

## ***Interactive comment on “Hydrometeor classification through statistical clustering of polarimetric radar measurements: a semi-supervised approach” by Nikola Besic et al.***

**Anonymous Referee #1**

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Review of Besic et al.: Hydrometeor classification through statistical clustering of polarimetric radar measurements: a semi-supervised approach. This paper presents a novel hydrometeor classification algorithm which combines the unsupervised cluster approach and the classical fuzzy logic in an iterative approach using 2 statistical methods: the unsupervised k-medoids clustering and the Kolmogorov-Smirnov statistical test. The paper is well written, the results are clear, the explanations of the method are simple and pedagogic. BUT again the main issue of this article is the validation part which, for me, is not sufficient. My recommendation is to resubmit the paper after Minor revision. I have 2 independent points: - First of all, perhaps it is a philosophical question or comment. With my experience with operational met services, I think a hy-

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hydrometeor classification algorithm should answer these points (I will answer on each question): o Is it simple to be implemented? (It is a very clever and nice approach but it is not simple!) o Is it fast, i.e. can we use it in operational real time? (Using iterations, convergence test ... with super computer and some paralleling it will be manageable). o Are the results on PPI or on ground, i.e. do we have classification on what is falling on ground? (It is more on PPIs or RHI) o Is the algorithm validated using REAL captured cases? (Well, not really) o Does it take the measurement errors into account (attenuation, SNR ...)? (No) o What is the sensibility of the algorithm when the measurement errors increase? (Not shown) o Can be easily adjusted, i.e. adding or removing hydrometeor types? (So far, yes). o Is there any long term statistical verification study (Scores)? (Not really) o ...

- The second philosophical point: I hope it is not offensive, I am not trying to be pessimist or difficult, but for me it is really important. I always enjoy reviewing papers when there is a new approach or algorithm presented and here it is the case. BUT in hydrometeor classification, do we really need a new algorithm? If I am not wrong this is the fourth or the fifth articles from the coauthors about the same topic, is it more important to more focus about what is written in the conclusion and future work (about the challenge of the hydrometeor mixture ...) or to have reliable verification?

Sorry for this point it is just an independent open question, I hope the authors take it as it is; it is ok if they don't answer and again I don't mean to offend or criticize the work, I respect the exceptional effort and the high quality of this paper.

Back to the paper, my major comments are:

- For the validation, I don't think it is reliable in this paper, for example, the authors validate the algorithm by compare it with an algorithm which was validated using video disdrometers. I don't think it is work like that, I would prefer to see a revalidation of this approach as done for the unsupervised approach.

- I believe that there is tremendous efforts invested on the calibration and monitoring

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of the network and the probability of radar errors is reduced. But it is not enough to not taking the errors into account in the algorithm. The reason is: what if another operational service wants to use this approach? What if its network doesn't have the same degree of calibration and monitoring?

- I think here it is important to decrease the quality of the data and see what is happened with the results.

- It is important to validate the hail detection, but it is the simplest way. The detection of hail is simple but the difficulty is to know its size and/or its percentage in the scanned volume. I think the comparison with POH is important but it is not really relevant.

- I will like to see how fast (in function of the CPU and RAM) the algorithm is.

Minor points: - Just for clarification: I know that most of the researcher called the Dual-pol radar: polarimetric radar. This nomination is not really correct, every electromagnetic wave is polarimetric, so simple-pol radar is a polarimetric radar but not Dual-pol!

- P3, L16: Redefine EPFL.

- P3, L26-27: Expert readers: I prefer to remove this classification of the readers; I think we don't need to know these two statistical methods to be expert or no! If we don't use them before, it is simple we don't know or we forgot them.

- P7, L3: do you have any statistical percentage about the error?

- P7, L4-8: for the information from the model, is it one altitude by radar or it is a full layer?

- P12, L5: Do you have any scores for this test?

- P12, L28: "reasonably simple", here I think we don't have the same reason!

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