMS precipitation classification result is the best benchmark in the training and validation of the proposed algorithm. Moreover, since the MRMS classification results are derived from 4 S-band radars, it can be viewed as an independent reference."

Line 165: "total one hour data were used as the convective type training data in the training data are associated with the >20 dBZs".What is meant by "total one hour data"?

Response: The radar data collected from 1030 UTC to 1130 UTC are used in the

Printer-friendly version

Discussion paper



training. Given the radar VCP, there are total 13 volume scans data are available. We modified sentence as shown in L:163.

Line 169: “ the number of support vectors is selected as 1000 and the current work”. . . .Not everyone who reads this article will be familiar with some of the machine learning/artificial intelligence setting of criteria. . .It may help to add a few more lines on this. . .You have done that in lines 170 through 172 but still it would help to go a little bit further into what is typically done for these types of learning algorithms.

Response: We do appreciate the reviewer point this out. We added more discussion in the revised manuscript in L:165~175.

Line 188: “results from RCMK.and MRMS could be different as large as five minutes in time stamps”.This may read better if written as.results from RCMK.and MRMS could be significantly different with timestamp differences as large as five minutes”

Response: the manuscript was modified following the reviewer’s comment.

line 190: “evaluation criteria of the possibility of detection”.Should read as the evaluation criteria of the probability of detection”

Response: the manuscript was modified following the reviewer’s comment.

line 197: “was first validated with two widespread mixture of stratiform and convective”. Should read as.was first validated with two widespread stratiform and convective mixed”

Response: the manuscript was modified following the reviewer’s comment.

Line 241: “it could found that the heavy precipitation band”.Should read as.it was found that the heavy precipitation band”

Response: the manuscript was modified following the reviewer’s comment.

[Printer-friendly version](#)[Discussion paper](#)

Line 253: “different from some existing classification algorithms” would read better as “different from other classification algorithms”

Response: the manuscript was modified following the reviewer’s comment.

Lines 273 – 274: “second, the performance of the proposed approach highly depends on the training data. It should be very careful to select the training data.” This would read better as “second, the performance of the proposed approach depends highly on the training data which should be very carefully selected. “

Response: the manuscript was modified following the reviewer’s comment.

[Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-324, 2019.](#)

[Printer-friendly version](#)

[Discussion paper](#)

