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Atmospheric Measurement Techniques Discussions

Interactive comment on "Learning about the vertical structure of radar reflectivity using hydrometeor classes and neural networks in the Swiss Alps" *by* Floor van den Heuvel et al.

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This paper describes a novel method for estimating the local vertical growth and decay of precipitation based on an artificial neural network (ANN). Two ANNs are investigated: one based only on dBZ profiles, and one based on profiles of both dBZ and the result of a hydrometeor classification scheme. It is shown that the method outperforms other vertical profile correction methods commonly used for operational weather radar data. I think the paper is well-written and the topic is highly relevant because the vertical structure of precipitation remains an issue with operational weather radar data. The paper is novel in two aspects: 1) the use of cones to extract horizontally distributed

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vertical precipitation variation information, and 2) the use of ANNs to correct for this variability. I did not find many things that I wanted to have clarified in the paper, and hence I think the paper can be published after (very) minor revisions. Some specific comments are provided below.

Specific comments

- You use polarimetric variables through a hydrometeor classification scheme. You could also use the polarimetric variables directly in the ANN. What is the reason for going thought the HC scheme in this study? I think that a short discussion on this could be added to the paper.
- How would this method be implemented operationally? It would really help me to have some sort of short explanation (possibly including a graphical representation of the implementation) on how one would derive 2-dimensional precipitation information on the ground from 3-dimensional volume scans from a radar using this method.
- If there are two or more radars that both cover the same area, could information from all of these be used to improve results? Consider discussing this briefly in the concluding section.
- On p.5, you state that the 30-minute time scale is needed in order for the upper and lower part of the vertical precipitation profiles to be linked. I can follow this reasoning, but it would be good to provide some more quantitative arguments to support this (like using the fall velocity of precipitation particles).
- On p.10, line 32, you introduce the regression slope β. Can you briefly introduce how this is defined? I find it puzzling that you say that there are high regression slopes, and then say that $\beta < 0.54$. Hence my question of defining β.

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