

## ***Interactive comment on “Precipitation accumulation analysis – assimilation of radar-gauge measurements and validation of different methods” by E. Gregow et al.***

### **Anonymous Referee #2**

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The paper “Precipitation accumulation analysis - Assimilation of radargauge measurements and validation of different methods” by Gregow, Saltikoff, Albers and Hohti addresses the problem of obtaining high quality precipitation maps over Finland, by using raingauges and weather radar data. The topic is interesting and fits the aims of HESS, dealing with the construction of reliable and accurate hourly rainrate maps for operational purposes. The paper is fairly well written and reports well documented results, and should be published. I think, however, at least two issues need to be discussed with more details in the final version of the manuscript.

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First, I disagree with the sentence on lines 20-22 (page 7). A large contribution of the differences between radar and raingauges observation is due to the different nature of the two measures. Problems with radar errors should be minimized by the radar data preprocessing carried on at FMI, following the discussion in section 2.2, and also the raingauges are quality controlled. Are there statistical studies on the radar error reduction algorithms used at FMI ? Looking at the station distribution, it seems that most of the time only one raingauge is present in a 3x3 km radar cell: the authors should discuss to what extent this raingauge can be representative of this large area (see as an example Kitchen and Blackall, 1992 J. Hydrol. 134, 13-33).

Second, the authors select seven ground stations to provide “independent” measures for validation of the techniques ensuring they are “representative of a characteristic Finnish climatological or geographical areas...”. This choice should be more substantially justified. If the authors are interested in validating the performances of the techniques over different background, the results for the seven stations should be separately analyzed and discussed. If they just want to give overall results, probably the best options would be to randomly select a variable number of stations and carry on several tests, providing averaged error values and their variances. Other points to be discussed: why seven (over 447) stations were selected ? which is the station density in the neighborhood of the selected stations ? how would change the performance of the techniques in areas with more coarse (or more dense) station distribution ? how much the hourly precipitation of the independent stations is correlated to the rates measured in the neighboring stations ?

I also suggest a number of minor corrections:

Abstract. In the first line it is said that in this paper “four different methods used for combining radar data with precipitation gauge data to produce...”, while it seems the first method (LAPS-radar), is used as reference and does not use raingauges data (line 4).

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Section 2.2. I suggest to anticipate here the ground resolution of the radar maps.

Page 6, line 14. What is the “standard Z-R relationship” ? Please, specify.

Page 7, lines 12-14. This is an important point, but the sentence is vague and the cited reference (Aaltonen et al., 2008) is difficult to reach. I suggest to quantify this “reasonable accuracy”.

Formula n. 8. In the definition of MAE, in the denominator, should be the absolute value of the difference.

Figures. I suggest to use larger fonts for the labels.

Figures 2, 3 and 4 are difficult to read, especially for low rainrates. The authors should try log-log scales or to use colors to resolve these values.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 2453, 2013.

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