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Hydrology and Earth System Sciences Discussions

Interactive comment on "Evaluation of radar-gauge merging methods for quantitative precipitation estimates" *by* E. Goudenhoofdt and L. Delobbe

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Thanks to anonymous Referee 5 for his interest in our study and his very interesting suggestions.

Responses to specific comments

1-2) A pseudo-CAPPI at 1500 m above sea level (radar height is 592m) is extracted from the 5 elevation scan (0.3, 0.9, 1.8, 3.3 and 6°). The highest elevation is used between 0 and 9 km, the 2 elevations around 1500m between 9 to 87 km and the lowest elevation between 87 and 240 km. The height of the pseudo-CAPPI is chosen to limit the effect of ground clutter. The lowest PPI product can not be used at short

range since it is contaminated by permanent ground echoes. There is still a range-dependence in the pseudo-CAPPI since the measurements height increases at very short and long range (> 87 km). Additional range dependences are produced by beam broadening (beam width is 1 degree) and sensitivity effects. The scanning strategy of the radar and the choice of the product used for QPE influence the range-dependence of the performances of the methods. This means that the results obtained for this part of our study are not necessarily valid for other radars, even in regions with similar orography and climatological conditions.

3) The choice of averaging over 9 pixels (3x3) is extensively discussed in the response to Milan Salek.

4) SRD means Static local bias correction + Range Dependent adjustment.

5) Good suggestion. Will be included in the revised version.

6) As suggested by the reviewer, the larger benefit of radar observations in summer is related to the type of precipitation, which is mostly convective. An interesting study would be to evaluate the performance of the methods with respect to the precipitation type. However, it is sometimes difficult to establish a good classification of precipitation. The common distinction between stratiform and convective situations can be somewhat arbitrary. As an example, we can mention mesoscale convective systems where convective cells are embedded into stratiform precipitation. Such a study would require a careful characterisation of the type of precipitation based for example on maximum reflectivity values or spatial variations of the reflectivity field. This could be the subject of further investigations.

7) To answer the question of the reviewer, we looked at the seasonal variations of the range dependence by comparing the results of summer months (June-Augustus) and winter months (December-February) from 2005 to 2008. At first sight, the range dependence of the performance of the methods is lower in summer than in winter. We have also noticed that the bright band affects the performance of the methods at

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very short range during the winter. As a result, the ordinary kriging, which does not make use of radar observations, has the lowest mean absolute error very close to the radar. It is worth pointing out that there is a large variability of the results from one year to another. Therefore, a more detailed analysis would be needed to get robust conclusions.

Blockage effects as addressed in Bech et al. (2007) are not very marked in the region of interest. However, in regions where blockage effects are significant, seasonal changes in the propagation conditions might produce seasonal range-dependence variations of the performances of the methods.

8) The last class is "100-120 km".

The corrections proposed in the technical comments will be taken into account to prepare a revised paper.

References

Bech J., U. Gjertsen, G. Haase, 2007: Modelling weather radar beam propagation and topographical blockage at northern high latitudes. Quarterly Journal of the Royal Meteorological Society, 133, 1191-1204

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2975, 2008.