

Interactive comment on “The accuracy of weather radar in heavy rain: a comparative study for Denmark, the Netherlands, Finland and Sweden” by Marc Schleiss et al.

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It is a very nice simple-minded but important paper. We need results such as those reported in the paper to monitor our progress in variety of hydrologic problems. Radar-rainfall estimation is one of many of such problems in hydrology.

I have very few comments to suggest to improve the paper. Here they come:

1. The authors say little about the type of rain gauges used in the studies. “Automated” does not define the type and the type has implications for the expected errors (sampling). I suggest including the reference by Ciach (2003) if some of the gauges are tip-

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ping buckets. 2. In the Conclusions, the authors say: “On average, the radar products with higher spatial resolutions were in better agreement with the gauges, thereby confirming the importance of high-resolution radar observations in hydrological studies.” There are problems with this statement. First, it has been shown by several studies in the past that rain gauges have representativeness errors. The larger the area, the larger the error. Ciach and Krajewski (1999a,b) have established a framework on this that was followed by many subsequent studies. Therefore, it is expected that radar products with coarser resolution will show poorer agreement with rain gauges data. This says nothing regarding importance of high-resolution radar observations in hydrologic studies. In fact, for many applications the resolution is not the most important aspect of the radar-rainfall product. 3. The quality of the figures should be improved.

Figure 1. With wide spread of GIS technology, I would expect much better quality maps. At the very least distinguish land from sea. Is the same project used? Make the gauge locations solid dots so that they are better visible.

Figure 2. Don't repeat the dimension for each panel, the information is in the caption. The color scale is the same for all panels. Don't repeat it. By eliminating the legend and the axis description you gain space for the panels to be larger.

Figure 4. Just overall poor quality (aesthetically). Also, I do not think that this figure adds much. They show just single event out of so many. I recommend removing it.

Figure 5 and 6. I recommend making all panels with the same scale range. This way you can remove the labels between the panels, make the panels larger, and make the dot larger.

Figure 7. Since you are using color in other figures, you can add color to this one. For example, you could use two shades of the color assigned to different countries to distinguish gauges and radar. This way you can remove the repetitive labels that clutter the figure.

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Figure 8. Use the colors assigned to the countries to draw nice solid lines. You can add subtle light gray horizontal grid to the panels. Change the y-axis scale range to simplify the numbers, e.g. for the correlation you can use 0.5-1.0 range with horizontal lines only. The principle to follow here is to minimize the amount of ink for the same information content.

Figure 9. Very busy. You can de-clutter by simple removing the labels between the panels since both axes range is the same for all panels (good!)

Figure 10. Same as above. Did you explain the red bump for Denmark at 45 minutes scale?

Figure 11. I recommend remove the whole story of the X-band radar. Including it seems forced. That's not what the paper is all about. Write another study about the X-band radar performance.

Suggested references to add:

Ciach, G.J. and W.F. Krajewski, Radar-rain gauge comparisons under observational uncertainties, *Journal of Applied Meteorology*, 38(10), 1519–1525, 1999. Ciach, G.J. and W.F. Krajewski, On the estimation of radar rainfall error variance, *Advances in Water Resources*, 22(6), 585–595, 1999. Ciach, G. J., Local random errors in tipping-bucket rain gauge measurements. *Journal of Atmospheric and Oceanic Technology*, 20, 752–759, 2003.

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