Response to the review of hess-2018-0351

RC3: Responses to G. Ravazzani (Referee 3)

The authors wish to thank the reviewer for his constructive comments and corrections to the discussion paper. In the following, we have responded to each of the comments from the reviewer for this manuscript. The comment from the reviewer (RC) is in italic font while the author comment (AC) and changes in the manuscript (CM) are in blue normal font.

General comments:

In this paper, a non-parametric method is applied to estimate radar precipitation considering both rainfall and temperature. The use of radar for precipitation estimation is an interesting topic. Many papers have been presented about this topic, but the specific problem authors deal in this paper is how to assess solid precipitation in cold regions. The solution they propose is of interest for cold climates in northern Europe, of course, but I suppose it could be extended to other areas where solid precipitation occurs.

Specific comments:

Authors used 68 rain gauges in this study that are clustered around urban areas. Do authors think that this uneven distribution may affect results? In other terms, is the location of raingauges relevant for the application of the proposed procedure?

AC: The method used is independent of the gauge locations, and the computed estimates are ascertained for each gauge individually.

P 9 L 14 "The gridded hourly wind speed datasets are derived from a statistical downscaling of a 10 km numerical model dataset onto a 1 km grid". Did authors verify how the method is sensible to the specific realization of the statistical downscaling?

AC: The Norwegian Meteorological Institute derived the hourly gridded (1 km x 1 km) wind speed dataset by statistical downscaling from the 10 km numerical dataset, "NORA10" and we used this in this study. We did not evaluate their method of downscaling. However, as described on p10, l12-14, to control the result of correcting with gridded wind speed, we compared the corrected precipitation using gridded wind speed with the 15 locations where we have wind speed measurements at the gauge site.

Authors apply correction to gauge precipitation to consider wind induced underestimation. Gauge precipitation is affected by several sources of uncertainty. Wind is of course relevant, but another systematic error is related to the calibration of raingauges that causes underestimation for high rainfall intensity and overestimation for low rainfall intensity. Further uncertainty arises when solid precipitation has to be measured. How did authors deal with these errors? Are they already managed by the meteorological institute?

AC: Norwegian Meteorological Institute manages the calibration of raingauges and takes necessary measures to reduce the uncertainty that arises when solid precipitation has to be measured. Further, data from the raingauges are gone through routine quality control before being released to the public through the database. However, the meteorological institute does not do wind induced undercatch correction for their precipitation data.

Section 5.6 is very short compared to the rest of the paper and I did not fully understand what is the intention of authors. I think they should better explain this part or remove it.

AC / CM: we did a test on uncorrected gauge precipitation data (not corrected for wind induced undercatch) showing that temperature works as a covariate also there. The intent of section 5.6 was to make this point clearly. However, in order to avoid lengthening the paper with more

results, we decided to remove section 5.6 in the revised manuscript and merge the above statement into other sections.

Technical corrections:
P.4 L. 6 The Finnish Meteorological Institute
AC / CM: It is corrected.